

**SOCIO-ECONOMIC DISPARITIES IN
ARGENTINA AND BRAZIL**

**Origins, Evolution and External Variables that Affect
Regional Convergence: The Implications for
Integrated Areas**

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Abstract

This thesis studies regional economic disparities both within individual countries as well as between countries. The main objective is to determine whether regional disparities converge automatically through time and, if this is not the rule, whether regional policies are needed. This thesis argues that disparities, far from converging automatically, can persist not only through time but also be affected by policies and external factors. The issue of convergence of regional incomes becomes significant when considering the case of integrated areas. In this thesis I study the potential effects that the deepening of MERCOSUR will have on disparities both between as well as within the member countries by focusing on Argentina and Brazil, the two largest countries within the area, up until the late 1990s.

In order to analyse disparities within integrated areas, the European Union will be considered as a frame of reference. I show that although regional policies appear to have favoured convergence, this has not been as significant as expected, particularly within the regions. In addition, Argentina and Brazil will be analysed, and I trace the origin of national disparities to late colonial times. Further, regional disparities within both countries have not shown any major trends towards convergence over the centuries. Moreover, political and macroeconomic factors do seem to have an incidence in the process of regional convergence within those countries. Also, different subperiods display convergence and divergence.

Both the European Union experience as well as that of Argentina and Brazil indicate that disparities were not reduced automatically as neo-classical economics predict. I also refer to macroeconomic and political factors having an impact in the process of convergence, diverting these regions away from their convergence paths. Another important factor in the automatic process of convergence as described in neo-classical economics is the inter-regional mobility of factors. However, this does not seem to have been the case for either the European Union or Argentina and Brazil.

The thesis seeks to provide an insight into how disparities evolve through time and its conclusions will not only be useful in terms of regional policy planning in Argentina and Brazil but also in the process of deepening in MERCOSUR and a possible Latin American integration. The comparison with the European Union experience provides a more general frame of reference for other integration schemes around the world. The conclusions should provide a better insight into the problem of unbalanced growth not only for individual countries but also for integrated areas.

Acknowledgements

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Bartholomew, I worked with Mr Dick Allard from Queen Mary University on specific econometric tutoring. Mr Allard had been my econometrics lecturer back in 1997 for my Masters degree and not only was he of invaluable help in giving me feedback on the econometric chapters but also provided me with an insight that only an econometrician can do.

I greatly appreciate the time that Dr José Luis Machinea, a family friend of many years, has taken to read my work despite his undoubtedly busy schedule working for the Inter-American Development Bank in Washington. Dr Machinea made numerous and highly valuable suggestions to my work, which were of great help.

An important part of a PhD thesis is, undoubtedly, library research and therefore I cannot leave out the contribution of the staff working at some of the libraries I have consulted. Ms Cinzia Benzikofer-Polli, at the European Commission Library, who was always welcoming and open to my requests. Also, the staff at Queen Mary University library, who remembered me from the days of my Masters degree and made me feel at home; the staff at the Institute of Latin American Studies, in particular Mr Alan Biggins, who more than once was able to find what seemed impossible. Also, a special mention to the staff working at the Consejo Federal de Inversiones in Buenos Aires, who were delighted and surprised to see someone unearthing regional GDP figures.

There are also others, who directly and indirectly led me into doing this PhD, such as the Universidad del Salvador, where I took my first steps in economics and in particular Dr Susana Szapiro, who has been following my undertakings since then. The lecturers at CEMA in Buenos Aires, such as Dr. Carlos Rodriguez and Dr. Carola Pessino, who were so passionate about their work that made me wonder for the first time whether I wanted to do a PhD.

I would also like to mention Dr. Roberto Frenkel and Tomás Bulat to whom I will be forever grateful since they both suggested choosing Queen Mary University for my Masters degree back in 1997, where it all started. I am also grateful to so many others

who have encouraged me over the years but the list is far too long to be able to reproduce it here.

On a more personal front, I would like to thank all those who had faith in me finishing this thesis and have supported me over the years, my family and friends; and in particular to my husband Robert, whose invaluable support and love in the last and probably most stressful stage – during the writing-up – ensured that nothing disrupted the smooth completion of this thesis.

Last, but not least, a special thanks to the person I admire the most in life, my father, Manuel, to whom this thesis is dedicated. He has, in addition to being my father, for many years also been my mother, my brother and friend and I would definitely not have gone this far with his unbounded continuous encouragement, understanding and love.

To my father, the 'wind beneath my wings'...

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Part I

Theory and Methodology

Introduction

The objective of this thesis is to determine the impact of regional integration on socio-economic disparities. This thesis studies the origin and evolution of regional socio-economic disparities and aims to provide a thorough analysis of the processes that shape regional convergence both within as between countries, focusing on both the European Union and MERCOSUR. The reason why I will be focusing on both areas is that regional policy constitutes one of the most important issues within the European Union at present, and this has significant similarities to the main problems that MERCOSUR will have to overcome if integration is to be deepened in the near future. In the case of the European Union, the enlargement to the poorer countries such as Ireland, Greece, Portugal and Spain, followed by the prospects for further enlargement to the Eastern European countries have not only already created but will also continue to exacerbate significant regional imbalances within the Union. Similarly, within MERCOSUR, disparities between countries are already significant, with Brazil being the country with highest total GDP, followed by Argentina, Uruguay and Paraguay. Disparities within countries, however, are more pronounced than those within Europe and therefore are expected to pose more difficult challenges in terms of policy formulation.

I will try to address four different issues in particular. First, to distinguish the mechanisms behind the creation of disparities. Secondly, whether automatic mechanisms of convergence exist in real world or, if by contrast, they are merely a theoretical construct. Thirdly, the issue of different external factors that may affect the process of convergence will be considered. Finally, I will try to determine the importance of regional policies in the process of convergence.

The problem of regional disparities is particularly significant in those countries characterised by historically determined internal differences such as Argentina and Brazil, with wide variety of factor endowments across the regions. In fact, these characteristics are present throughout Latin America and they are more significant than those in European countries. Indeed, Latin American development patterns have not only originated but also reinforced geographical, cultural and economic disparities and this will be one of the main points addressed throughout the thesis. By focusing on the external markets, the agro-export models predominant in Latin America until the middle of the twentieth century favoured the concentration of activities in certain regions in detriment of others. During the import substitution industrialisation stages in the fifties and sixties, this concentration was further reinforced because production was orientated towards the internal markets and located around the main consumption centres. Migration to those centres, far from decreasing disparities, accentuated the divergent trends. Taking these factors into account is therefore crucial in order to understand the potential outcomes of the current processes of integration in terms of disparities in order to be able to formulate the necessary policies.

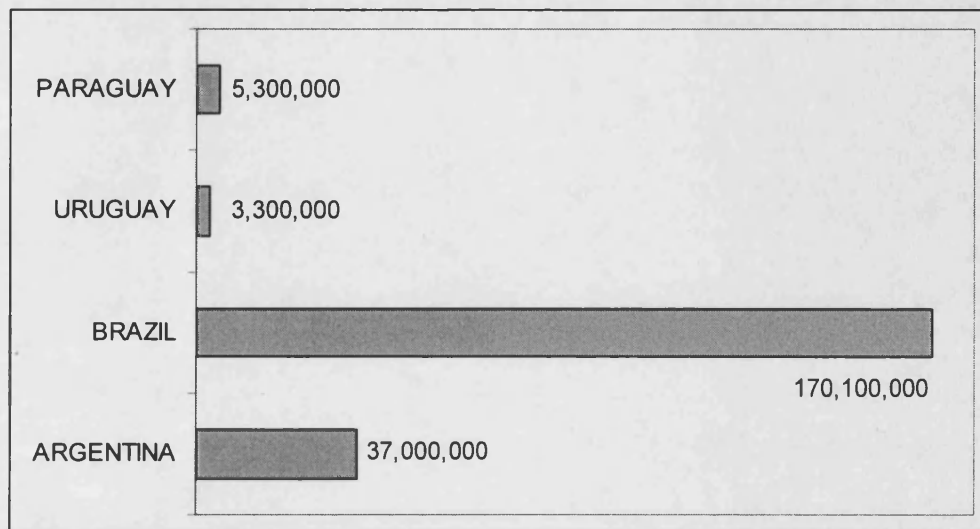
According to classical economic theory, disparities within countries should be automatically reduced through time. As will be seen in the following chapter, this kind of convergence would be achieved via factor mobility and decreasing marginal returns. In this thesis, I will try to test empirically this conclusion not only within countries but also by extending this self-regulating mechanism to test for convergence within economic areas. In the context of standard economic theory, and given that disparities will automatically be reduced through time, regional policies would therefore not be necessary. The present thesis will try to show that convergence, far from being an automatic process, needs strong and effective regional policies in order to close the gap between richer and poorer areas within as well as between countries.

The European Union will be taken as a case study for economically integrated areas in order to determine the rigidity in the process of 'automatic' convergence as well as to rule out the 'less-developed countries' bias when analysing areas in Latin America. The

role of regional policies in achieving a balanced development in the European Union will be analysed. As will be shown, the European Union still presents disparities not only between its member countries but most importantly within regions, contrary to neo-classical economic conclusions, even though it was established fifty years ago. Integration by itself is manifestly not the solution to development problems. The regional policy institutional development process in the European Union will be addressed, and it will be shown that countries have displayed a converging trend, particularly in the last decades when regional policy became one of the pillars of the EU. This trend, however, cannot be seen for the regions. It will also be shown that even in the European Union, external shocks such as the oil crisis have affected the process of convergence. Having said this, external (and also internal) shocks in Latin American countries, particularly Argentina and Brazil, have exercised a significant impact on both countries' regional disparities. This is of great importance given that the regions are characterised by instability in terms of rates of growth, investment rates and macroeconomic crises.

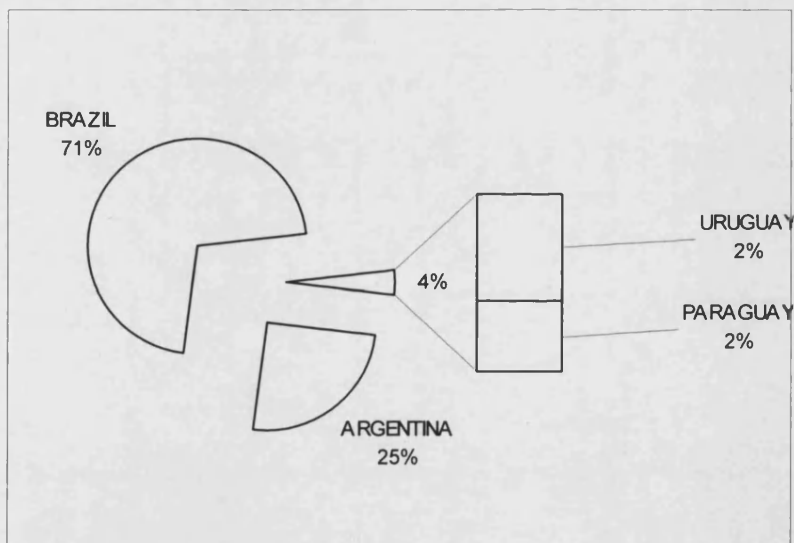
The original idea for this thesis was to analyse disparities for the four member countries of MERCOSUR at the regional level. However, due not only to data availability at the regional level but also in order to simplify the analysis, only Argentina and Brazil will be considered. Both the size of Brazil and Argentina relative to the other member countries; together with their huge diversity in regional incomes make them the perfect examples as a framework of analysis in order to draw conclusions for MERCOSUR as a whole. As can be seen in Figure 1.1 the population of both Argentina and Brazil are significantly higher than that of Uruguay and Paraguay. In fact, Argentina and Brazil account for 17 per cent and 79 per cent of MERCOSUR's population respectively; that is, together they comprise 96 per cent of the area's total population, leaving Paraguay and Uruguay with only 4 per cent of MERCOSUR's population. The same holds for the distribution of total GDP, where again both Argentina and Brazil account for 96 per cent of total GDP as can be seen in Figure 1.2; with Argentina accounting for 25 per cent while Brazil 71 per cent of total GDP.

Figure 1.1. Differences in Population Between the Four Members of MERCOSUR, 2000



Source: Data from World Bank (see Appendix II, Table II.a on page 311)

Figure 1.2. Differences in Total GDP between the Four Members of MERCOSUR, 2000

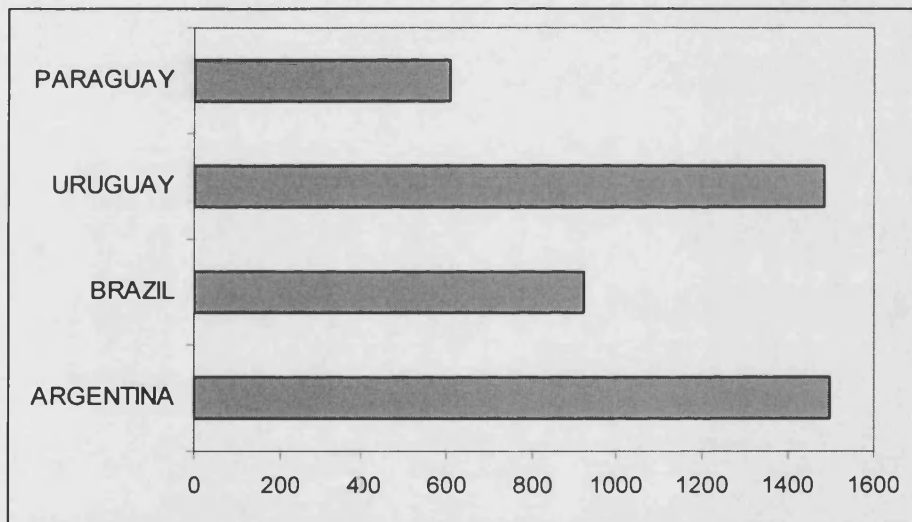


Source: Data from World Bank, (see Appendix II, Table II.a on page 311)

Regarding disparities between countries, it would be interesting to test for any particular impacts derived from MERCOSUR. There is not a significant amount of data at the regional level, particularly for Argentina, as will be addressed in detail in both section 7.2 and Appendix III.g. Since MERCOSUR is a fairly recent area that experienced stagnant

development in the deepening process, it is effectively impossible at this stage to produce any reliable convergence analysis for the sub-region. Furthermore, it would be impossible to isolate the MERCOSUR effect from the stabilisation in Argentina in the early nineties and that of Brazil in the mid-nineties that induced an increase in trade between the two countries. Nevertheless, a brief description of the disparities as well as convergence analysis between the four MERCOSUR countries has been performed for the period 1940-2000. As will be indicated in Section 5.4, due to the reduced number of observations, the convergence analysis performed in Chapter 5 will only be indicative and not conclusive.

Figure 1.3. Real GDP per Capita in the MERCOSUR countries, 2000 (in 1970 US\$, PPP adjusted)

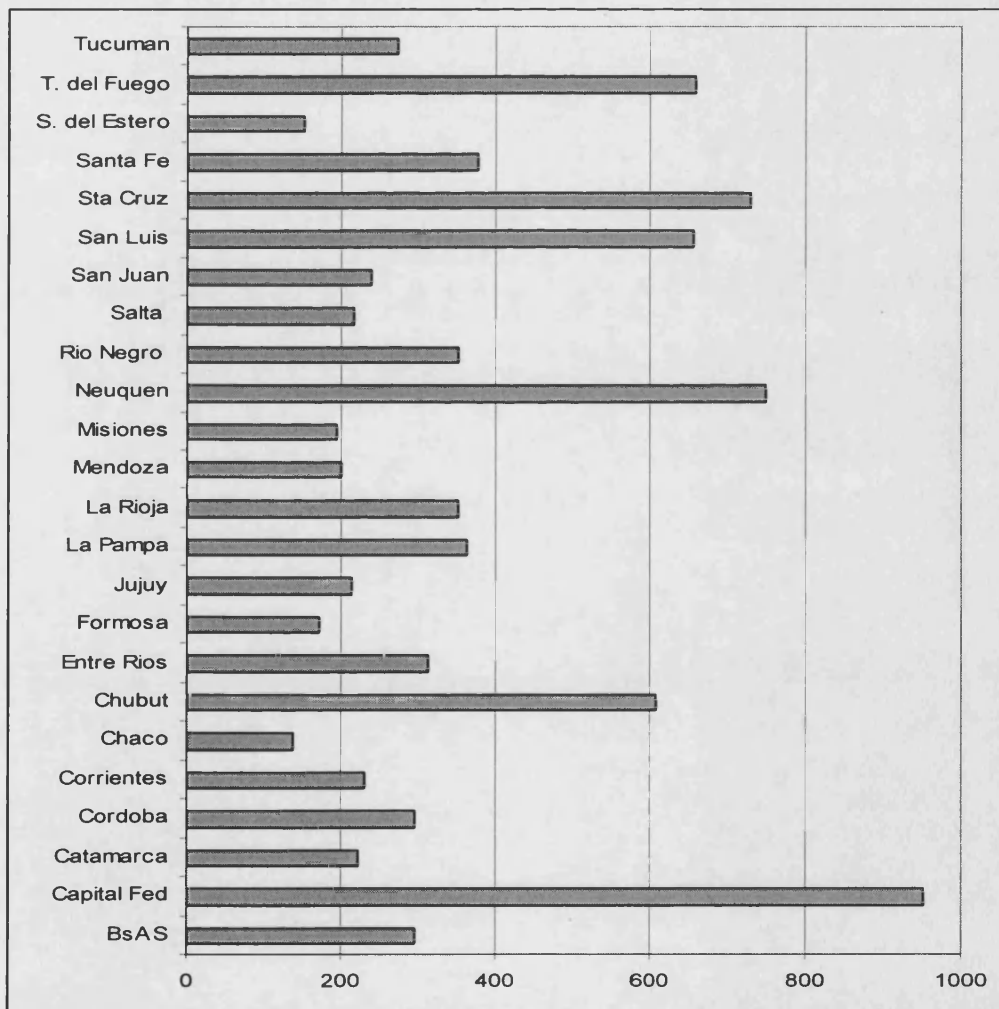


Source: World Bank, calculations from Tables II.a and II.b on page 311

Argentina and Brazil are not only the countries that account for most of the population and total GDP in MERCOSUR but also those that display most regional disparities. Regional disparities both within the Argentine provinces as well as within the Brazilian states are significant as can be seen on Figures 1.4 and 1.5, where GDP per capita values for 1995 and 2000 respectively have been depicted to show how it varies according to different areas. For consistency (and in order to avoid excessive data manipulation), the data sets used in these Figures corresponds to those used in the convergence analyses of Chapters 7 and 9 for consistency and can also be found in Appendices III and IV. The

reason why the main analysis for Argentina is performed from 1961 to 1995 while that for Brazil from 1970 to 2000 will be better explained in the methodological sections of Chapters 7 and 9 (pages 178 and 259 respectively) as well as in Appendix III p 319. Since the objective of this thesis is to study regional disparities I will be using the same data throughout, as mentioned above, given that the main concern is to show differences rather than values. Therefore, data for Argentina belongs to the series from UNLP as on table IIIa on page 315 in constant 1986 prices per capita (the entire data set has been multiplied by 1,000 for presentation).

Figure 1.4. GDP per Capita in Argentina by Provinces, 2000 (in constant 1986 prices)



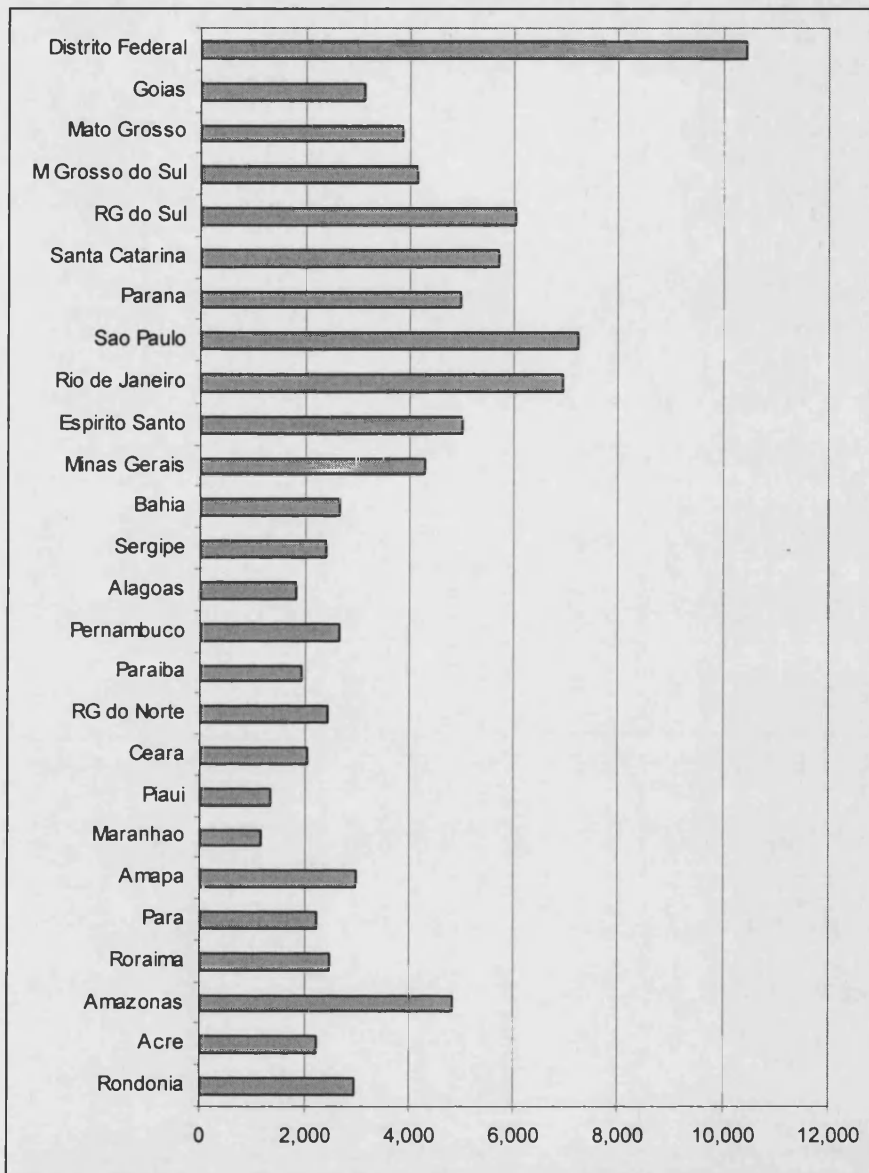
Source: Data from Universidad de la Plata (1999)

It is clear from Figure 1.4 that disparities among Argentine provinces are wide, with Capital Federal exhibiting the highest per capita income while Chaco has the lowest per capita income, almost seven times lower. In the case of Brazil, Figure 1.5 shows that Distrito Federal has more than seven times higher GDP per capita than the lowest income state, Maranhão. GDP data for Brazil was used from the IBGE databases as in table IIIa. The data on figure 1.5 is in constant 1986 prices as will be used in chapter 9. as will be explained in that chapter, the choice of base year for the analysis of convergence is irrelevant for this study since all the results that we will be focusing on will remain unaltered (see figure VI.g on page 325 to compare with figure 1.5 in constant 1995 prices). The analysis of convergence focuses on differences between regions rather than on values.

It will be shown in this thesis that, contrary to neo-classical theory, poorer and richer areas both in Argentina and Brazil have not converged significantly. In fact, disparities have continued from colonial times. The models of development undertaken after independence, instead of providing the opportunity to change these inequality patterns, made them even worse. Moreover, policies destined to correct those imbalances have, in general, exercised limited influence or been entirely ineffective. The development processes in both countries, by focusing on export-led sectors, have but reinforced the existing gaps. In fact, between 1850 and 1940 the export-led model spread throughout Latin America, the emergence of exporting *elites* being linked to foreign markets and capital. Within this model, comparative advantages ought to be exploited by free trade. Both Argentina and Brazil were the two Latin American countries with the highest exports in that period (Bulmer-Thomas, 1994; Topik, 1987).

Moreover, it will also be seen that once the export-led model of development came to an end and countries followed an import substitution industrialisation model, disparities were reinforced. This model, by increasing industrial output, induced rural-urban migration and a resulting concentration in urban centres that helped to accentuate these

Figure 1.5. GDP per Capita in Brazil by States, year 2000 (in constant 1995 prices)



Source: Data from IBGE, different years

disparities between the already more developed centres and the rest of the country. It will then be empirically shown here that disparities have remained almost unaltered over the last forty years, only exhibiting decreasing or increasing trends in certain sub-periods that can be related to specific events. It will also be seen that when certain policies destined to correct imbalances have been in place, they appear to have made some difference.

However, neither Argentina nor Brazil has implemented any coherent or efficient regional policy over a significant time.

The methodology of this thesis will go beyond the usual techniques for testing convergence and will aim to include other variables more appropriate for both Argentina and Brazil. These will not only be the standard socio-economic variables such as education and health but also those for political and economic stability. Furthermore, it is often stated that regional disparities tend to move counter-cyclically; that is, in times of recession disparities are reduced. This has been the case in the advanced countries of Europe, but it appears not to be the case in less developed countries, such as Greece as will be mentioned in the following chapter. It is, then, of interest to test such a proposition for the case of Argentina and Brazil as well as for the four MERCOSUR countries since the argument that disparities are pro-cyclical is reminiscent of ideas proposed by the regional disparity economists.

The evidence shown by the European Union and both Argentina and Brazil will provide solid arguments for redefining the role of efficient and consistent regional policies in achieving balanced regional development and growth, both nationally as well as within economic unions. In the light of these conclusions, it will be argued that MERCOSUR has not altered the divergence 'map' in any of the member countries and that it will probably reinforce those disparities as integration deepens. If MERCOSUR was to become a full operating economic area, a more balanced level of development between its regions will be essential and therefore a sound regional policy will be needed. It will then be essential to rethink the role of the state within economic areas, and not to associate national policies with inefficiency (as it is done in neoclassical theory). Instead, an active role of the states within an integrated area should be promoted. Furthermore, plans for a Free Trade Area of the Americas (FTAA) must address a priori potential undesirable outcomes of integration, in particular regarding issues such as poverty and regional inequalities, which already constitute a significant problem in the region.

This thesis is divided into two parts. **Part I**, of which this is the introductory chapter, includes theory and methodology regarding regional disparities and convergence as well as the case study of the European Union. In **Chapter 2**, the theoretical framework for analysing regional disparities is presented, starting with the neo-classical model of growth and the automatic mechanisms through which convergence should be achieved. The chapter also reviews the theories that explain why regional disparities might persist over time and why those mechanisms described in the neo-classical framework might fail to achieve convergence. The chapter also addresses the extension of both neo-classical and regional theories to integrated areas as well as the more recent research in convergence studies that will later be referred to along this thesis. Further, a review of the Latin American school of thought is presented, highlighting the main theories that underpinned the industrialisation model followed in the post war period. Both the dependency as the structuralist schools will be briefly referred to in order to assess their contributions to development policies in the region and the effects on regional concentration.

In **Chapter 3** the methodology that will be used in this thesis is described, covering the standard procedures for analysing convergence (beta and σ -convergence) as well as more descriptive analysis. In addition, a review of the main studies in the field of convergence will be presented, covering different areas of the world but with an emphasis on Latin America. **Chapter 4** attempts to provide some preliminary answers to the main questions posed here by analysing the case of the European Union over the last fifty years. The chapter describes briefly the history of the Union in terms of regional-related institutional developments and the impact of these in the process of convergence, particularly after the 1988 Reform of the Structural Funds and the Treaty of Maastricht in 1992. In addition, convergence analysis will be performed, and I will also refer to other studies. It will be shown that convergence was far from automatic and it was not until regional policies became more important within the EU that convergence became stronger for the inter-country analysis while had little impact among the regions. Moreover, it will be seen that macroeconomic conditions seem to have made an impact in the process of convergence.

Part II of this thesis aims to relate the main conclusions of the first part to the empirical and historical chapters on MERCOSUR and those on Argentina and Brazil in particular. A brief history of the integration process of MERCOSUR is followed by a convergence analysis for the four MERCOSUR countries since 1940 in **Chapter 5**, although, as mentioned above, the MERCOSUR ‘effect’ as such will not be analysed fully mainly due to insufficient observations. Both **Chapters 6** and **8** describe the history of Argentina and Brazil respectively from colonial times until 1960, focusing on the way that disparities were shaped and highlighting the implications of both the export-led and the import substitution development models for convergence dynamics. Both chapters include a brief descriptive account of some of the regional policies applied in both countries. **Chapters 7** and **9** analyse the data for Argentina and Brazil to test the hypothesis of convergence within regions in each of the countries over the last decades. The findings in both chapters are related to specific periods and areas in which regional policies were implemented as well as macroeconomic crises in order to determine whether any links can be made. It is shown that disparities have not decreased significantly and that more efficient regional policies than those applied in the past should be considered. Also, I present some evidence linking high inflation periods and political instability with low convergence.

Although extensive research has been performed regarding disparities in the European Union and some for Argentina and Brazil, this thesis goes further by extending the analysis of the theoretical framework of neo-classical economics (automatic convergence) to economic areas. Taking Argentina and Brazil as representative of MERCOSUR as well as considering the EU, some interesting conclusions can be drawn regarding economically integrated areas and the evolution of disparities. The conclusions can be applied not only to individual countries but also to the EU and MERCOSUR. Moreover, the link between macroeconomic and political variables is relatively recent in the literature and it has never been tested for Argentina and Brazil before.

Theoretical Framework

1. Introduction

In this chapter the main literature regarding regional economic disparities will be addressed. As mentioned in the introduction, this thesis intends to understand how disparities are created; whether these are automatically reduced or alternatively regional policies are needed; what happens when countries form economic unions and how political and macroeconomic variables affect the process of convergence. The analysis of how regional disparities originate and develop through time has been long neglected in economic theory. As will be seen in this chapter, the first attempts to include disparities into economic models by neo-classical economists concluded that convergence between poorer and richer areas would be the rule. This statement was derived from the neo-classical models in which there were no frictions in the economy; models in which the assumptions of perfect competition, full employment and perfect factor mobility held as well as no transport costs and perfect information. That neo-classical framework was later extended to the analysis of regional disparities in economic areas and customs unions, as will also be seen later in this chapter. Nevertheless, interest in regional economics has been growing from a part of the economic geography literature to having become one of the most studied topics over the last few years, being applied to numerous areas in the world. Examples of these studies will be commented on both in the present and the following chapter.

The following section of this chapter provides a brief summary of the main neo-classical models of growth and their implications for the issue of regional disparities. The third section focuses on departures from neo-classical economics and the growing importance of regional economics in the literature. The fourth section aims to explain why there may

or may not be convergence between poorer and richer areas belonging to an economic union. The last section includes two related issues. The first one refers to the role of trade in the development process of Latin America and the Latin American School of thought that constitutes the theoretical framework of the import substitution industrialisation process. Finally, the most recent line of research within regional economics, namely the relationship between macroeconomic conditions and disparities and the link between institutions and growth will be addressed.

2. Regional Disparities in Classical Economics

Until the 1960s, growth theory focused mainly on the neo-classical model, as developed by Ramsey (1928), Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965), generally referred to as the Solow model. In this model, a standard neo-classical production function with decreasing returns to capital is assumed. The Solow model emphasises the role of labour supply and the capital stock in the growth process. Both the saving and population growth rates enter the model as exogenous variables and determine the steady state level of income per capita. Therefore, the higher the rate of savings the higher the rates of growth; whereas the higher the rate of population growth, the poorer the country (Barro, 1998). An important implication of this model is that of convergence, since it predicts that those countries with initial lower levels of domestic product will achieve higher growth rates, as will be discussed later in this section.

A simple description of the Solow model follows. The aggregate production function in neo-classical models with no technical progress determines that the level of output will be given by both labour and capital inputs.

The production function can be expressed as follows:

$$(1) \quad Y_t = F(K_t, L_t)$$

Where:

Y: real output

K: capital stock

L: labour force

t: the time

The Cobb-Douglas production function, assuming constant returns to scale is:

$$(2) \quad Y_t = k_t^\alpha L_t^{1-\alpha}$$

Assuming a one-sector perfectly competitive economy with flexible prices and full employment, the output growth will then be determined by:

$$(3) \quad y_t = \alpha k_t + (1 - \alpha)l_t$$

Where:

y: output growth

k: growth of the capital stock

l: growth of the labour force

By subtracting the growth of the labour force from both sides the rate of output per worker is obtained:

$$(4) \quad y_t - l_t = \alpha(k_t - l_t)$$

The output per worker will only increase if the capital-labour ratio increases. There is then a positive relationship between capital per worker and output per worker. However, since there is no technical progress in this simple model, and given that both labour and capital suffer from diminishing marginal returns, output per worker will increase at a diminishing rate. Capital-labour ratio will be at its long-term equilibrium (the steady-state capital stock) when net investment is zero, i.e. when the marginal product is low enough

and gross investment sufficient to maintain the existing stock (Armstrong and Taylor, 1993).

The neo-classical economic assumptions of the Solow model, such as perfect competition, full employment, perfect factor mobility (labour and capital) and no transport costs imply that theories of 'balanced growth' (Nurkse, 1962) operate through automatic classical mechanisms of marginal productivity of capital and labour without intervention of any kind. According to this view, imbalances would be levelled out automatically. Given two regions with identical conditions, if any one region had a higher marginal productivity of labour (or higher real wages), labour - being mobile - would migrate to that region. The resulting increase in labour supply would, in turn, reduce its marginal productivity and therefore real wages would decrease. Conversely, in the other region, as a consequence of migration outflows, labour would decrease and marginal productivity increase. This increase in marginal productivity and the subsequent increase in real wages will then attract more workers and this process will continue until the differences in both regions are equalised.

Since the deficiencies of the Solow model without technical progress were recognised early in the sixties, technological progress was included and assumed to occur exogenously. This addition can combine the theory with a positive and constant per capita growth rate in the long run, while still maintaining conditional convergence. Within this model, the long run per capita growth will be determined by the rate of technological progress (Barro, 1998).

If technical progress is included in the equation as a separate element in the production function, both the aggregate production function and the Cobb Douglas function can be extended to allow for a constant growth of this variable, as follows:

$$(5) \quad Y_t = F(A_t, K_t, L_t)$$

Where A is technical knowledge

$$(6) \quad Y = A e^{gt} K_t^\alpha L_t^{1-\alpha}$$

Where g is the constant rate of technical progress

The resulting growth equation would then be determined by:

$$(7) \quad y_t = g + \alpha k_t + (1 - \alpha) l_t$$

The result of this inclusion is that technical progress shifts the function upwards and therefore there will be an increase in the output per worker at every level of the capital-labour ratio. In this model, even if the capital stock and the labour force grow at the same rate, output per worker will only increase if the rate of technical progress is positive. In long-run equilibrium both the output growth and the growth of the capital stock are assumed to be equal (Armstrong and Taylor, 1993).

The main conclusions of this simple one-sector neo-classical model with technical progress are that regional disparities can exist because of differences between regions in either technical progress, the growth of the capital stock or the growth of the labour force. Following these conclusions, in a neo-classical world where economies differed only in their initial levels of capital intensity, there would be convergence among them. This convergence would be absolute, i.e. in per capita terms; poorer areas would grow faster than richer ones. However, if economies differ, then the convergence would apply only in a conditional way, meaning that the growth rate would tend to be higher if the initial level of income is low relatively to its long-run equilibrium (or steady state level) (Barro, 1998).

The failure of the Solow model to account for international differences in income stimulated work on endogenous growth theory. While the steady state levels of capital and output per worker depend in the neo-classical model on the propensity to save, the rate of population growth and the production function; new extensions to this model suggest the inclusion of other variables. In a number of models of endogenous growth

such as Romer (1986), Lucas (1988), Romer (1990), Barro (1991), Caballe & Santos (1993) and Barro (1998) human capital is included and it can be further enlarged to include education, experience and health.

The endogenous growth models of Romer (1986), Lucas (1988) and Rebelo (1991) based their research on the previous works of Arrow (1962), Uzawa (1965) and Sheshinski (1967). Endogenous models are characterised by the assumption of non-decreasing returns to capital and labour. The implication of this model is that countries which save more will grow faster and indefinitely. Therefore, convergence in incomes per capita will not necessarily be the rule, even with equal preferences and technology. Growth may go on indefinitely because the return to investment in a broad class of capital goods including human capital does not necessarily diminish as the economies develop. The acquisition of knowledge (or learning) will enter the production function and this may grow indefinitely. Arrow (1962) uses cumulative gross investment (cumulative production of capital goods) as a proxy for experience. The economy tends to a steady state ratio of human to physical capital, but the ratio may depart from its long-run value in an initial state given the inclusion of the “learning by doing” variables that continuously affect the returns on human capital. The extent of this departure will in turn alter the rate at which the income per capita approaches its steady state value. Therefore, given any two economies that only differ in their initial capital stocks, these will have the same growth rate and therefore will not converge (Sala-i-Martin, 1996).

Mankiw *et al* (1992) argue that the predictions of the Solow model are consistent and that both the saving and population growth do affect income in the way that Solow predicted. However, they admit that the Solow model does not provide a complete theory of growth since population growth, saving and technical change are treated as exogenous. On the other hand, they do not dismiss the endogenous models entirely, since they agree that these models provide an explanation of technological change. Further, they provide an “augmented” Solow model in which they maintain the assumption of decreasing marginal returns but include accumulation of human and physical capital to make the predictions more accurate. They conclude that convergence should not be expected and instead

countries will reach different steady states. Therefore, in this augmented Solow model, differences in saving, education and population growth should explain cross-country variations in income per capita. In particular, this model shows that after controlling for those variables, there is convergence of incomes per capita in the Solow model.

By allowing for increasing returns due to the inclusion of variables such as education (i.e. implying non-decreasing growth rates), both endogenous growth models and the “augmented” Solow model explain why richer countries may not converge to poorer ones. However, they still fail to explain what prevents poorer regions (or countries) from catching up with richer ones. The following section reviews a different perspective of the regional problem by lifting some of the neo-classical assumptions and introducing further restrictions and structural imbalances that work at the regional level.

3. Departures from Classical Economics

The main difference between the models seen in the previous section and those reviewed in this one is that while the former are interested in automatic processes of convergence that would lead economies to their steady state equilibrium, the latter are concerned with imbalances. That is, regional economics acknowledges the existence of factors that prevent economies from achieving the desired growth rates. As will be seen below, some authors conclude that differences will gradually disappear while others assume they are of a structural nature and therefore government intervention would be necessary in order to achieve convergence.

The first steps towards a theory of regional economics started with geographical economics and theories that questioned the assumption of negligible transport costs in particular. Location models go as far back as von Thünen’s (1826) model for agriculture with concentric belts around an isolated town, followed by Weber’s (1929) model for industrial location, models for the location of economic activity (Hoover, 1948) and agricultural models (Lösch, 1954). Although these were first considered in models of industrial organisation, they have been neglected in general economic models.

In economics, theories of 'unbalanced growth' (Nurkse, 1962) are linked to market failures or departures from classical assumptions. That is to say, they incorporate assumptions such as economies of scale, imperfect competition, labour rigidities and transport costs. Perroux (1955) introduced the term '*pôle de croissance*' (or development poles) which describes regional growth differentials. This was followed by the polarisation effects illustrated by Hirschman (1958) through which the richer became richer and the poorer, poorer.

Myrdal (1957) introduced the concepts of backwash and spread effects, as well as that of cumulative causation, in which initial differing conditions can perpetuate through time. The cumulative process includes both economic and non-economic factors, which can be generated by changes in terms of trade in a region if these are persistent enough or have significant impact on the economic variables such as demand, purchasing power, incomes, investment and production. The concept of cumulative causation is similar to that of the vicious circle of poverty introduced by Nurkse (1953) where poverty itself is the reason why a particular country remains poor. He also referred to non-economic factors such as poor infrastructure, health care and education. According to Kaldor (1970) cumulative causation is essential for understanding the differences in development between regions. Cumulative causation then explains the unequal regional incidence of industrial development resulting from endogenous factors in the development process itself. In other words, differences in income are the "cumulative result of persistent differences in growth rates" (Kaldor, 1970: 337).

For Myrdal, the backwash effects are those that the expansion of one area has on another, particularly regarding labour, capital, goods and services. Centres of expansion will attract investment and this will have a multiplier effect on that region to the detriment of other areas. For instance, those regions that are expanding will be recipients of migration from other areas; hence there will be a drain of labour and capital from those areas towards the centres of expansion. The spread effects, on the other hand, refer to movements originating in the centres of expansion, which positively affect other areas.

This refers to the multiplier effect on the neighbouring areas that the centre will generate in terms of employment, investment and services. These two effects will balance each other and, in the marginal case, will have a stagnating effect for the region. In any case, this is not a stable equilibrium since any changes will trigger a cumulative process either upwards or downwards. According to Myrdal (1957), these forces will tend to increase rather than decrease the inequalities between regions. Balassa (1961) adds low investment and productivity growth rates as two other factors that can in fact act like a vicious circle in perpetuating differences.

Hirschman (1958) criticises Myrdal's approach on the grounds that his concern with cumulative causation makes him fail to recognise that after an initial phase in which polarisation accentuates differences, there will be a turning point after which this trend will be reverted. Although initially differences in development between regions will be created, this will later be reversed by the emergence of strong forces or growing points, which will stimulate further growth.

Williamson (1965) explains spatial inequality within a country by arguing that internal factor flows do not occur with enough speed and quantity in order to offset the conditions that cause these disparities and that economic interdependence between regions of a country is not significantly strong. Williamson expects that the elements causing divergence (or North-South income differentials as he refers to them) will diminish over time through automatic equilibrating factors as interdependence among regions grows. Therefore, in the later stages of development, convergence of interregional levels of development would become the rule.

Friedmann (1966) in his case study for Venezuela postulated a similar pattern with regard to the spatial dispersion of economic activities during the process of national development. He assumed an increasing polarisation of population and output during the early phase, a spatial transformation towards greater balance at a more advanced stage and a continuous dispersion in highly developed economies. Richardson (1980) initiated

a new debate called 'polarisation reversal', namely the move from concentration to deconcentration, reaching very similar conclusions to those of Friedmann (1966).

Both Myrdal and Hirschman agree that migration is selective, at least with respect to age, and thus will prejudice some communities while favouring others. Myrdal compares this to capital movements since expansion in demand will increase investment and this will have multiplier effects. Williamson also refers to capital migration to richer regions and the resulting exacerbating effects on differences. Finally, Myrdal argues that trade operates with that same bias in favour of booming regions through competitive advantages. Therefore, richer areas will specialise in manufactured goods while backward regions would remain mostly agricultural, thus hindering any industrialisation process.

Williamson's hypothesis can also be seen in the context of the paradigm of modernisation, which dominated development theory and policy after Second World War. The main critique was made by the Latin American school, pointing to a possible systematic difference of conditions of economic development between the backward countries of the time and the developed countries at the beginning of the industrialisation process, as will be studied later in this chapter.

While Hirschman (1958) believes that only the intervention of the government in the field of regional development will remove structural disequilibria; Myrdal (1957), on the other hand, believed that government action will be long delayed and, if taken at all, will tend to strengthen the existing process of divergence. Dependency school theorists, as will be seen in section 5.1 of this chapter, agree with Myrdal in this point.

Regional growth differences can also be explained by regional differences in the growth of a region's exports. The export-led model traces the initial development stimulus in a region to the exploitation and export of its natural resources. Thus, the geographical distribution of natural resources may explain, at least partially, why regions grow at different rates. This growth process can be cumulative since the demand for exports has a multiplier effect on regional income. These regions will then have a competitive

advantage, which, in turn, reinforce regional specialisation. This can also be linked to external economies and the proximity of related activities, such as localisation and agglomeration economies (Armstrong and Taylor, 1993). The role of regional exports in the process of development will be expanded later in both this and following chapters when the historical development of disparities in Argentina (chapter 6) and Brazil (chapter 8) will be reviewed. In both countries, the export-led strategies of development favoured certain regions in detriment of others and when the industrialisation process started it only reinforced the supremacy of those already more developed regions.

This section has provided a review of the main attempts in economic theory to explain why poorer regions fail to converge towards richer ones. Such theories include structural imbalances that are present, with more or less significance, in most backward regions and countries and prevent those areas from achieving higher growth rates. In the following section, the analysis of convergence of regional economic disparities is expanded to include economic integration in an attempt to determine what happens in terms of regional differences when countries eliminate trade barriers between them.

4. Economic Integration and Regional Disparities

Within the neo-classical model, integration was considered as being a move towards free trade and therefore welfare enhancing. The removal of trade barriers under classical assumptions would imply that any existing regional imbalances between countries would be levelled out in the same way as within countries. Further, integration would imply several gains. Among these, increased specialisation - as a result of the law of comparative advantages; increased market size and production - linked to economies of scale; improved international bargaining position; enhanced competition and economic efficiency; and technological advances- affecting both the amount and quality of the factors of production (El-Agraa, 1984).

It was not until Viner (1950) introduced the concepts of trade diversion and trade creation that customs unions were regarded as a combination of free trade and protectionism.

However, welfare was addressed from a general rather than regional perspective, in terms of trade creation and diversion. Trade creation is the replacement of expensive domestic production by cheaper imports from a partner country. Conversely, trade diversion is the replacement of cheaper initial imports from the outside world by more expensive imports from a partner. It is then the relative strength of these two effects that determines whether customs union formation is beneficial. Nevertheless, it was still assumed that if the net effects were welfare enhancing, then the benefits would be evenly spread.

A better understanding of regional problems allowed the same arguments to be applied to integration and it became clearer that the benefits of free trade would not be evenly distributed. Balassa (1961) indicated that integration would not only affect economic welfare through changes in the quantity of commodities produced and the degree of discrimination between domestic and foreign goods; but also through two other channels, namely the redistribution of income between nationals of different countries and redistribution within individual countries.

According to Camagni (1992) there are five elements that hamper opportunities for easy convergence. The first is that in an economically integrated area, backward regions have to compete with an exchange rate level that is relatively overvalued with respect to their production capabilities. Thus, within a monetary union, in the absence of wage and price flexibility among regions the theorem of comparative advantage no longer holds. The second element is that since regions within a country compete on the basis of an absolute advantage, inefficient areas will be forced out of the competitive arena. The third element refers to the reduction and disappearance of original advantages given by labour costs due to initial lower productivity and efficiency and a later convergence of wages and prices. A fourth element is the presence of non-linearities and cumulative processes in economic development, such as scale economies, agglomeration economies and technical progress. This last factor can be linked to both economic and trade dependence.

Camagni (1992) also lists the advantages of an integrated market for those regions in the process of catching-up. These include integrated market and technology potential, capital

availability and infrastructure provision resulting from regional policies. However, he stresses the importance of evaluating the conditions of the backward regions in order to assess whether they will be able to reap these benefits. El-Agraa (1984) highlights that although the introduction of factor mobility may enhance efficiency through a more efficient allocation of resources, it may also create or aggravate regional problems and imbalances in depressed areas.

Following Perroux (1954), economic integration will only be beneficial for those regions with development poles; regions with higher development that can create linkages. Since the development of backward regions and integration are incompatible, the most likely outcome of integration will be an increase in regional disparities. The impact upon the less developed regions will be indirectly through the effect on the more developed ones given that both had already achieved some sort of coexistence within the national market (Robertson, 1962). This is reminiscent of the structuralist approach of the previous section, in which there was not only a dualism domestically but also another internationally.

Towns and regions that had artificial advantages due to the national pattern of agglomeration would suffer from integration as a consequence of a new reallocation at the international level. This will reinforce the attractiveness of those highly industrialised centres for both capital and labour. Conversely, national borders that had suffered from barriers imposed by national agglomeration forces would develop after the abolition of those barriers (Giersch, 1950).

More recent theoretical and empirical research has drawn attention to the importance of geographical factors such as adjacency and proximity for international trade. Barriers to trade between countries including tariffs, language and cultural differences, lack of factor mobility are usually enough to block the expansion of an industrial centre beyond its domestic market. As integration proceeds, it is then expected for some industries to serve the market from a single local agglomeration rather than from several (Krugman, 1991; Krugman and Venables, 1995). The performance of surrounding regions can help predict

that of a particular region and this, in turn, would favour an understanding of inequalities. Both physical location and geographical spillovers matter more than national macro factors for regional distribution dynamics (Quah, 1996; 1996b).

In the case of neighbouring regions belonging to different countries, both the geographical as well as economic proximity will favour trade once the barriers are removed. This will be particularly strong if both are backward regions. In the case of one developed region and one lagging one, the removal of trade barriers will increase trade but benefits will be unequally distributed (Auverny-Bennetot, 1975). In the case of Greece the 'missing neighbours factor' in the trade relations seems to have played a key role limiting the country's export markets and the potential for export-led growth (Petraikos, 1997; Sachs, 1997).

Although distance from the world major markets is always a disadvantage, proximity can be considered an advantage only under certain conditions. Following Krugman and Venables (1995) proximity to large markets (or metropolitan regions) facilitates growth only if differences in development levels and structures are not too pronounced. Otherwise, it leads to a penetration of product markets by the more dynamic enterprises of the more advanced region. Lack of spatial and sectoral integration of the economy at the regional and national level appears also to be hampering performance because of the poor linkage effects between the centre and the periphery.

A key issue for any region is the degree of protection it currently obtains from the barriers that will be removed by a common market, in particular relative to other regions with which competitiveness is possible due to barriers to trade. The effect of the removal of restrictions on a particular region will then depend on two factors. The first is the growth in the whole region, which will have a trickle down effect on individual regions belonging to the union and the second is the reallocation of resources within the newly enhanced internal market. The process of integration may therefore trigger cumulative processes both ways and will clearly produce winners and losers (Begg, 1989).

Increased integration leads to more clusters. Given several final consumption and intermediate good industries and countries with similar resources and technology, if transport costs are initially high, each country will maintain its full range of industries. However, if transport costs fall, each industry will tend to concentrate in one of the countries, as producers of final goods will realise that countries with a higher intermediate industrial base will imply lower export costs to other markets.

Similarly, producers of intermediate goods will find that it is better to concentrate their production near the large final goods industry. Then agglomeration depends on how strong forward and backward linkages are. In addition to the usual gains of integration, at the end of the process incomes will be higher. However, there may be adjustment problems in the short-run, such as workers in each particular industry that will suffer loss of real wages and probably a rise in unemployment (Krugman and Venables, 1995).

‘Economic integration may or may not imply a tendency towards per capita [income] equalisation’ (Bertola, 1999:289). However, even if disparities grow larger, there is little evidence to suggest that economic integration has itself contributed to the widening of disparities, as it is virtually impossible to isolate the effect statistically (Tsoukalis, 1991). According to Romer (1990) free international trade can speed up growth. He also suggests that low levels of human capital might explain the lack of growth in underdeveloped and closed economies and that a less developed economy with a large population can still benefit from economic integration with the rest of the world. Andres *et al* (1996) found correlation between growth and exports growth in accordance with Williamson (1995), who concluded that convergence across the world has taken place in periods of free trade and increases in international trade.

As seen in this section, although integration has many beneficial outcomes, these may not be evenly distributed. In the same way as regional disparities persist within a country given the existing patterns of agglomeration within national borders, when countries form an economic union a new agglomeration pattern will develop, which will be the result of the interaction of both national and international factors. The integrated area will create

new relatively poorer areas, posing a problem for the previously backward regions as well as for the new relatively poorer areas when competing with richer regions. Therefore, the degree of national protection they were granted before is important, as well as the linkages that will develop as a consequence of integration. Given that the automatic mechanisms mentioned in classical economics do not seem to operate due to persistent rigidities, policies in order to correct distortions will be needed. Further integration might also help in reducing these disparities by creating more linkages and increasing mobility. The more evenly spread the distribution of benefits within an economic union, the higher the gains for each member and for the union as a whole, since no country would be willing to join or continue to be a member of an economic union if it meant being worse off.

The next section addresses two issues of significance that are mentioned in the literature regarding convergence and will become relevant in following chapters. The first is the role of international trade in the development process of backward countries, which will be addressed later when reviewing the origin of disparities in both Argentina and Brazil and the development models that both countries followed - export-led and import substitution industrialisation – and the effects of these on regional imbalances. Both dependency and structuralism will be briefly referred to as they constitute the theoretical framework of the ISI development strategy. The other issue analysed is the link between regional growth and both macroeconomic and political stability, which will be further expanded in the following chapter when explaining the methodology used in this thesis and will later be empirically tested for the case of Argentina and Brazil.

5. Related Issues in Growth Theory

5.1. The Role of International Trade in the Development Process and the Latin American School of Thought

General background

Developing countries were often confronted with the dilemma as whether to specialise along lines of comparative advantage internationally or to diversify in order to provide markets for each other locally. Historically, regions of temperate climate followed a process of growth through trade in the nineteenth century. These countries received considerable migration flows from Europe, but the main trigger for their expansion was the impressive rate of growth in western Europe, particularly in Great Britain, which determined a growing demand for food stuffs and raw materials. Therefore, growth through trade in the periphery was induced by growth in the industrial centre (Nurkse, 1962). According to Robertson (1962) trade in the nineteenth century was not a device for the optimum allocation of a given stock of resources but above all it was an engine of growth.

This pattern of development has, in many cases, had undesirable effects, particularly for tropical areas, given that while the export sector was aided by foreign capital, the domestic economy remained backward. This dual economy will often show a lack of internal social and economic integration as well as poor linkages since foreign investment was directed mainly to the extraction and export of raw materials – but not their manufacturing (Nurkse, 1962). Kaldor (1970) argued that unequal regional development within a country poses more serious intellectual challenges for policy than unequal development internationally.

Further, export activities are subject to cyclical instability and changes in demand as well as the substitution of natural products by synthetic ones and this pattern of development may therefore result in an unbalanced and unsteady growth. However, Nurkse (1962) argued that the prospects for this kind of export-led growth were no longer as promising as they used to be. His argument was that in the nineteenth century, the centres were

experiencing a sustained period of growth and this translated into a sustained and growing demand in the less developed areas. However, in the twentieth century, there was no longer a guarantee for this, particularly when the demand was generally inelastic with respect to price and showed a low rate of increase in total volume. Given these prospects, the possibility of stagnation and bottlenecks arises. "The case for specialisation as such is just as strong as ever, but the forces making for the transmission of growth from advanced to less developed countries may not be as powerful as they were a hundred years ago" (Nurkse, 1962: 254).

Up until the end of the 1920s, and despite recurrent changes in commodities prices and balance of payments problems, Latin American countries had followed the above-mentioned export-led economic model of growth that relied on primary-product exports and international capital inflows. Within this outward-oriented model, countries such as Argentina and Brazil also received significant amounts of external migration. During the 20th century, however, Latin America was subject to three major external shocks that would result in significant policy changes. The First World War followed by the economic depression of 1929 and later by the Second World War would present Latin America with both prospects as well as threats. In fact, it is only over this period of the 20th century (1914-1945) that Latin America as a region grew more rapidly than the world average. Between 1913 and 1929, the rate of growth in world trade slowed down and the reduction in the Net Barter Terms of Trade (NBTT) for most countries (except for Brazil and Uruguay) provided fewer incentives to exports - the NBTT being calculated as the ratio of the prices of a country's exports to the prices of its imports that can be exchanged for a unit of exports. In the years between both wars, while the demand for a few Latin American products increased, imports were seriously affected. During this period the British trade hegemony was broken and the United States became a key international player. The reliance on primary export products in addition to the external shocks affecting the region translated in a generalised sense of vulnerability. Moreover, domestic factors such as population growth, increasing rural-urban migration and the resulting expansion of urban conglomerates together with a growing sense of nationalism resulted

in an increase support for the need to carry out industrialisation policies in the forties (Thorp, 1998: 98).

According to Nurkse (1962), the solution for less developed countries would consist of diversified growth by following a balanced pattern of investment in a number of different industries, to enlarge the size of the market and fill the vacuum in the domestic economy of low income areas. Then, there would be a pattern of mutually supporting investments over a range of industries wide enough in order to create growth. He also discussed the risks of following an import substitution industrialisation policy, its main disadvantage being the resulting costly production of import substitutes. Filling this vacuum in the domestic market would, in turn, increase the productivity and real purchasing power.

At the time of First World War, a few manufacturing industries had already been established in some Latin American countries, mainly in Argentina, Brazil, Chile, Mexico, Peru and Uruguay. In those countries, the basis for manufacturing industries had been provided by the export-led model, in terms of better infrastructure, increasing the domestic demand and urban concentration. With imports reduced as a consequence of the war, local industries faced no competitors and this acted in favour of the establishment of more industries. In addition, the declining position of Britain in world trade in favour of the United States would translate in unbalanced trade relations for certain Latin American countries. In the case of Argentina, although still having trading and investment relations with Britain, most of its imports – particularly agricultural capital goods – were from the United States. By 1929, countries like Argentina were exporting to Britain while most of its imports originated in the United States, resulting in a trade surplus with the former and a trade deficit with the latter. For Brazil, however, this was the opposite, with imports from the United States almost doubling exports to it. After the First World War the gold standard system came to an end and international capital flows followed suit, inducing a decline not only in capital inflows but also in export incomes as well as the demand for imports (Bulmer-Thomas, 1994).

The Wall Street financial crisis in 1929 reduced consumer demand and the sharp decrease in prices for primary products had a significant effect for Latin American countries. Import prices also fell but not as much as export prices and therefore the net barter terms of trade NBTT worsened for most countries. Latin American countries were facing both the decline in capital flows and export income, and the resulting deficit was being financed with international reserves. Once the reserves ran out, the countries had to use their own currencies as a means of financing their imports. In addition, governments printed money in order to back their internal imbalances, which were the result of decreases in government revenues that could no longer be financed abroad. The persistent crisis in export markets following the 1929 crash, as well as the increase in the price of imported goods, due to both the deterioration of the terms of trade and the devaluated exchange rate, favoured the non-export sector and was thus an incentive for substituting foreign for domestic manufactures. Another feature that characterised this decade was the re-emergence of nationalism and protectionism, which translated into an increased state intervention in the economy with industrial groups demanding subsidies, credits and tariff protections from the state. Those countries that already had industries had an advantage, such as Argentina and Brazil, since production could be adjusted in response to changes in both relative prices and domestic demand. However, it was not until the recovery of the NBTT after 1932, that the export sector also received an incentive, which in turn favoured an increase of certain imports allowing an easier and more successful transition to import substitution industrialisation (ISI). The Second World War was another major disruption for Latin American countries in terms of import supply; export demand, shipping and credit. This was, in fact, the most significant of all shocks to affect Latin America. The combination of an increasingly distorted world trade by a number of non-tariff barriers, together with the increased nationalism and export pessimism in many Latin American countries, resulted in a number of governments following inward looking development policies and placing import restrictions (Love, 1996: 212; Thorp, 1998).

Therefore, import substitution industrialisation became the model followed in Latin America after the Second World War and by the first half of the fifties industry was the most important sector in many countries, particularly Argentina and Brazil. As will be

seen later, the main problem with the ISI model was its inability to solve the balance of payments constraint and the ever-present vulnerability to external factors as it depended on foreign imports to deepen the industrialisation process while at the same time, while favouring the industrial sector, neglecting the export one and the main source of foreign exchange. In the decade of the seventies, the flaws of this model became relevant and the debt crisis of the eighties signalled the end of the ISI model in favour of a renewed export-led payment of the debt.

In addition, urbanisation had already been steadily increasing in several Latin American countries during the export-led phase (as will be seen in the historical chapters 6 and 8) but the inward looking policies after the thirties and the encouragement of urban activities further aggravated urban-rural migration. This process of urban concentration has often been the result of industrialisation in many Latin American countries, contributing to the accentuation of both national regional disparities and the worsening of income distribution. In the case of Mexico, the ISI process that began in the thirties was highly successful in promoting domestic industry. Between 1930 and 1970, the share of manufacturing in Mexico's GDP doubled. However, this industrialisation process was concentrated in Mexico City. In the same period, the city grew at an average of almost 6.7 per cent annually, compared with only 2.4 per cent in the rest of the country. Since 1980, following the increased openness of the Mexican economy and the NAFTA agreement, industrial activity has shifted to those states neighbouring the United States, implying a relocation of population as well (Hanson, 1998). It must be added, however, that the case of Mexico is unique since given its proximity to the United States; trade liberalisation also implied economic integration between both countries.

As will be seen in the second part of this thesis, the processes of industrialisation in both Argentina and Brazil also contributed to unequal urbanisation rates. In the case of Argentina, the growing importance of the port of Buenos Aires in the colony, together with the agro-export model located mainly in the pampa, contributed to create an asymmetry between urbanisation in Buenos Aires and the rest of the country. The industrialisation process reinforced this trend and migration flows from the interior to

urban centres enlarged the gap between Buenos Aires and its surroundings and the rest of the country. This process of urbanisation as a result of industrialisation will be referred to in more detail in section 2.3 in chapter 6. In the case of Brazil, the industrialisation process located around São Paulo and the migration flows, particularly from the northeast, also reinforced the urbanisation trends aggravating the already existing disparities that were a legacy of the colonial period – this will also be addressed later (chapter 8, section 2.3).

The urbanisation trend can also be found in other regions of the world. Ioannides and Petrakos (2000) say that in the case of Greece the process of industrialisation has been mostly responsible for urban concentration. Although some industrial activity moved to the periphery in the seventies and eighties de-concentration never really took place. The reason for this is that the relative importance of industry in the economy declined in the eighties and the rising tertiary sector of the economy exhibited a preference for location in the metropolis, which is not incompatible with other European countries.

Latin American economists

In the period after 1930, but most importantly after the Second World War, and up until the debt crisis of the eighties, significant contributions to development theory came from Latin America. The import substitution industrialisation process followed in some countries in the region manifestly contradicted the neoclassical theory of international division of labour. Up until 1949 industrialisation took place without a theory that underpinned the model. The theory that later explained the already ongoing process of inward looking development was *structuralism*, which was developed at ECLA (United Nations Economic Commission for Latin America) and later by the *dependency theory*. It was in the period between the thirties and the eighties that structuralism and dependency emerged and later declined, followed by the neo-liberalism of the eighties and the Washington Consensus (Love, 1996: 208).

The failure of the traditional export-led model of growth in the decade of the thirties, as mentioned above, paved the way for the Prebisch theory of 1949 and a completely different way in which to analyse and formulate Latin American development strategies. The subsequent failure of the ISI model to generate sustained and independent development in the following years – mostly due to persistent inflation pressures and the persistent reliance on capital imports - in turn, gave rise to the dependency school. The subsequent criticisms to both structuralism and dependency theories, coupled by the debt crisis of the eighties, would then result in a yet another swing towards the export sector as income generator and the liberalisation and privatisation policies of the last decade.

In 1948, ECLA was created and most of its works at the time reflect the export pessimism of that period and trying to understand the declining terms of trade after the 30s. In 1949, Prebisch (1949) published his thesis in which his main argument was that there was a centre (which specialised in primary products) and a periphery (specialising in industrial products). In addition, agricultural production was inelastic relative to industrial production. Therefore, the gains in productivity in any given period were greater for industrial than for primary products. Moreover, productivity gains derived from technical progress were retained at the centre, rather than transferred into lower prices. In the periphery, though, productivity gains would be translated into labour surpluses but wages were kept low –mainly due to lack of organisation of the agricultural workers and the surplus of labour supply. Prebisch identified two sources of deterioration of the terms of trade, one at the centre and the other at the periphery. The centre's gains would be greater and provided the system worked properly, these would be spread to the periphery and therefore over the long run the terms of trade of the centre would deteriorate and those in the periphery improve. If the terms of trade in the periphery declined, that would indicate that not only it was not sharing the centre's gains but also transferring some of its own productivity gains to the centre. In the upward part of the cycle, the centre (Britain in his argument) generated the cycles and gold flows from the centre towards the periphery; however, on the downwards of the cycle gold would flow back to the centre. In this way, monetary stability was at the cost of the contraction of the

periphery. Therefore, the protection of industry was a necessary condition to prevent the concentration of technological progress in the centre.

Prebisch considered that both primary exports and industrial development were possible provided the composition of imports was changed from consumer to capital goods. He considered that solely relying on export-led growth was not the path to a long-term sustainable economic development. Moreover, industrialisation was seen not only as a way of generating economic development but also as a means of absorbing the labour surplus in the agricultural sector (Love, 1996: 228). According to ECLA, the main negative characteristics of Latin American economies such as declining NBTT, structural unemployment and external imbalances would be possible to eliminate by following an inward-looking development. In order to achieve this industrialisation, import barriers were increasingly needed and a shortage of foreign exchange was another argument in favour of these restrictions. Countries such as Argentina, Brazil, Chile and Uruguay adopted the model, whereas other Latin American countries, such as Colombia and Mexico, combined it with export promotion (Thorp, 1998). ECLA's view was, therefore, concluded that deliberate government promotion of industrialisation should be pursued.

The fall in primary product prices relative to manufactures prices and the decline in the NBTT provided evidence to those that supported CEPAL. In addition, the discrimination of exports in the developed countries in favour of their former colonies as well as the establishment of the Common Agricultural Policy in the then European Community in 1957 reinforced this argument. During the fifties, Latin American economies had the choice to intensify ISI or revert to export led growth strategy. CEPAL identified several phases within the import substitution process. The first one involved the 'easy' phase; in which domestically produced consumer goods substituted previously imported ones. The second stage involved the production of intermediate goods and consumer durables, while a final phase referred to the production of capital goods. For those countries that already had a significant industrial base such as Argentina, Brazil, Chile, Colombia, Mexico and Uruguay, the easy stage of ISI was already completed by then (the share of consumer goods in total imports had been reduced) and there were no incentives to go

back to an export led strategy. The industrial sector in those countries either already was or was in its way to being one of the leading sectors. In addition, CEPAL still defended inward looking policies, particularly after the deterioration of the NBTT following the Korean War in 1953. However, the protection granted to industrial sectors was not always consistent and, in addition to tariffs, multiple exchange rates, import quotas and licenses were often used. The IMF insisted on the elimination of multiple exchange rates and quotas and in the long run protection relied merely on orthodox instruments such as tariffs. For domestic producers, however, the effective rate of protection (ERP) was the significant variable – ERP refers to the change in value added per unit of output as a result of protection not only from nominal tariffs to imported goods but also tariffs and other forms of protection on the cost of inputs. This measure is a much better indication of the incentives offered to industry (Bulmer-Thomas, 1994).

However, and as mentioned in the introduction of this section, the main problem in the fifties was the lack of finance in order to support the industrialisation effort, particularly once the “easy” stage had been done. In that first stage the replacement of imported consumer goods for domestically produced ones represented no major capital investments. However, when moving to the second phase of industrialisation, the necessary technology was not always available due to the lack of private funding, the government established several companies. Still, the dependency on imports continued, as industry was import intensive and intermediate and capital goods were required in order to further the industrialisation effort. Industrialisation was successful in terms of the increased share of manufactures in total GDP as well as the industries established in the period – as will be mentioned in following chapters – but these industries were sometimes high cost and lacking in efficiency since they faced no international competition, and thus ruling out the possibility of engaging in international trade with domestic manufactures. The increasing rural-urban migration that will be referred to again later in chapters 6 and 8 and the inability of industry to absorb it would also accentuate income disparities.

The above mentioned factors such as the dependency on foreign imports, the increasing concentration of income, balance of payments problems, together with the decline in the rate of growth, high inflation rates, political instability (the military coup in Brazil in 1964, which put an end to the development plan followed by Goulart, as well as the military coup in Argentina in 1966) of the mid and late sixties, led to a sense of failure of the structuralist programme for national development, which led to the theory being reworked and the emergence of the dependency school (Love, 1996).

The dependency school argues that spatial inequality and the marginality of the peripheral populations are inevitable consequences of the position of poorer regions in the development process. Dependency school economists, such as Frank (1967), Gonzalez (1964-5) and Sunkel (1969) argue that regions are linked to dynamic national centres, which, in turn, are linked to dynamic foreign centres in an international dependency relationship. Backward regions in a particular country are therefore dependent on the domestic economic centre, creating an asymmetry in the national economic structure that in turn affects the process of national development. Similarly, the dual economy present at a national level is replicated between the domestic and foreign economic centres. This, in turn, affects the insertion of the domestic centre into a dynamic and competitive world economy. Therefore, there are two coexisting structural imbalances; one can be found within the national boundaries and the other at the international level.

While for structuralism the state had a key role in the process of national development; the dependency school regarded the state as autonomous but insert within a social structure. Prebisch (1949) thought that state intervention and the national bourgeoisies would achieve industrialisation; however, as mentioned before dependency school theorists - such as Frank (1967), Gonzalez (1964-5) and Sunkel (1969) - agree that the ability of governments to remove inequalities is limited, and given that the local political and socio-economic *elites* are also benefiting from this dependency relationship, little action is expected from national governments. Therefore, for the dependency theorists the reasons for economies (or regions) not converging towards each other is to be found in

the existing social and political barriers that are part of these societies (Gilbert and Goodman, 1976).

While Sunkel (1969) considered the above mentioned international dependency relationship as given for the periphery's own structure; Cardoso and Faletto (1969) refer to a the internal and external sub-systems, and emphasised that the international capitalist system was not solely determining since the dependency is possible through a network of interests across various social groups (page 162). They analyse the development of the populist coalition of national and foreign capital with the working class – corresponding to the successful phase of ISI – and linked the failure of ISI with the fall of populism. The “masses” (page 108) are a necessary condition for the industrialisation process not only as a supplier of labour but also given that it constituted the domestic market and became a powerful political player. Cardoso and Faletto (1969) saw development and underdevelopment not as stages but as “functions” or “positions” (page 23) within the same international economic system determined by the “historical process” (page 18). According to Furtado, the main difference between industrialisation in Europe and that in Latin America was that for the latter technology was exogenous to the regional economy and designed for the requirements of the developed countries (Love, 1996: 247).

The dependency school became influential outside Latin America in the 1970s. Structuralism during the eighties developed into ‘neo-structuralism’, in which the mistakes from ISI would be avoided and incorporate lessons from neo-liberalism seeking export opportunities in a flexible policy aiming at helping both the internal as external market. ‘Inward directed development’ was then replaced by ‘development from within’ (Sunkel, 1993).

Theories aside, the weakest point of the inward model since it was first applied was the balance of payments constraint and the inability to finance further imported inputs to continue with the industrialisation process. The first stage of ISI or the ‘easy’ stage, by replacing previously imported products by locally manufactured ones, allows rapid growth of output independently of income levels and the growth in final demand since

the size of the market is somewhat fixed, as the substitution is carried out based on existing patterns of demand. Once this market is satisfied, further industrial production can only occur if additional imported manufactured goods can be substituted by local production and this is where the dependency on imported machinery became a crucial flaw in the ISI model. With the adoption of the floating currencies following the collapse of the Bretton Woods system in 1971 and the further strain derived from the oil shocks in 1973 and 1978, the inability of the ISI model to generate sustained development was blatant. Moreover, debt and inflation spiralled and the debt crisis of the 1980s put a definitive end to the ISI and signalled a return to the agro-export sector as a main source of resources needed to service the debts which culminated in the liberalisation of the last decade.

Inspired by the European integration, CEPAL also encouraged Latin American integration as a means of enlarging the market and allowing for economies of scale and lowering unit costs while maintaining protection against imports from third countries (Prebisch, 1971). It was in this context that LAFTA was created in 1960 as will be mentioned in chapter 5 (page 128).

5.2. Macroeconomic and Political Stability and their Impact on Growth and Inequalities

Another issue that has increasingly been referred to in growth theory is the link between macroeconomic conditions and disparities. Increasing urban concentration and the preferred industrial location in the metropolis is linked with increasing GDP per capita, and therefore an expansion cycle usually starts at the metropolis while a recession hits the metropolis harder than the periphery. Berry (1988) has argued that business cycles are associated with cycles of spatial concentration. This hypothesis links rapid economic growth with increased regional inequalities and it is reminiscent of the growth poles theory of Perroux (1955, 1970) and of the cumulative causation theory of Myrdal (1957). In this context, economic cycles begin at the major poles of concentration of economic activity intensifying inequalities since its effects are not spread out immediately.

Conversely, in times of recession, the metropolitan regions would be hit harder than the peripheral ones and thus inequalities reduced.

This topic is relatively new in the literature and there are not many empirical studies, particularly for Latin America. The link between macroeconomic conditions and disparities is included in this thesis and will be empirically tested for Argentina and Brazil in chapters 7 and 9. Andres *et al* (1996) present evidence of macroeconomic variables having a significant impact on growth in the short, medium and long run. They claim that the importance of macro variables is higher in periods of slow growth and turbulence, helping to explain the slowdown of growth in OECD countries in the seventies. They also conclude that growth seems to be positively correlated with exports and monetary growth and negatively with inflation and the variability of money and inflation.

There is some evidence presented by Dunford (1993) for Europe that is in line with the view of the European Commission (Commission of the European Communities, 1991), indicating that regional disparities tend to move counter-cyclically by increasing during recessions and diminishing in periods of strong economic growth. On the other hand, Petrakos and Tsoukalas (1999) test the hypothesis of positive correlation between regional inequalities and macroeconomic performance for Greece. Their conclusion is the opposite and disparities in Greece seem to be pro-cyclical.

A possible reconciliation of these two findings according to Ioannides and Petrakos (2000) is that economic expansion is more likely to lead to regional convergence in advanced countries with a spatially integrated economic base. Conversely, in less advanced countries, it is more likely to lead to regional divergence, since these usually present strong spatial fragmentation and imbalances as well as a dual economic base. It is, then, interesting to consider the evidence from Argentina and Brazil and determine whether disparities in these countries are pro-cyclical, as in the case of Greece, or counter-cyclical, as the other countries in the European Union. In the following chapter,

some of the empirical studies in this area will be discussed in more detail together with the methodological aspects of the thesis.

Another line of research that has received much attention in the recent literature is based on the proposition that the security of property and contractual rights as well as government policies are significant for the speed in which countries grow. Then, countries where public investment and economic policies are inefficient are expected to have lower rates of growth (Knack and Keefer, 1995). Within a classical economics context, security of rights affects their value. If there is uncertainty regarding the rule of law, transaction costs are higher and therefore affect the rates of capital accumulation (Scully, 1988). In this section, the main theoretical elements will be presented, while in the following chapter the empirical results will be further discussed.

Testing for political instability and property rights have not been widely undertaken in the literature. Barro (1991) tests convergence for a series of countries for the period 1960-1985, including variables that proxy for political instability, the number of revolutions and coups per year and the number per million inhabitants of political assassinations per year. He shows that each of these variables has a significant negative impact on property rights as well as on investment and growth.

Economic freedoms are usually thought to encourage economic growth. Kormendi and Meguire (1985), Scully (1988) and Barro (1998) have used the Gastil index of civil liberty. They all found a relationship between increases in liberty and growth, through investment. Knack and Keefer (1995) consider this index to be too aggregate, and therefore use further variables to account for property rights and the efficiency of public goods allocation. These include expropriation risk, rule of law, repudiation of contracts, corruption in government, quality of bureaucracy, contract enforceability, infrastructure quality, nationalisation potential and bureaucratic delays. All these researches found that the variables included had a significant impact on growth. In the same line of analysis, Rebelo (1991) studied the link between low growth rate in countries with high income tax and poor property rights enforcement.

According to Lipset (1959), prosperity stimulates democracy (this is often referred to as the Lipset hypothesis). He noted an increased education and a large middle class as elements that expand “receptivity to democratic political tolerance norms” (p.83). Empirical studies show that the Lipset hypothesis holds, and that increases in measures of standards of living tend to generate a gradual rise in democracy. By contrast, democracies arising without prior economic development tend not to last (Barro, 1998).

Barro (1998) uses an indicator of political rights, finding that there is a positive relationship between an increase in democracy and growth when political freedoms were initially weak. However, further democracy tends to depress growth once a moderate amount of freedom is already established. He concludes that the positive relation between democracy and prior measures of prosperity – the Lipset hypothesis - is indeed an empirical regularity.

6. Conclusions

Throughout this chapter it has been shown that neo-classical models assume that convergence would be a natural outcome of growth. Models of regional economics, by contrast, focus on the constraints that prevent those automatic mechanisms from achieving their long-term equilibrium. These include transport costs, economies of scale, agglomeration economies and geographical differences among others. Such observations can also be extended to integrated areas, and therefore convergence of incomes across countries and regions may not be the natural outcome.

When other considerations, such as the role of specialisation in the process of development, macroeconomic conditions and institutional factors are also included in the analysis, convergence is far from being automatic since all these are forces that contribute to create and accentuate imbalances. When thinking of less developed countries as Argentina and Brazil, or even in the case of the poorer countries of the European Union such as Greece, the implications are more significant. In such countries, characterised by

dual economies as a result of export-led models of development, with weak institutions, non-democratic periods and significant macroeconomic crises, the simple Solow model is not useful in explaining differences in income. This does not mean that the predictions of the Solow model are wrong, but that the equalising mechanism with decreasing marginal productivity and full mobility of resources does not operate in the way described by the theory. It is therefore essential to take into account structural imbalances that affect the process of convergence.

In countries such as Argentina and Brazil that began their development process much later than the advanced nations, models of growth have historically been imposed from abroad. After independence the existing patterns of trade and distribution were changed to accommodate the needs of the external sector. In the export led phase, Latin American countries exported raw materials in return for manufactured products from the developed countries, certain areas were developed more than others in order to satisfy export demand and the countries as a whole did not achieve a long term development. When that model came to an end and Latin America was left in an unfavourable international position, import substitution gained momentum.

Import substitution industrialisation, and the theories that underpinned it, were the most significant attempt in the region to understand historically determined models of development as well as providing correcting policies in order to achieve a balanced growth. The role of the government as an efficient provider of resources and policy formulation was revived – as opposed to the automatic non-governmental policies embraced by neoclassical economics. However, Latin American countries were still dependent on imports in order to continue their industrialisation effort and therefore – and as will be seen later in chapters 6 and 8 – these countries were still dependent on developed countries. The increasing balance of payments problems and debt gave rise to another dependent phase in which Latin America has been following the economic guidelines dictated by the Washington Consensus. Over the last decade, liberalisation and deregulation followed, which, again had a negative impact on regional disparities since

the role of the government as redistributing agent was again – like in the export led model – neglected.

Once again, Latin America's major problem is timing. Following the Second World War, when Latin America followed an inward looking strategy, world trade was expanding rapidly. Industrialisation was undoubtedly the right policy given the market situation but the reliance on imported technology to further industrialisation and the not enough export earnings contributed to the failure of the model and the return to liberal policies.

The next chapter will review the methodology used for analysing inequalities and regional convergence in particular. It will address the main methodology for testing the theoretical models reviewed in this chapter and the debate regarding its applicability. Empirical studies carried out for several areas in the world will be discussed, with an emphasis on Latin America. The methodology that will be later used in the empirical chapters to analyse the European Union (chapter 4), the MERCOSUR countries (chapter 5) and Argentina and Brazil in particular (chapters 7 and 9) will also be explained and evaluated.

Methodology

1. Introduction

This chapter discusses the main methodological tools used in the literature in order to analyse disparities and test for convergence of regional incomes both within and between countries, highlighting the advantages and disadvantages of each of them. It is therefore the methodological basis for the empirical chapters on the European Union, the MERCOSUR countries and particularly Argentina and Brazil.

The most simple distinction when measuring regional economic disparities is that they can be measured either at any given period of time by the use of straightforward formulas or within a dynamic framework with the aid of econometric models. Section 2 will review the former. Most of these models will not be used in the rest of the thesis but deserve mention. In Section 3 the shift-share analysis is explained. Again, this methodology will not be used for Argentina and Brazil (mainly because of lack of accurate data) but will be briefly mentioned later since it has been used for the European Union by other authors. Section 4 describes the econometric methods most often used for testing convergence, and that will be used for the analysis in Argentina and Brazil in chapters 7 and 9 respectively. Finally, Section 5 reports the main relevant empirical findings in the literature when using the methods described.

2. Measurement of Disparities

There is a wide variety of techniques to calculate disparities, but they can effectively be divided into two groups, those that apply ratios between indicators and those that use comparisons of area distribution. The first group consists of simple, straightforward

methods; while the second group comprises specific measures used in the studies of income distribution and regional development.

Dispersion of values in a series

Within this subgroup there is a further distinction between those indicators in which the dispersion can either be analysed by the extreme values (or groups of extreme values) and those indicators that account for the distance of each observation to the mean of the series.

The indicators that analyse extreme values include the range of variation, the ratio of variation, the ratio of extreme quantiles, the range between the means of upper and lower quantiles and the divergence of the extreme values from the population mean. The two measures most widely used are the range of variation and the ratio of variation. The range of variation, which is the simplest of all coefficients, is defined as the difference between the extreme values of a series. The ratio of variation is given by the ratio between the extreme values, and it makes the coefficient less vulnerable to extreme values.

In another group, those indicators that refer to a general mean can be listed, such as the mean deviation, the relative mean deviation, the variance, the standard deviation, the coefficient of deviation, the coefficient of variation, the weighted coefficient of variation and the coefficient of variation logarithms. The standard deviation is usually preferred, given that it is not influenced by extreme values as the variance. In this thesis the standard deviation will be used.

Comparing elements of two series

This subgroup can also be further divided into two subsets; the simple (or 'one-effect') coefficients and the more sophisticated analytical devices (or 'decomposable coefficients'). Within the one-effect coefficients' group, the mean deviation between elements of two sets can be calculated. Also, coefficients that measure inequality such as the coefficient of geographic association (or coefficient of Florence) and the coefficient of correlation around zero, where 1 means maximum equality and 0 maximum inequality.

Finally, another measure of inequality widely used in development economics is the Gini coefficient; where 0 and 1 mean maximum equality and inequality respectively. A way of looking at this coefficient is with the Lorenz curve whereby the percentages of population from the poorest to the richest are depicted in the horizontal axis and percentages of income in the vertical one. A Lorenz curve runs from one corner to the opposite one. If everyone enjoys the same income, then the curve will be diagonal. In the absence of perfect equality the bottom income groups receive a proportionately lower share of income and therefore a Lorenz curve will lie below the diagonal.

The second sub-group refers to decomposable coefficients. The T-coefficient of Theil measures inequality, in which 0 corresponds to maximum equality and $\log N$ to maximum inequality. The Dalton measure, on the other hand, is based on a comparison between actual levels of aggregate utility and the level of total utility that would be obtained if income were equally divided. Finally, Atkinson's measure; which defines the 'equally distributed equivalent income' as the level of per capita income which if received by everyone would make total welfare equal to total welfare generated by the actual income distribution. If income were equally distributed, the value would be 0.

Main drawbacks of the measures for the regional analysis

Molle (1980) points out that not all these indicators may be suitable for regional analysis. He particularly considers that the range and ratio of variation as well as the ratio of extreme quantiles are not very useful because extreme values can be incidental and influenced by the regional division chosen. Further, the range of variation does not differentiate between real and nominal changes, therefore distorting the results. The ratio of extreme quantiles, although it does not have any of the drawbacks of the previous ones, is not suitable for small samples (less than a hundred).

The average mean is not appropriate for comparisons through time, and the relative mean deviation would be better in this case. The coefficient of variation is more adequate than the variance, since it is not affected by changes in average values and it is more appropriate for comparisons through time. The rest of the coefficients of variation are

also suitable for the regional analysis. The Lorenz curve will be referred to later to illustrate the differential impact that regional policies in the European Union had for different products.

3. Shift- Share Analysis

In order to assess the growth difference between two regions or between a particular region and the country, Molle (1980) refers to the multi-level and shift-share analysis. The difference in growth between a region of an integrated area and the whole area, or the difference in growth between two regions, can be decomposed into the sum of structural effects between the region and its country, and the differential effects between the country and the community.

The growth difference between a region and the nation, or as in this case between two regions can be seen as stemming from two effects, one structural and the other differential. The structural effect is due to a difference in sectorial composition between the individual region and the total of all regions. The differential effect refers to those activities in particular sectors that do not increase or decrease in all regions at the same rate. The differential effect is sometimes referred to as the location effect given that higher growth rates in particular regions might be a consequence of location advantages. These two effects can be measured using the shift share analysis as follows:

$$(1) \quad i^g - j^g = s_{ij} + g_{ij}$$

Where,

i^g, j^g = the rates of growth of the economy of regions i and j respectively

s_{ij} = the structural effect comparing region i with region j

g_{ij} = the differential effect comparing region i and j

By definition,

$$(2) \quad \begin{aligned} i^g &= \sum_k g_{ik} f_{ik} \\ j^g &= \sum_k g_{jk} f_{jk} \end{aligned}$$

in which,

g_{ik} and g_{jk} = rates of growth of sector k in regions i and j, respectively
 f_{jk} and f_{ik} = fractions of sector k in the regions i and j respectively

Thus,

$$(3) \quad \begin{aligned} f_{ik} &= e_{ik} / \sum_k e_{ik} \\ f_{jk} &= e_{jk} / \sum_k e_{jk} \end{aligned}$$

where,

e_{ik} = persons in employment in sector k in regions i and j respectively.

Then (1) may be rewritten as:

$$(4) \quad \begin{aligned} i^g - j^g &= \sum_k g_{ik} f_{ik} - \sum_k g_{jk} f_{jk} \\ &= \sum_k g_{ik} f_{ik} - \sum_k g_{ik} f_{jk} + \sum_k g_{ik} f_{jk} - \sum_k g_{jk} f_{jk} \\ &= \sum_k g_{ik} (f_{ik} - f_{jk}) + \sum_k (g_{jk} - g_{ik}) f_{jk} \\ &= s_{ij} + g_{ij} \end{aligned}$$

Therefore, the structural effect is a weighted mean of the differences between the economic structures of both regions weighted by the growth rates of the sectors in region i. The differential effect is measured as the weighted sum of the differences in the growth rates of the sectors of both regions, weighted by the sectoral fractions in region j.

As an example, shift-share analysis can be applied to regions of the European Community comparing each individual region with its country and the community as a whole. For each region, the procedure can be expressed in symbols as follows.

$$(5) \quad i^g - n^g = s_{in} + g_{in}$$

$$(6) \quad n^g - c^g = s_{nc} + g_{nc}$$

$$(7) \quad .n^g = c^g + s_{nc} + g_{nc}$$

where,

i^g = growth rate of region i of country n

n^g = growth rate of country n

s_{in} = growth rate of the European Community

g_{in} = structural effect between region i and country n

c^g = structural effect between country n and the EC

s_{nc} = differential effect between region i and country n

g_{nc} = differential effect between country n and the EC

Substituting (7) into (5)

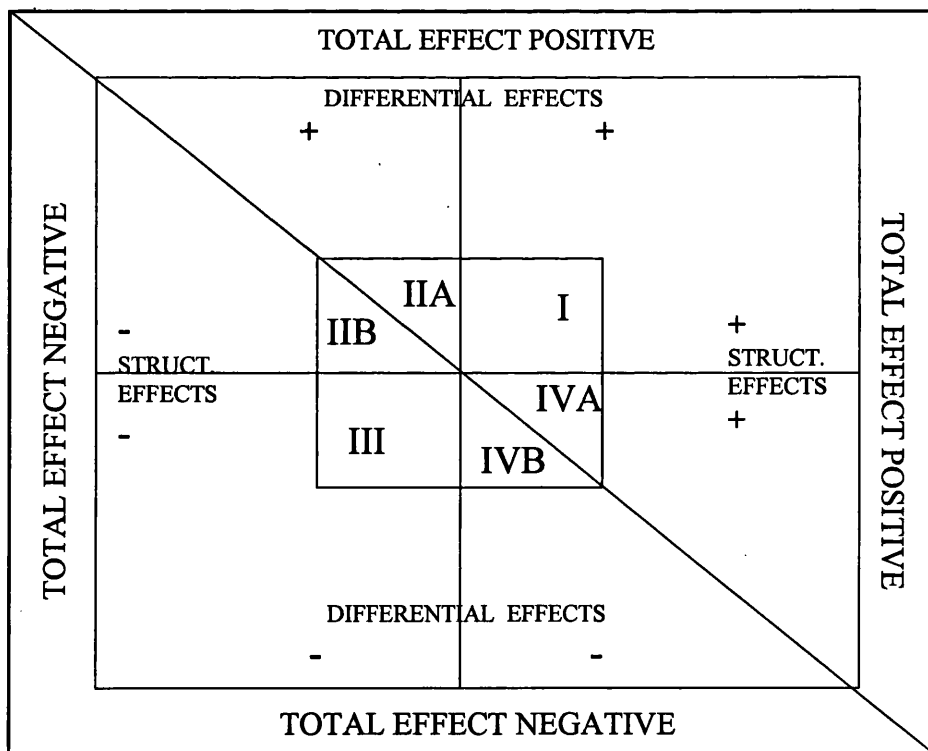
$$(8) \quad i^g - c^g = s_{in} + g_{in} + s_{nc} + g_{nc}$$

That is, the difference in growth between a region i and the European Community is the result of the sum of the structural effects between the region and its country; the structural effects of the country and the Community; the differential effects between the region and its country; and the differential effects between the country and the Community.

According to the positive or negative sign of the structural and differential effects, four cases can be distinguished, both at the national and regional level (Figure 3.1).

- I. The region shows both a positive structural and differential effect. This implies that although the economic structure in the region favours growth, this was higher than expected.
- II. Despite a high proportion of negative growth sectors in the regional economy, the region either succeeded in catching up with the country (A, positive net effect) or made some improvements (B, negative net effect)
- III. The region shows two negative effects, thus is heavily economically dependent on declining sectors and the decline is sharper than what its economic structure would have determined.
- IV. Although the regional economy would grow if all sectors grew at the same rate in the region as in the nation, other factors have retarded growth (A) or caused decline (B)

Figure 3.1. Shift-Share Analysis: Structural and Differential Effects



Source: Molle (1980)

In Armstrong and Taylor (1993), shift-share analysis has been used to explain regional disparities in employment growth. Although this technique has been heavily criticised (Richardson, 1978), it continues to be employed mainly because it is easy to understand and requires few data. It is useful in explaining the regional growth differences since it accounts for the industry mix of a particular region in its growth performance.

However, the technique has also several disadvantages that limit its use. The main problem is that of aggregation and the definition of industry that it is used. Further, for the case of less developed countries, data availability is a main drawback for the use of this method; whether it is data on industry mix or even employment. Therefore, this methodology will not be used in the analysis for Argentina and Brazil.

3. Convergence Analysis

The convergence hypothesis has been a matter of empirical controversy over the last few years. There are basically three main hypotheses. The first one is the *absolute convergence hypothesis* in which per capita incomes of countries converge in the long run to each other independently of their starting levels. Secondly, the *conditional convergence hypothesis* that tests for convergence of incomes per capita for countries with identical structural characteristics. Lastly, the *club convergence hypothesis*, which includes polarisation, persistence and clustering, tests for countries that are identical in their structural characteristics and converge to each other in the long-run if their initial conditions are also similar (Galor, 1996).

The use of convergence analysis is accepted as the main tool in order to differentiate between the different growth models seen in the previous chapter. As was mentioned before, the conclusion of the neo-classical model of economic growth is that poorer regions (or countries) will grow faster than richer ones. Therefore, if the conclusions of the neo-classical model hold, there would be absolute convergence. Romer (1986), Lucas (1988) and Barro (1991) argue that this is not the case and reject the neo-classical model in favour of endogenous models of growth.

Supporting evidence for the conditional convergence hypothesis can be found in Barro (1991), Mankiw et al (1992) and Barro and Sala-i-Martin (1995). Finally, Quah (1996) supports the existence of convergence clubs against the other two hypotheses. As will be seen below, the club convergence and conditional convergence hypotheses can be reconciled. Following Galor (1996), it will be seen that those two hypotheses are consistent with the neo-classical growth model, in contradiction to prevailing ideas. Moreover, Galor also concludes that the absolute convergence hypothesis, contrary to what is generally tested, is not derived from the neo-classical model of growth. Mankiw et al (1992) also conclude that the Solow model predicts that countries will generally reach different steady states. The convergence club hypothesis is nevertheless very useful when comparing very poor and very rich countries - or regions - in order to determine the dynamics of the groupings.

Convergence analysis is often carried out with the beta (β) and sigma (σ) analyses, which were introduced by Sala-i-Martin (1990), Barro and Sala-i-Martin (1991) and Barro and Sala-i-Martin (1992). The σ -convergence analyses how the dispersion of real per capita income (in logs) across certain groups of economies (or regions) tends to decrease over time. In other words, how the distribution evolves over time. As has been seen in Section 1, the dispersion of the variables for different countries - or regions - can be examined by the variance. There is σ -convergence if the dispersion, as measured by the variance of income per capita (in logarithms), decreases over time (Tavèra, 1999).

It is measured by:

$$(9) \quad \sigma_{(t)} > \sigma_{(t-1)}$$

where,

$$(10) \quad \sigma_t^2 = (1/n) \sum (\ln(y_{i,t}) - u_t)^2$$

u_i is the sample mean

n is the number of observations

$y_{i,t}$ is the income per capita in each period

(Villaverde, 1999; Utrera and Koroch, 1998)

There is β -convergence in a cross section of economies (regions) if there is a negative relation between the growth rates of income per capita and the initial level of income; in other words, β -convergence studies the mobility of income within a certain distribution. The existence of β -convergence means that poorer regions or countries would be growing faster than richer ones (for the definitions of convergence and divergence used throughout this thesis see point 5 in Appendix Va). Therefore, if β -convergence proves to be the case, it is said that the neo-classical model of growth holds. However, this model assumes that the only difference across countries is their initial levels of capital. In the real world, however, the neo-classical model would predict not that all economies tend to the same steady state but that each economy will tend to their own steady states (Sala-i-Martin, 1996). This is the reason why Galor (1996) also says that the neo-classical model does not generate the absolute but the conditional convergence hypothesis and therefore a rejection of the absolute convergence does not imply a rejection of the neo-classical model.

In order to test the absolute β -convergence the following equation will have to be estimated:

$$(11) \quad \ln(y_{i,t}/y_{i,t-1}) = \alpha + \beta \ln(y_{i,t-1}) + u_{i,t}$$

Barro (1991), Baro and Salai-Martin (1991, 1992), Mankiw, Romer and Weil (1992) and Knack and Keefer (1995) assume that the problem of omitted variables is not serious enough in order to abandon the use of ordinary least squares (OLS). Although this is a strong assumption, if any of the omitted variables were correlated to the included

explanatory variables, the coefficients on the included ones would be biased (Knack and Keefer, 1995).

In the case of conditional β -convergence, the incomes per capita of the economies (or regions) *that have identical structural characteristics* converge in the long run (as opposed to the absolute case, where the incomes converge in the long run regardless of their initial conditions). Thus, there is conditional β -convergence when the partial correlation between growth and initial income is negative. The conditional β -convergence explains why the absolute convergence might not take place, since it allows for other factors such as institutional or economic policy issues to be considered. Then, the trend towards convergence determined by the marginal productivity of capital can be counterbalanced by institutional factors or economic policy issues that prevent certain regions from reaching higher growth or trigger more advanced areas to grow faster than less developed ones.

According to Sala-i-Martin (1996), in order to test for conditional convergence, the steady state value of each economy has to be held constant. There are two ways of doing this. Firstly, by introducing variables that can act as proxies for the steady state. The second approach is to study sets of economies for which we can safely assume similar steady states. As will be seen in Section 4 this has been performed for OECD countries (Sala-i-Martin, 1996, 1996b; Andres *et al*, 1996) and the European regions (Sala-i-Martin, 1996, 1996b). Studies within a country have also been performed under the hypothesis of similar steady states for the states of the United States, Japanese prefectures (Sala-i-Martin, 1996, 1996b) and Sweden (Persson, 1997), among others as will be later discussed in Section 4.

The equation to be estimated will then be:

$$(12) \quad \ln(y_{i,t}/y_{i,t-1}) = \alpha + \beta \ln(y_{i,t-1}) + \gamma X_i + u_{i,t}$$

The vector of auxiliary variables, X_i , is a vector of proxy variables of steady state for the economy (region) i (Villaverde, 1999).

If the coefficient on initial income is negative, the economies (regions) under study display conditional convergence. Several variables can be considered in the conditional beta analysis, such as education, fertility, infrastructure or the share of the agricultural sector or industry in regional income. In the case of the share of the agricultural sector, presumably this sector is characterised by a relatively lower level of productivity growth. Therefore, the higher the share of this sector in the regional economy the lower the steady-state level of per capita income and the lower the expected growth rate given the initial income. In fact, omitting this variable can lead to a biased estimation of the speed of convergence. Conversely, regions with a higher share of industry and technical progress can be benefited by scale economies or learning by doing. In this case a higher share of industry in regional GDP will be expected to increase the rate of growth given an initial level of income.

As mentioned in the previous chapter, recent studies on convergence expanded to include other variables in the analysis of conditional convergence, such as political instability (Barro, 1991); rule of law and inflation (Barro, 1998); corruption and quality of bureaucracy (Knack and Keefer, 1995) and civil liberties (Kormendi and Maguire, 1985). This will also be referred to again later in this chapter when empirical studies are discussed.

In order to obtain the speed of convergence (λ), it is necessary to do the following transformation after estimating the equation by ordinary least squares:

$$(13) \quad \lambda = -\ln(1-\beta n)/n$$

where n is the time period

It is possible to compare both beta and sigma concepts of convergence. The β -convergence examines the presence of a mechanism of adjustment of economies towards their long-term equilibrium, while the σ -convergence shows the effect of convergence between the economies without any explicit theoretical reference (Tavèra, 1999). Therefore, although these two concepts of convergence are not equivalent, they are related. In Barro and Sala-i-Martin (1991) and Sala-i-Martin (1996) the relation between both the beta and the σ -convergence has been derived, and it was shown that the existence of β -convergence is a necessary but not sufficient condition for σ -convergence. Sala-i-Martin (1996b) intuitively explains that if the GDP levels of two economies become more similar over time, it must be the case that the poor economy is growing faster. Moreover, if there is β -convergence then the dispersion at the end of the period considered is smaller than at the beginning of the period, therefore σ -convergence must exist as well. Alternatively, 'the existence of β -convergence will tend to generate σ -convergence' (Sala-i-Martin, 1996b: 1021). Thus, β -convergence analysis usually follows a first approximation with the σ -convergence analysis.

However, as Quah (1996) points out, even when β -convergence is observed, the separation between regions as measured by the spread sigma may not be decreasing and therefore the poorer regions are not catching up. He then focuses on σ -convergence and presents various extreme scenarios to exemplify the potential shortcomings of sigma analysis. In the first one, sigma remains unchanged while some economies grow and others decrease but in such amounts that the indicator remains unchanged. Therefore it will not be possible to see intra-distribution dynamics. In the second scenario, sigma also remains unchanged; the reason being that the poorer stay poorer and the richer remain richer, therefore there is persistent inequality. Based on these 'extreme and unrealistic' examples, Quah (1996: 1366) concluded that neither sigma or beta analyses are able to provide a convincing answer for the analysis of convergence.

Quah (1996b) argues that a negative correlation between growth rates and levels says nothing about the poor catching up with the richer. Quah criticises the conditional convergence since he says its only use is to show whether a country is converging to its

own steady state, different from that of other countries. He adds that 'it is a complete puzzle to me how this can be interesting for whether the poor are catching up with the rich' (Quah, 1996b: 1048). According to Quah (1996), using panel data, that is combining cross section with dynamic variations, will not solve the problem since it will again fail to capture the dynamics of the entire distribution. Since a phenomenon such as twin-peakedness will not be seen by any of the standard methods for studying convergence, Quah suggests a way of analysing that can capture intra-distribution dynamics and which includes information on switches in ranks as well as the distance when those changes happen. Convergence dynamics can include situations such as convergence in clubs, which include polarisation, stratification and overtaking and difference. Polarisation refers to situations in which the poor get poorer and the rich richer with middle-classes disappearing. In the case of stratification, there are not two resulting clubs but several. Lastly, when referring to overtaking and difference this would be represented by two economies that initially were similar and over time one becomes richer than the other.

As mentioned earlier in this section, Galor (1996) reconciles the Solow model with the existence not only of conditional but also club convergence. He reinforces Quah (1996b) since countries that exhibit club convergence will also show conditional convergence in the data. Countries with similar conditions will be converging to each other's steady state levels and, given their similarities, these will be generating clubs. The inclusion of variables such as human capital, fertility and so on will strengthen the possibility of multiple steady-state equilibria and therefore makes club convergence compatible with conditional convergence and thus with the neo-classical model.

4. Empirical Studies

Over the last decade, a number of studies focused on convergence analysis. These studies can usefully be divided into two groups. On the one hand, there is a group that tried to determine the viability of either the Solow or the endogenous models. These models test whether poorer countries grow faster than richer ones and therefore include larger

samples. On the other hand, a second group studies regions within a particular country or similar regions in the world (an example was already mentioned on page 57, with reference to convergence studies for the OECD countries). Since their main focus is not the validity of any particular theoretical model but, rather, an analysis of the evolution of disparities, the latter provide more useful insight for this thesis. Unfortunately very few studies of this kind have been performed for countries in Latin America (those carried out for Argentina and Brazil will be discussed later). A separate group may be distinguished to include the most recent literature in growth theory, namely the effect of macro and political variables. However, this has so far only been tested for a large sample of countries, given the nature of the data and the very recent applications of these models. In this section, all of these groups will be discussed in order to assess the importance of each methodology used.

Within the more general empirical studies, Barro (1991) studied the relationship between per capita growth in the period 1960-1985 and the initial (1960) level of GDP per capita for 98 countries. When performing absolute β -convergence the correlation is close to zero, therefore seeming inconsistent with the hypothesis that poor countries grow faster than richer ones. However, when performing a conditional β -convergence analysis and including measures of human capital, this relationship becomes significant. In particular, he measures human capital with the rates of secondary and primary school enrolment. A positive relationship with the per capita growth is found when holding the initial human capital levels constant. He mentions that school enrolment could be measuring a flow of investment and not a stock of human capital, in which case literacy rates seem to be a more appropriate indicator. However, he points out that literacy rates appear to be measured distinctly in different countries and, in particular, these are quite inaccurate in the case of less developed countries. So, although enrolment rates might be referring to a flow instead of a stock of human capital, they might provide more accurate and consistent proxies, in particular when performing a cross-section analysis (Barro, 1991).

Regarding any possible measurement errors, as noted by Romer (1989), if there were a temporary measurement error, future growth rates of GDP would automatically have a

negative correlation with the starting level. For this to hold though, the measurement error would have to be very large, as well as temporary. If it were short-lived, no estimation problems would arise. Then, measurement errors, or business-cycle effects, can only be important for the results if they persist over periods longer than ten years. Again, he mentions that the measurement error is expected to be larger in less developed countries (Barro, 1991).

Sala-i-Martin (1996) reports the results of convergence tests across regions of the United States (48 States), Japan (47 prefectures), Europe (90 regions), and Canada (10 provinces). The time period differs among them, commencing in 1880 for the United States, 1950 for Europe, 1955 for Japan and 1961 for Canada. They all end in 1990 (except for Canada, in 1991). Data on Europe was expanded to include 17 Spanish autonomous communities for the period 1955-1987. He estimated the speed of β -convergence with a non-linear equation. He uses a non-linear estimator as opposed to the OLS because the estimated speed of convergence beta can be directly compared across samples with different length without the use of any transformations. His results show both beta and σ -convergence across all regions. The betas obtained are 'extraordinarily similar across countries' (p.1339), about 2 per cent per year, this estimate being very robust and always significant.

Despite the fact that Sala-i-Martin (1996) refers to specific countries in this analysis, his aim is to prove the validity of the neo-classical model and the robustness of the 2 per cent rate of growth across the samples. He mentions that the measurement error in the initial level of income might lead to a negative bias in the least squares estimation of the convergence coefficient and the results can therefore exaggerate the estimated convergence. However, he argues that classical measurement error is an unlikely explanation of this phenomenon. If temporary measurement error were important, the finding would have been a much smaller convergence coefficient when the lagged income was used. Nevertheless, even when the measurement error would show convergence when there was none, the sigma analysis would be unaffected by any

measurement errors since the measures of dispersion cannot be biased (unless one argues that the variance of the error falls over time, Sala-i-Martin, 1996: 1340).

On the other hand, Quah (1996) argues that the evidence of the 2 per cent convergence might be, at least in part, related to a statistical uniformity, namely the small sample downward bias in unit root processes. By generating a number of Monte Carlo simulations of cross-sectionally independent random walks and running cross sectional regressions, as in Sala-i-Martin (1996), he shows that the speed of convergence of 2 per cent a year can be estimated quite consistently when sample sizes are close to those used by Sala-i-Martin (1996). Secondly, he points out that findings on convergence using both beta and sigma might be misleading since they fail to identify the existence of different convergence dynamics, as seen in the previous section.

Bernard and Jones (1996) make an important point in indicating that from the initial concern about how poorer nations grew, convergence analysis has derived into a mere debate as to the annual convergence rate is 2 per cent and how robust or not this estimate is. Even if one wanted to enter the 2 per cent debate it should be noted that when considering studies such as Sala-i-Martin (1996); Barro and Sala-i-Martin (1992) - the United States and Japan; Dolado, *et al* (1994) - Spain; Cárdenas and Pontón (1995) - Colombia; Persson (1997) – Sweden - Jian, Sachs and Warner (1996) and Zhao and Tong (2000) - China; the results fluctuate between 1 and 4.2 per cent. These results, therefore, do not validate the 2 per cent so-called ‘iron rule of convergence’.

Among the studies that focused on income differentials within countries a few can be named, such as the ones for Spain, Sweden and China mentioned above, as well as Andres *et al* (1996) for the OECD countries, Coulombe and Lee (1993) for Canada, Tsionas (2000) for the United States, Tavèra (1999) for Europe, Petrakos (2000) for Greece, Nagaraj *et al* (2000) and Bandyopadhyay (2000) both for the Indian regions. Amongst Latin American examples worth mentioning are those by Esquivel (1999) for Mexico, Cárdenas and Pontón (1993) for Colombia, Cáceres and Sandoval (1999) and Dobson and Ramlogan (2002).

Esquivel (1999) studies the convergence between the Mexican regions and states for the period 1940-1995. There is evidence of absolute convergence among Mexican states for the period 1940-1995. However, when performing sigma analysis his findings reveal that there have been two different trends; first a reduction in the dispersion of the per capita GDP between 1940 and 1960 and in the period that followed, convergence stopped and remained mostly unchanged. Unfortunately, he does not perform β -convergence for the different sub-periods. In the case of regions instead of states, he finds again evidence of absolute convergence for the period, and sigma is quite similar except for the fact that there is an increase in regional disparities for the fifties, which was reversed in the seventies, remaining relatively constant until 1995. Esquivel then included education levels (percentage of population over 15 with post-primary education) and concluded that the reason for non-convergence in the sub-period 1960-1995 might be found in the growing divergence of human capital formation across Mexican regions and states. He also concluded that the low sensitivity of migration to income differentials could be another factor that slowed convergence.

Cárdenas and Pontón (1995) analyse Colombia for the period 1950-1989, finding absolute convergence for the 22 departments. They also calculate the ratio between the highest - and lowest - income departments, and find that this fell consistently from 10 in 1950 to 3.1 in 1989. However, they also discover that when dividing into sub-periods there is a lot of mobility, and departamental growth is an unstable process. The decade of the sixties is characterised by a stronger convergence than during the fifties, whereas the seventies are characterised by a very low convergence. The estimated rate of convergence for the whole period is 4.2 per cent. They also use regional dummies and find that this inclusion increases all the coefficients except in the eighties. They have also tested for the effects of migration on growth and found a positive but small effect. Cárdenas and Pontón (1995) include variables for human capital and find that the only significant one is illiteracy rates; the others (years of schooling and school enrolment) are not equally robust. They conclude that Colombia is a success story in terms of regional convergence with a speed of convergence twice as much as that for developed countries. There is also

evidence of σ -convergence, although this is highly irregular, exhibiting upward jumps in the mid-sixties, early seventies and again in the second half of the eighties.

Cáceres and Sandoval (1999) study the convergence of 17 Latin American countries for the period 1950-90. They find no conclusive evidence of absolute β -convergence. However, when looking at the σ -convergence, they find that the standard deviation has increased from 1953 until 1957 and then a decrease until 1978. In 1990 the value of dispersion was that of the beginning of the fifties but less than the peak of 1957. When analysing sub-regions the results become clearer. In particular, for the Andean countries there has been convergence from 1957 until 1987, when it increases, but the final value is still lower than that of the initial year. This is attributed to the high growth of Colombia in the sixties and seventies, of Peru, Ecuador and Bolivia in the seventies, and of the low growth rates of Venezuela (the country with the highest per capita income at the beginning of the period) in the seventies and eighties.

In the case of the Central American countries, Cáceres and Sandoval (1999) find a noticeable increase in dispersion. This is due to the high growth rates of the country with highest per capita income, Costa Rica, and the collapse of the economies of El Salvador and Nicaragua in the eighties. When considering the case of the four countries that constitute MERCOSUR, they point out that there was a strong decreasing trend from 1952 to 1982, which halved the dispersion value. This was due to the high growth of Brazil and of Paraguay in the sixties and seventies, while Argentina and Uruguay exhibited low growth rates. They then conclude that the decreasing dispersion found for all 17 Latin American countries reflect that of the Andean and MERCOSUR region while say nothing about what was happening in Central America.

Dobson and Ramlogan (2002) find evidence of absolute β -convergence between 1960-1990 in Latin America, but they also point out that stronger convergence as well as divergence may be present during shorter time periods. In particular, β -convergence was highest in the seventies and mid-eighties. This convergence then disappeared in the late

eighties due to the economic crisis and did not occur again in the nineties despite moderate growth.

In the case of European countries, I will here note only the study by Persson (1997) since Sweden joined the European Union in 1993 and so will not be considered later. He analyses convergence among the twenty-four Swedish counties from 1911 to 1993. His findings reveal stronger and more robust evidence of convergence in per capita income than for cross-country studies. The σ -convergence also shows a steady decline throughout the period with only two stagnating periods, 1920-1940 and from 1980 onwards. As in the case of Mexico (Esquivel, 1999), Persson does not perform beta analysis for the different sub-periods.

Convergence studies have been carried out for other areas of the world, and some should be mentioned from the perspective of comparing Brazil and Argentina with other less developed countries. For the case of India, Nagaraj *et al* (2000) study inter-state disparities in the period 1970-1994. They find evidence of conditional convergence across regions, once allowing for the impact of literacy (particularly strong), primary education, health conditions, roads, irrigation, power capacities and financial development. When considering the share of agriculture in regional GDP, a significant coefficient was found and the predominantly agricultural states had a lower level of steady-state per capita income. However, when performing σ -convergence they found evidence of growing disparities as measured by the standard deviation. Although it decreased slightly at the beginning of the sixties, it increased sharply in the seventies and although less markedly, it persisted throughout the period. Bandyopadhyay (2000) has also studied the Indian regions in the period 1965-1988 and found a decline in disparities in the sixties, an increase in the seventies and eighties and a clear emergence of two convergence clubs. One of these clubs is located at around 130 per cent of national average, while the other at 50 per cent. Nevertheless, he finds a weakening of the polarisation trend in income distribution.

Jian, Sachs and Werner (1996) very interesting paper on regional disparities in China, performs both sigma and beta for the sub-periods. They analyse convergence among Chinese provinces for the period 1952-1993, finding that convergence has been a relatively recent phenomenon, in particular after the reforms in 1978. During the initial central planning phase, until 1965, only weak convergence is observed. In the period of the Cultural Revolution (1965-1978), there is strong divergence among the Chinese provinces. By contrast, after 1978, there is evidence of convergence; in particular associated with rural reforms and coastal areas, the latter associated with the trade liberalisation and investment flows. Finally, since 1990, regional incomes seem to have been diverging, and Jian and Sachs explain this by the existing gap between the coastal and interior provinces rather than a general increase in disparities. It seems that after 1990 the emergence of a two-speed China can be observed, with fast-growing coastal areas and interior regions lagging behind.

Zhao and Tong (2000) also blame the “coastal development strategy” for worsening disparities by switching national development priorities from the interior to the coastal regions. When looking at the σ -convergence analysis, Jian *et al* show a slight decrease until 1957, followed by a clear increase and a subsequent decrease until 1965, a sharp increase until 1970 and a further jump until 1978 (the highest indicator of the period). Thereafter, a steady decline is seen until the beginning of the nineties, when after reaching the lowest deviation of the period starts to increase again. In terms of the beta analysis, when dividing into sub-periods, it can be seen that a small though statistically insignificant convergence for 1952-65 is found, followed by a positive and significant value of beta (divergence) and during the reform period after 1978 evidence of β -convergence. Jian *et al* therefore conclude that regional convergence in China is strongly associated with the degree of openness in the economy. The authors, however, did not test formally for the link between the sub-period characterised by divergence corresponding to that of the Cultural Revolution, a period of great instability in China and the absence of the rule of law as mentioned in the previous chapter.

The recent empirical research on political and macroeconomic variables affecting growth, though still at an exploratory stage, may be summarised in the following terms. Barro (1991) has included variables that account for political instability in his study of 98 countries for the period 1960- 1985. In particular, when taking into account the number of coups per year and a variable that accounts for the number of political assassinations per million of inhabitants per year, his findings reveal that these had a significant impact on growth. He also includes a proxy for price distortions and finds it to be negatively linked to growth. In Barro (1998) other variables apart from the democracy index have been included, such as the rule of law and the inflation rate. All these variables showed the expected signs in relation to their impact on economic growth. He includes a 'dummy' variable in order to capture any effects when considering Latin American countries into the analysis. This dummy variable was negative and significant with respect to growth for the whole period and significantly positive for a variable that accounts for the number of children per woman that will live beyond the age of four. Regarding investment ratios, the estimates are negative but not significant. However, Barro concludes that this analysis leaves unexplained a good deal of the weak growth performance of Latin America. The Latin America dummy is again included in Barro (1998) for the period 1960-1990. In this analysis, however, he finds that the variable is individually insignificant, and the slow growth of the region can be mostly attributed to the explanatory variables. By including the inflation rate, the Latin American variable becomes insignificant. Besides, if the fertility rate or government consumption ratio is omitted, the Latin American variable becomes significant.

Knack and Keefer (1995) consider that both political violence and political and civil liberties are insufficient proxies for the quality of institutions and that more direct indicators should also be included. They consider variables such as expropriation risk, rule of law, of contracts by governments, corruption, the quality of bureaucracy, contract enforceability and infrastructure quality. They find that there is an increase in both the magnitude of the repudiation and statistical significance of the convergence coefficients when institutional variables are included in the equations. These coefficients were lower once investment was included in the equations, since this effect was captured by the

coefficient of investment itself, signalling the expected relations between higher instability as a deterrent of investment.

Kormendi and Meguire (1985) also carry out an “exploratory empirical study” in their sample of 47 countries in the period 1950-77. They use the Gastil index of civil liberty, where 1 means most free and 7 least free. A negative, though marginally significant, effect of civil liberty on economic growth is found. However, the impact of civil liberties on investment was highly significant. They follow the hypothesis that the variability of monetary shocks adversely affects growth and they find strong support for this hypothesis. They estimate that an increase of 10 per cent in the standard deviation of money supply shocks is associated with almost 3 per cent lower economic growth. For a country like Chile, they estimate that the apparent cost of monetary variation in terms of lost economic growth is on the order of 4.9 per cent. In the case of Uruguay, the country with slowest growth in the sample, this could be explained mainly by the mean growth of the rate of inflation, the standard deviation of the money supply and the level of initial per capita output. There is a negative coefficient when including inflation in the equation to be estimated contrary to the Tobin-Mundell hypothesis that states that there will be a shift away from real money balances towards real capital as a consequence of expected inflation. Hence, the higher the anticipated inflation growth, the larger the shift towards capital and therefore higher economic growth.

Finally, Scully (1988) tests 115 market economies over the period 1960-1980 in which GDP per capita and a measure of economic efficiency are compared to measures of political, civil and economic liberty. His results show that the choice of institutional framework had a significant impact on the efficiency and growth of the economies. In particular, politically open societies grow more than those in which freedoms are limited. Unfortunately he does not report conclusions for any particular country or region.

The European Union will be analysed in more detail in the following chapter, but mention should be made here of studies specifically on the impact of political systems on disparities for both Greece and Spain. Petrakos and Tsoukalas (1999) included the recent

theoretical literature in their model and found that increases in spatial concentration in Greece have been associated with the country's deviation from democratic politics. Tavèra (1999) mentions that the poor growth of the Spanish economy between 1970-1975 can be associated with the political instability in the country in that period.

Rodrik (1998) argues that the decrease in growth rates in Latin America after 1980 is proportional to the magnitude of both the external shocks as well as to the institutional ability to deal with conflicts. Unfortunately, this new literature on growth has not yet been tested empirically for Latin American countries and these observations are descriptive rather than analytical.

5. Conclusions

In this chapter, the main methodology used for analysing disparities and testing for convergence has been reviewed, from the simplest measures of dispersion to absolute and conditional β -convergence analyses. The latter are the two most widely used methods for analysing convergence, despite some controversy as to which theoretical model each one validates as well as the two per cent convergence growth rate. The criterion in this thesis follows Bernard and Jones (1996) in that the debate should be focused somewhere else. This thesis is not a theoretical discussion and it is therefore not aiming to validate any growth model in particular; but simply to determine whether convergence is automatic, to show the evolution of disparities and to study what variables affect the process of convergence as will be studied in Part II of this thesis.

Simple measures of disparities, such as percentages of national averages, rankings and σ -convergence are useful in order to draw some simple descriptive observations. They can be used as a first approximation as well as to complement more specific analyses. It has been also seen in this chapter that the results of the β -convergence analysis can vary throughout the different sub-periods under study. Most authors work on the longer periods and do not analyse short-term variations in the evolution of disparities. With results varying according to the period under consideration, this seems to be an important

point to be taken into account for further research. Also, variables such as education, regional share of agriculture and industry are particularly relevant for the case of less developed countries and should also be included in the analysis. Moreover, accounting for macroeconomic factors, political violence and political and civil liberties also seems to be a significant addition for analysing the factors that may hinder convergence, particularly in less developed countries. The approach followed here is to try and use different methods, since each has its advantages - as well as disadvantages - and allows gaining a different perspective. Diverse and useful results can be reached by applying each of them, without getting into an a priori debate about their theoretical usefulness.

The following chapter of this thesis will focus on the European Union, which is the case study chosen in order to provide a better insight not only in terms of disparities within a particular country but also in order to draw conclusions for integration schemes. This will be relevant for the analysis of the second part of this thesis, and in particular for Argentina and Brazil in terms of future integration if MERCOSUR is deepened and for a possible FTAA (Free Trade Area of the Americas).

Integration and Disparities: The European Union Experience

1. Objectives

The main objective of this chapter is to study regional economic disparities in the EU since the late fifties, focusing on whether the removal of trade barriers across European countries has contributed to a decrease in disparities not only between but also within countries. The structure of the chapter is as follows. First, a brief history of the process of deepening in the EU since 1957 to present times is undertaken, emphasising the process of institution building regarding regional disparities. Then, Section 3 empirically analyses the development of disparities for the whole period, stressing the growing importance of regional concern in the EU. Lastly, in Section 4, the effects of particular regional policies that have been implemented in the EU will be reviewed, in order to determine not only whether these have been successful but also to identify policies that could have been working against income redistribution.

In order to study the development of disparities in Section 3, both sigma and beta analyses have been performed with data from Eurostat. Although in the case of the European Union both the political and economic conditions are not as relevant as will be in the cases of Argentina and Brazil; links to these two topics will be made when relevant.

2. The European Integration Experience

The European integration process provides a unique framework of analysis in that it constitutes the most successful and important economic area in the world. The EU produces 20.2 per cent of total world GDP and comprises 6.4 per cent of total world

population (Eurostat, *Statistics in Focus*, 1999). The EU-15 is the largest exporter in the world, with a share of 20.3 per cent of world trade, while it is the second largest importer, after the United States, with a share of 19.1 per cent of world imports (WTO). Besides, it has undergone several distinct stages in its fifty years of existence that provide a unique insight into regional issues.

The growing concern for regional policies can also be seen from the percentage of the EU budget allocated to structural policies. While in 1985 the amount accounted for 3.7 billion ECU (European Currency Unit), this had increased to 18.3 billion by 1992 (House of Lords, 1996/1997). This amount reached 36 billion ECU in 1999, and in Agenda 2000 it was agreed to be maintained at this level, which accounts for 0.46 per cent of the Union's GDP for the programming period 2000-2006 (Commission of the European Communities- CEC, 1997b). A brief outline of the process of institution building from the regional perspective is given below.

2.1. The European Coal and Steel Community

The origins of the European Union can be traced to the aftermath of the Second World War. The European Coal and Steel Community (ECSC) was established by the Treaty of Paris in 1951 with the purpose of creating a free market for those products. Although this was expected to generate benefits, it was also recognised that such an initiative would imply structural changes, such as loss or interruption of employment. Re-adaptation assistance was designed to deal mainly with structural but not cyclical unemployment. Provisions were taken during a five-year transitional period. In order to assist workers, an innovative supranational agency, the High Authority, was created (Robertson, 1962).

The High Authority had the right to raise levies on coal and steel production within the Community and the government of each member state would make an equal contribution to the costs of re-adaptation (Tsoukalis, 1991). However, only a few workers affected by the re-conversion were reallocated, and the objective of re-employment of displaced labour was only partially achieved (Romus, 1979). During the first years of the ECSC, re-adaptation aid was mainly characterised by the reluctance and inhibitions of national

governments to apply for it, due to internal political tensions. Besides, there was strong social resistance of workers to migrate from one region to another. On the side of the High Authority, criticisms were mainly directed to delays and lack of information regarding aid schemes (Robertson, 1962).

The ECSC was subsequently incorporated in the Treaty of Rome, and today it is concerned with making loans to coal, iron and steel and associated industries for investment purposes. It also provides conversion loans to other industries in order to create jobs and absorb redundant coal and steel workers as well as providing grants for retraining and resettling those workers (Armstrong and Taylor, 1993).

2.2. Treaty of Rome and the Creation of the European Economic Community

The Treaty of Rome was signed in 1957, creating the European Economic Community (EEC). The original members - referred to as the EEC-6 - included the Benelux countries (Belgium, Luxembourg and Holland), West-Germany, France and Italy. The countries of the EEC-6 had similar levels of development, the extreme cases being Luxembourg, which was 40 per cent above the average EEC-6 income level and Italy, which was 18 per cent below this average. However, the case of Italy was due less to a generalised underdevelopment problem than to her regional problem in the Mezzogiorno region in the south, as will be discussed in the following section (Kennedy, 1994).

One of the objectives of the European Economic Union was achieving a 'harmonious development by reducing the differences existing between the various regions and the backwardness of the less favoured regions' (Preamble, Treaty of Rome). In Article 2 of the Treaty of Rome, the need for more equilibrium between regions is again referred to. However, Article 92 states that any aid granted which might distort or threaten competition is incompatible with the common market. Consequently, there are no mechanisms for regional policy outlined in the original Treaty. Regional economic policy is otherwise treated as exceptional, as in Article 80.2 where regional considerations are

made as an exception to achieve convergence in transport policy (Lopes Porto, 1997; Treaty of Rome).

This apparent contradiction in the Treaty corresponds to the widespread belief at that time that the creation of a single market would lead to the alignment of incomes per capita and would promote economic growth (Sutherland, 1986). That view is in line with classical economics, as seen in previous chapters, whereby differences would be levelled out through automatic mechanisms operating in the economy. Moreover, as the existent disparities in the EEC-6 were predominantly within rather than between countries, Community regional policy was slow to develop and therefore responsibility for conducting regional policies was mainly left to national authorities (Tsoukalis, 1991).

Nevertheless, few institutions were created and some Community policies, which offered specific financial help in different areas, were implemented. These included support for agriculture - through the Common Agriculture Policy (CAP), the labour market - the European Social Fund (ESF) - and assistance for depressed areas - the European Investment Bank (EIB) (Glöckler et. al., 1998). The Common Agricultural Policy was outlined in the Treaty of Rome, Article 3 of which states that the Community will include 'a common policy in the sphere of agriculture and fisheries'. This is reinforced by Article 38 that extends the common market to agricultural products and provides for the creation of a common agricultural policy among the Member States. The objectives were to increase agricultural productivity, to ensure a fair standard of living for the agricultural population, to stabilise markets, assure availability of supplies and ensure reasonable consumer prices (Article 39). It also provided for the creation of agricultural guidance and guarantee financial instruments (Article 40:4, Treaty of Rome). The main objectives were to promote agriculture and to guarantee the income of agriculture population.

The European Social Fund, established in Articles 123-125 of the Treaty of Rome as an agency of the Commission, was intended to overcome structural unemployment by encouraging geographical and occupational mobility to those workers affected by re-conversion schemes. Initially, the ESF paid 50 per cent of the costs of re-employing

workers by retraining and resettlement and also granted aid to workers during the re-conversion period. However, there was no explicit reference to regional problems. Nowadays, the ESF is the second largest structural fund, and since the 1988 reform focuses more on regional problems in depressed regions and youth employment (Treaty of Rome; Armstrong and Taylor, 1993).

The European Investment Bank, established in former Articles 129 and 130 (now Articles 198d and 198e) as an independent institution, was given the task of granting loans and giving guarantees in order to help financing projects in less favoured regions. The EIB was the only mechanism in the original Treaty of Rome directly linked with promoting regional development within the Community (Sutherland, 1986; Treaty of Rome). Over the years, the EIB has become a more significant contributor to regional policy, and since 1979 loans have been made available through the New Community Instrument. The latter was established in order to speed up the integration of poorer member states and includes specific loans to small and medium sized enterprises (Armstrong and Taylor, 1993).

In 1965, the First Report on Regional Policy was issued, and in 1967 the Commission submitted a proposal for Community action regarding regional development and a communication on EC regional policy. As a result, the Directorate General for Regional Policies (DG-XVI) was created in 1968, nowadays the Regional Policy Directorate-General.

2.3. Regional Policy Reconsidered: the Creation of the European Regional Development Fund

The EEC-6 became the EEC-9 with the enlargement towards the United Kingdom, Ireland and Denmark in 1973. At this stage, income levels became more heterogeneous. Although the UK and Denmark had income levels close to those of the Community average, Ireland's was three-fifths of that average (Kennedy, 1994). The real income level of Luxembourg, the richest nation, more than doubled that of Ireland, the poorest (Sutherland, 1986).

'Enlargements have proved to be the catalyst for movement towards developing policies directly aimed at reducing differences between regions' and thus this first enlargement resulted in 'a new dynamism in the search for regional policy instruments' (Sutherland, 1986: 373). However, enlargement was not the only reason for a growing concern about regional disparities. From the beginning of the European integration process until the seventies, member countries were experiencing rapid economic growth, high employment rates and relative monetary stability. However, in the seventies, growth stagnated, the fixed exchange rate system was dropped and the first oil crisis took place (Tsoukalis, 1991). Thus, both enlargement and the economic slowdown led to regional policy to be reconsidered. This will be further examined in the following section.

In 1973, the Thompson Report on the regional problems of an enlarged Community reaffirmed that the long-term prospect of a monetary union would not be possible unless an effective regional policy was implemented (MacDonald and Dearden, 1994). The European Regional Development Fund (ERDF) was established in 1975, and a Regional Policy Committee was created in order to monitor, access and advise on the development of regions. Another reason for the creation of the European Regional Development Fund was to compensate Britain financially for the negligible benefit that it derived from the Common Agricultural Policy (Glöckler, G. *et al*, 1998). Together with the creation of the ERDF, a more accurate definition of a region, criteria for eligibility and characteristics of the policies were outlined. The ERDF was later modified in 1979 and 1984 but the most important reform was not attained until 1988.

2.4. The Single European Act and the Creation of the Single Market

The second and third enlargements that included Greece (1981) and later Spain and Portugal (1986) situated the EEC at a 'turning point in the development of policies to promote convergence' (Sutherland, 1986:377). The enlargements resulted not only in an increase in heterogeneity within the Community but also posed a major challenge for the CAP. The three new members increased the Community's population by 22 per cent and surface by 48 per cent but only added 15 per cent to GDP (See Table in Appendix I.f). Besides, these countries were characterised by their high proportion of labour force

engaged in agriculture, representing 36 per cent in Greece, 28 per cent in Portugal and 22 per cent in Spain, while the average of the EEC was 8 per cent. The enlargements resulted in a 50 per cent increase in the Community's agricultural population (Romus, 1979).

The approval of the Single European Act (1986) and the objective of creating the Internal Market for 1992 signaled the most challenging task yet faced by the EC, generating expectations on two fronts. On the one hand, an increase in economic growth in the Community was predicted, providing the opportunity for less advanced regions to catch up with the rest. On the other hand, it was recognised that the increase in competition resulting from the single market could undermine the competitiveness of less favoured regions and thus lead to a widening of disparities in Europe. The latter argument resembles that of the dependency school in Latin America in the way in which poorer countries insert into international trade, and even within the EU the impact of the SEA was recognised not to be uniform for all regions. The White Paper, presented in 1985, admitted there would be risks given that labour and capital would be able to move freely to areas of greatest economic advantage. It was recognised that the discrepancies between the regions could be exacerbated as a result of the creation of the Single Market, and this in turn would jeopardise convergence (Begg, 1989).

As a consequence, the Commission launched a programme of research - 'The cost of non-Europe' - in order to assess the spatial distribution of benefits of the completion of the internal market and adjustment costs and several vulnerable sectors were identified. These included sectors with high non-tariff barriers that would need to operate at a larger scale; those with high non-tariff barriers, low import penetration and price dispersion where rationalisation and restructuring was expected; and sectors subject to greater import penetration but where economies of scale were still possible (Hart and Roberts, 1994).

As a result of acknowledging the potential risks for less advanced regions, the Single European Act consolidated the aspiration vaguely mentioned in the Treaty of Rome by devoting a whole section to economic and social cohesion. The First Periodic Report on

the Development of the Regions was published in 1981, the Second in 1984 and the Third in 1987. In 1988, the reform of the Structural Funds was carried out and regional policy was included in the Treaty. On 1 January 1989, the reforms became effective and the criteria for eligibility was divided into five objectives.

2.5. The Treaty on the European Union and the Importance of Cohesion

In 1991 the Treaty of Maastricht – or Treaty on the European Union - introduced cohesion as one of the ‘pillars’ of the new European Union. This was accomplished by strengthening the articles relating to it, annexing a specific protocol and by the creation of the Cohesion Fund, which constituted the major innovation (Hall, 1994). Despite the Structural Funds being the main community instrument for regional policy, the Cohesion Fund is a highly significant instrument of regional policy in the Union. It constitutes the first attempt to establish a budget-transfer mechanism related to economic performance and it is directed towards member states rather than regions (Cristophersen, 1994). Member states whose per capita GDP is less than 90 per cent of community average are eligible and the Fund’s main objective is to ‘provide a financial contribution to projects in the fields of environment and trans-European networks in the area of transport infrastructure’ (Treaty of Maastricht, Article 130d).

In addition, the Treaty on the European Union created the Committee of the Regions (CoR) (Articles 198a-198c). CoR is an advisory body with 222 representatives among local and regional authorities, who are chosen by the Member States, and it is intended to comply with the subsidiarity principle, i.e. that decisions should be taken at the level that can act most effectively for the issue concerned. This is a major step from the first days of the Community where the decisions were to be taken only at the national level. The Committee of the Regions is responsible for providing the regional and local insight to the institutions and keeping their citizens informed of community policies. The CoR acts on five areas: economic and social cohesion; trans-European networks; public health; education and youth; and culture. In 1997, the Amsterdam Treaty expanded the areas of interest to employment and environment among others. Article 130b establishes that the Commission will submit a report to the Parliament, the Council, the ESC and the CoR

every three years on economic and social cohesion progress (Treaty of Maastricht; Glöckler, G. *et al*, 1998).

2.5. Agenda 2000: the Prospects of Further Enlargement and the Challenge for Regional Policies

Following the fall of the Berlin Wall in 1989, the European Community re-established diplomatic relations with the Central and Eastern European Countries (CEECs) and after the collapse of the Council for Mutual Economic Assistance (CMEA) trade was directed westwards, primarily to the EC. The transition process initiated a different period in European-CEEC relationships by removing quotas on several products, instituting Generalised System of Preferences (GSP), and reaching various Trade and Co-operation agreements as well as Co-operation Agreements with CEECs (Jovanović, 1998).

The Phare Programme, created in 1989, initially including Hungary and Poland, was later extended to most of the transition countries. It was intended to provide subsequent financial support in the process of reforming the economies, improving market access, promoting investment, transferring know-how, adjusting the farm sector, food aid, environment protection and vocational training. At a later stage, this will also include the adoption and application of the *acquis communautaire*, which comprises the whole of primary and secondary instruments which makes the EU and to which each Member State is bound (Jovanović, 1998).

During the 1990s Europe (or Association) Agreements were signed to provide the legal basis for bilateral relations between the EECs and the EU. These agreements offer the possibility of full membership in the future. In 1993, the deepening of enlargement was agreed at the Copenhagen European Council. The Copenhagen Criteria defined the economic and political conditions that the applicant countries are required to satisfy in order to be able to join the Union: a market economy, democratic political system and the acceptance of the full *acquis communautaire*. A fourth implicit requirement is that entry should neither jeopardise the EU's financial resources or enlargement endanger the deepening of the integration process (Jovanović, 1998).

In 1997, the Commission presented Agenda 2000 in which future developments of the EU including enlargement, its impact and the financial framework beyond 2000 were addressed. The EU institutional reform would allow for the accession of the first countries that fulfil the criteria. In 1998, the EU launched the process to make enlargement possible. There were thirteen applicant countries: Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, the Slovak Republic, Slovenia and Turkey.

This enlargement (not considering the special cases of Cyprus and Turkey) constituted the major challenge for the EU so far. The eleven CEECs represented an increase in surface of 34 per cent, in population of 29 per cent - more than a hundred million people, but they only imply an increase in total GDP of 9 per cent (See Table in Appendix I.f). The most striking feature is that enlargement will imply a reduction in the average per capita GDP the Community as a whole, of larger proportions than for other enlargements before. The overall per capita GDP of the eleven CEECs is estimated at 38 per cent of the Community average- while that of the four less favoured Member countries of the EU15 is at 74 per cent of Community average (See Figures in Appendix I.e).

Despite the potential economic benefits that enlargement will bring, the Commission recognised that these would not be immediate or evenly spread, and so an adjustment period will take place in order to deflate to economic, social and political tensions. Several problematic areas have been identified: the low per capita incomes of the applicant countries; the heavy bias towards agriculture in most of them; inadequate infrastructure and networks; weak administrative capacity and high unemployment (the latter present in both applicant and member countries).

There are several benefits for Eastern European economies from joining the EU; membership will provide access to the Structural Funds and to other EU funds. However, the austerity measures required by EMU pose a question as to where will the funds come from. Further, the loss of jobs and business in industries and

agriculture due to eastern exports will put pressure on policy makers (Jovanović, 1998). Agenda 2000 also addressed the issue of the Structural Funds and proposed modifications aiming at improving effectiveness by increasing concentration, simplification and decentralisation of its management.

3. Development of Disparities

3.1. Methodology

In this section, I empirically analyse the evolution of disparities between and within countries of the EU, based on GDP data from Eurostat reports (1972, 1981, 1988, 1993, 1998). The period of study comprises the period 1960-1995 since this was the last year for which data was available at the time of the writing of this chapter and it will suffice for the case study of an integrated area over a long period of time. It should be noted, however, that this analysis will not be as in depth as that for Argentina and Brazil. The period of study 1960-1995 will be divided into three sub-periods, following the institutional developments in the EU. Each sub-period (1960-1973; 1973-1988 and 1988-1995) will include the countries that belonged to the EU at that time (namely the EEC-6, EEC-9 and EEC-12) with the exception of Greece, which despite having joined in 1981, is only considered in the third sub-period. The data used is the NUTS 1 (Statistical Nomenclature for Territorial Units); which is used to determine the distribution of structural funds and for statistical data. NUTS 1 corresponds to a higher aggregational level while NUTS 2 has more detailed information on smaller regions. Both the French *Departements d'Outre Mer* as well as the Netherlands Antilles have not been considered given the irregularity of the series and also because they do not belong to the EU geographically. Moreover, the five German *länder* that were included in the territory after unification will not be considered. Finally, Austria, Sweden and Finland have been excluded from this analysis given that they joined the EU at a later stage.

In the case of countries with no regions at NUTS 1 (Luxembourg, Ireland and Denmark) these countries have been omitted for regional analyses and only considered when analysing disparities between countries. There were some gaps in the data, such as

Hamburg (1972-1975), France (1970), Netherlands (1967-1970 and 1972), Belgium (1969), Denmark (1985) and Greece (1989-1991). In those cases, intrapolation was used in order to fill in the gaps since they did not extend for long periods. In other cases, such as for the period 1960-1970, where GDP was in local currencies instead of in million ECU, data from different series had to be merged using exchange rates, ratios and logarithms when necessary. For other periods, although the data was in million ECU, merging different series was also done in order to apply sigma and beta analyses. In the case of Portugal, even though Continente, Madeira and Açores are defined as NUTS 1, there is no regular data for the last two prior 1995 and therefore only Continente will be considered. The data used in this analysis is in Appendix I.b.

For the first sub-period (1960-1970), the countries and regions considered are as follows. Germany (11 regions): Schleswig-Holstein; Hamburg; Niedersachsen; Bremen; Nordrhein-Westfalen; Hessen; Rheinland-Pfalz; Baden-Württemberg; Bayern; Saarland and Berlin (West). France (8 regions): Ile-de-France; Bassin Parisien; Nord-Pas-de-Calais; Est; Ouest; Sud-Ouest; Centre-Est; Méditerranée. Italy (11 regions): Nord-Ovest; Lombardia; Nord-Est; Emilia-Romagna; Centro; Lazio; Campania; Abruzzi-Molise; Sud; Sicilia; Sardegna. Netherlands (4 regions): Noord-Nederland; Oost-Nederland; West-Nederland; Zuid-Nederland. Belgium (3 regions): Vlaams Gewest (Région Flamande); Région Wallonne (Waals Gewest); Région Bruxelloise (Brussels Gewest). Luxembourg (1 region)

In the case of the sub-period 1973-1988, the above-mentioned countries were included plus the following. United Kingdom (11 regions): North; Yorkshire and Humberside; East Midlands; East Anglia; South-East; South-West; West Midlands; North-West; Wales; Scotland; Northern Ireland. Ireland (1 region). Denmark (1 region).

Finally, from 1988-1995, the new member countries and their respective NUTS 1 regions are: Spain (7 regions): Noroeste, Noreste, Madrid, Centro, Este, Sur, Canarias. Greece (4 regions): Voreia Ellada; Kentriki Ellada; Attiki, Nisia Aigaiou and Kriti. Portugal (1 region): Continente

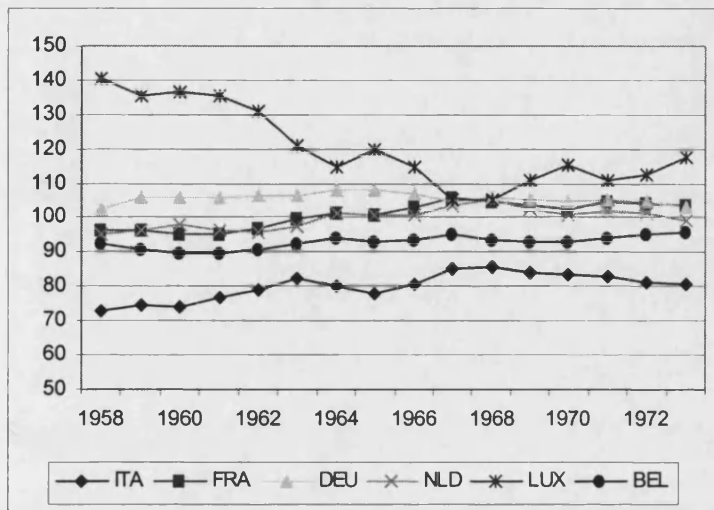
3.2. From the Treaty of Rome to the First Enlargement (1958-1973)

The main argument regarding disparities in the literature that covers this period is that while there was convergence between the six member *countries*, disparities among *regions* remained mostly unchanged. According to Tsoukalis (1981), there was a marked convergence between the original six members of the Community. Sutherland (1986) agrees that over the period 1960-73 there was convergence of income levels, but he also points out that the increase in free trade and growth was not only attributable to the EEC, but also coincided with a period characterised by high growth rates in Europe. This would seem to indicate that, at least in this sub-period, disparities between countries were counter-cyclical (i.e. decreasing when macroeconomic conditions are favourable).

I have depicted each country's percentage of average EEC-6 GDP in Figure 1.4, where the evolution of GDP per capita for the six member countries can be seen. It is clear that except from Luxembourg and Italy, there were no major differences in income levels in Europe at the beginning of the period. In fact, Italy, the lowest per capita income country in the EEC-6, had 72 per cent of Community average. Luxembourg, on the other hand, was 40 per cent above the EEC-6 average GDP per capita in 1958. The rest of the countries had a GDP per capita between 8 per cent below- Belgium- and 2 per cent above- Germany- of Community average.

At the end of the period, all countries except Luxembourg had increased their percentages of EU average GDP. This increase was less than 1 per cent in the case of Germany and 3, 4 and 7 per cent for Belgium, the Netherlands and France respectively. The country that had the largest increase in GDP per capita in this period was Italy, which reached almost 81 per cent of Community average GDP by 1973. Luxembourg was the only country in the EEC-6 to have a lower percentage of average GDP in 1973 (17 per cent above EEC-6 average) than at the beginning of the period.

Figure 4.1. GDP per Capita as Percentage of EEC-6 Average

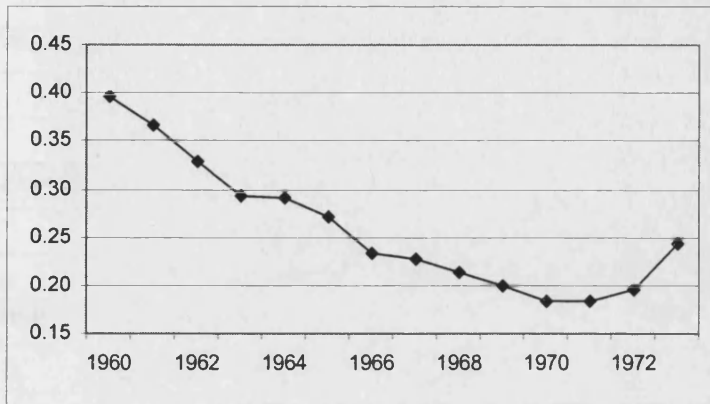


Source: own calculations

Therefore, disparities between countries seem to have been reduced in this period. When performing sigma analysis for the period, it can be seen in Figure 4.2 that the dispersion of income between countries almost halved, decreasing until 1971 and increasing later in 1972 and 1973.

Additionally, I have performed absolute β -convergence. As it can be seen in Table 4.1, there is absolute β -convergence between the six European countries belonging to the EEC-6 between 1960 and 1973, with a negative and highly significant coefficient on initial income and a high R-squared. Full readout for Tables 4.1 to 4.4 are found on the Econometric Appendix V (pages 327 onwards).

Figure 4.2. Sigma Convergence between the EEC-6 Countries



Source: own calculations

Table 4.1. Absolute Beta Convergence in the EEC-6 Countries 1960-1973

1973-1960 Countries				
	Coefficient	Std.Error	t-statistic	
Constant	1.12	0.06	19.10	
ln (1973)	-0.45	0.14	-3.33	
R-squared	0.73			
1973-1960 Regions				
	Coefficient	Std.Error	t-statistic	
Constant	0.85	0.090	9.54	
ln (1973)	-0.10	0.04	-2.84	
R-squared	0.18			

Source: own calculations

At the regional level, however, disparities were not reduced as much as between countries. Romus (1979) attributes this to the lack of Community regional policy and insufficient number of purely regional projects. The Thompson Report for the period 1959-70 recognised that economic activity in the community did not develop evenly and the gaps between regions did not show any noticeable changes (Robson, 1987). Kiljunen (1980: 206) shows that on the whole, the *share* of the developed and less developed regions of each country's total GDP remained roughly the same throughout the period 1957-75 (Table 4.2).

Table 4.2. Share of Developed and Less-Developed Regions in each EEC-6 Country

	1957	1975
West Germany	100	100
Dr	74	74
Ldr	26	26
France	100	100
Dr	(a) 68	71
Ldr	32	29
Italy	100	100
Dr	77	76
Ldr	23	24
Netherlands	100	100
Dr	(b) 90	89
Ldr	10	11
Belgium	100	100
Dr	69	73
Ldr	31	27
Luxembourg	100	100

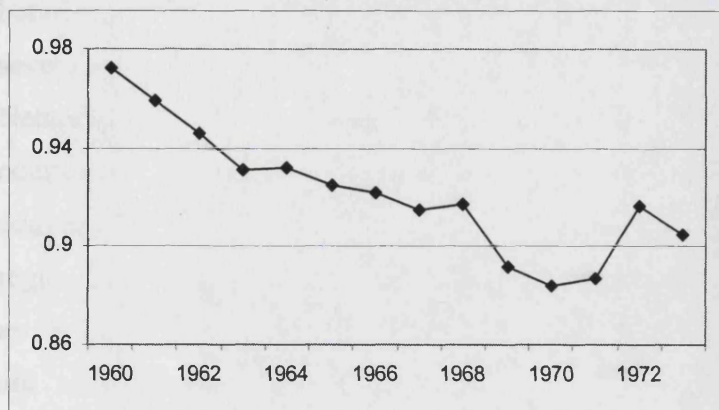
dr: developed regions

ldr: less developed regions

(a) 1962; (b) 1960

I have performed a sigma analysis for the regions and it can be seen that over the period, disparities have decreased and in fact follow a similar pattern as that of the sigma analysis between countries. However, while the reduction in the sigma indicator for the countries represents a 50 per cent decrease; this amounts to only 10 per cent for the regions. When doing an absolute beta analysis, the existence of weak convergence is revealed (see Figure 4.3 and Table 4.1) with a significant though smaller coefficient on initial GDP and lower R-squared than for the countries.

Figure 4.3. Sigma Convergence between the EEC-6 Regions



Source: own calculations

As mentioned in the previous section, the main regional problem in the original EEC-6 was located in the Italian Mezzogiorno. In Italy, the difference between the richest and poorest regions was larger than in other member states. In the region of Calabria, GDP per capita was 26.8 per cent of Community average in 1960 and it had risen to 33.2 per cent in 1969. For the region of Basilicata, this index rose from 25.5 per cent to 38.2 per cent. The region with highest GDP per capita in 1960, Lazio, slightly decreased from 72.1 per cent to 71.6 per cent. These data is in NUTS 2 classification, which as mentioned above, is more disaggregated than NUTS 1 (CEC, 1971). This convergence is due to the lower growth in richer areas than to faster growth in poorer ones. Besides, the slow growth registered in some poor areas is linked to emigration and the subsequent slower population increases. The continuous migration from the Mezzogiorno region is considered to be the reason for the reduction in per capita differences in Italy during this period (Gianola and Imbriani, 1984; Kiljunen, 1980). Emigration was mainly concentrated in the South of Italy and it was in fact 'the only main area in the Community to have a substantial net outflow during the period 1960-1967' (Commission of the European Communities, 1971: 25). Moreover, even though emigration from Southern Italy was present throughout the century, it was particularly strong after 1951. Nevertheless, this emigration was not directed to other member countries and integration of the Community population and labour was very limited at this time.

Cuadrado Roura (1991) explains the reduction in disparities between the EEC-6 countries between the late sixties and the first half of the seventies by saying that GDP per capita of several countries increased from below the average (UK, France, Belgium and the Netherlands). This, in turn, coincided with moderate increases in the less developed countries. While during the sixties and early seventies the process of regional convergence had accelerated, this was both because of the growth in less favoured regions but also as a consequence of migration flows. This constitutes a good example of an increase in incomes per capita due to out-migration that does not mean that disparities are reduced by factor mobility within the region. As seen for Italy, at this stage interregional mobility was limited and most of Italian out-migration was not directed to other member countries.

Despite the fact that convergence between countries was taking place at a faster pace than convergence among regions, the Community was still reluctant to address regional policy issues in this period. During this period, as discussed in the previous section, regional policy planning and implementation was left mainly to national governments (Molle, 1980).

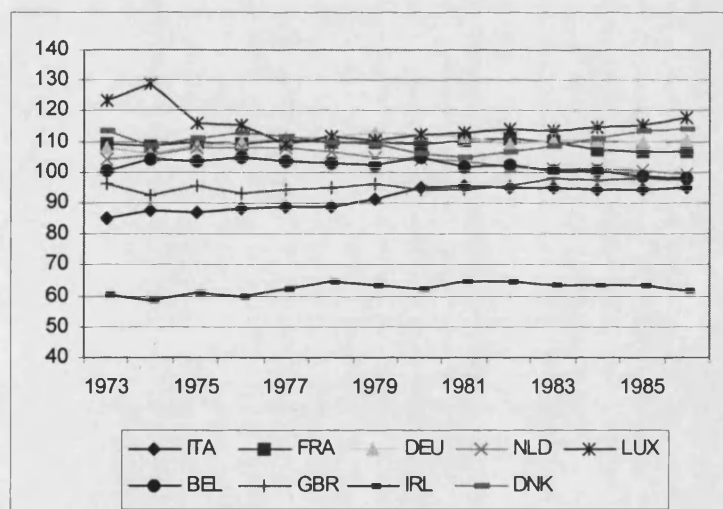
3.3. The Creation of Regional Institutions until the Reform of the Structural Funds (1973-1988)

It is generally agreed that while convergence had predominated prior to 1975, the mid-1970s marked a turning point and gave way to a less clear situation. It was not until the late eighties that convergence became a stronger trend, probably partly due to the reforms of the Structural Funds in 1988 and the move towards the Single Market in the following years. During the seventies, trade imbalances, divergent price trends and exchange rate instability were present in the Community and the weaker countries and regions were the ones mostly affected (Sutherland, 1986). Therefore, the slackening of growth in Europe coincided with an increase in disparities (Kennedy, 1994). This, again, suggests that disparities in Europe were counter-cyclical at least regarding countries. Despite that, it is effectively impossible to assess to what extent this trend was attributable to Community membership *per se* (Kiljunen, 1980). Cuadrado Roura (1991) says that the crisis in the

seventies affected unequally all the countries, interrupting the convergence process and increasing inter-country differences. According to him, in the second half of the eighties, what can be seen is not a return to convergence but a stability of the global position reached within the EEC, with disparities staying mostly unchanged.

When looking at the percentages of EEC average, between 1973 and 1988 non-convergence between countries was mainly due to the case of Ireland (Figure 4.4). When enlargement took place, Ireland was 40 per cent below the average GDP per capita and stayed at this level throughout the whole period. The other countries show some convergence, particularly Italy that still shows a trend towards the average, rising from 84 to 94 per cent of EEC-9 average GDP. The other two new members- the UK and Denmark, joined the Community with almost Community average GDP (4 per cent below for the UK and 13 per cent above in the case of Denmark).

Figure 4.4. Percentages of EEC-9 average GDP

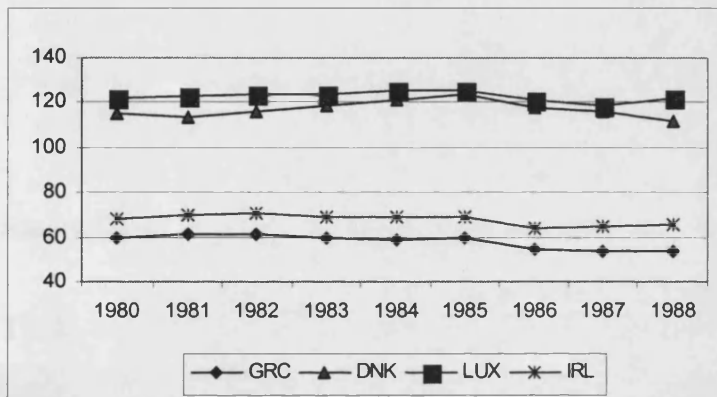


Source: own calculations

Greece, which was more than 40 per cent below the Community average GDP when it joined in 1981, showed no convergence at all in the period 1981-1988. That is, it had the same problems in order to catch up as Ireland, and in fact both countries showed very similar patterns as can be seen in Figure 4.5. In this Figure, Ireland and Greece are

depicted (the two lowest income countries at that time with similar patterns); Italy and two of the richest countries, Luxembourg and Denmark (the reason for Greece not being included in Figure 4.4 is that it did not join the EEC until 1981).

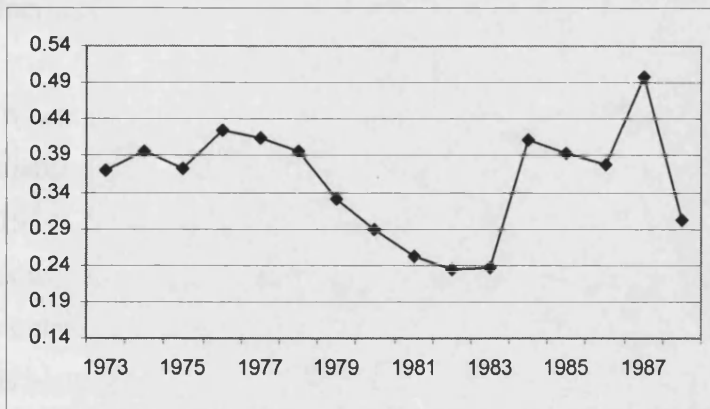
Figure 4.5. Share of European GDP: Selected Countries



Source: own calculations

The sigma analysis performed on the nine countries reveals that the dispersion between countries does not exhibit a clear trend. It remains stable throughout the seventies, decreases in the early eighties and increases later on. It then decreases sharply in 1988 (Figure 4.6). However, when I analysed absolute β -convergence, a strong convergence can be found, as seen in Table 4.3, which could be reflecting the sharp drop found for 1988 when performing the sigma analysis.

Figure 4.6. Sigma Analysis in the EEC-9 Countries



Source: own calculations

Table 4.3. Absolute Beta Convergence in the EEC-9 (1973-1988)

1988-1973 Countries			
	Coefficient	Std.Error	t-statistic
Constant	1.67	0.06	25.79
ln (1973)	-0.28	0.05	-5.27
R-squared	0.82		
1988-1973 Regions			
	Coefficient	Std.Error	t-statistic
Constant	1.28	0.060	20.78
ln (1973)	-0.04	0.04	-0.97
R-squared	0.02		

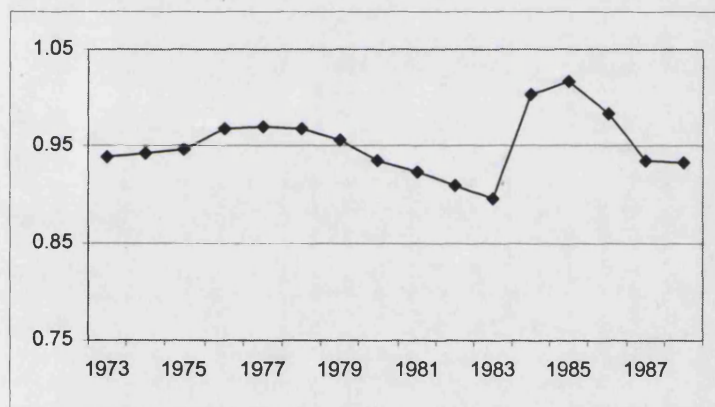
Source: own calculations

Regarding the regions within the community, the First Report on the Regions partly explained the divergent trends in regional disparities by migration trends. The effect of the economic crisis in the seventies was to increase the levels of unemployment in all Community regions leading to widening of regional disparities. Further, the report says that over the period 1970-1977, interregional differences in employment rates explained between half and two thirds of regional disparities in GDP per capita. It is then productivity differences within sectors that best explain regional output divergences,

possibly as a consequence of the relative openness of the regional economies and the increasing competition in world markets (CEC, 1980).

When analysing σ -convergence for the regions, it can be seen in Figure 4.7 that dispersion remained stable throughout the seventies and early eighties and increased in 1984, declining in the late eighties. A further beta analysis confirms that there was no convergence within the regions (Table 4.3) with a negative though not significant coefficient on initial income at either 5 or 10 per cent. Again, it is clear that convergence is harder to achieve for the regions than for the countries.

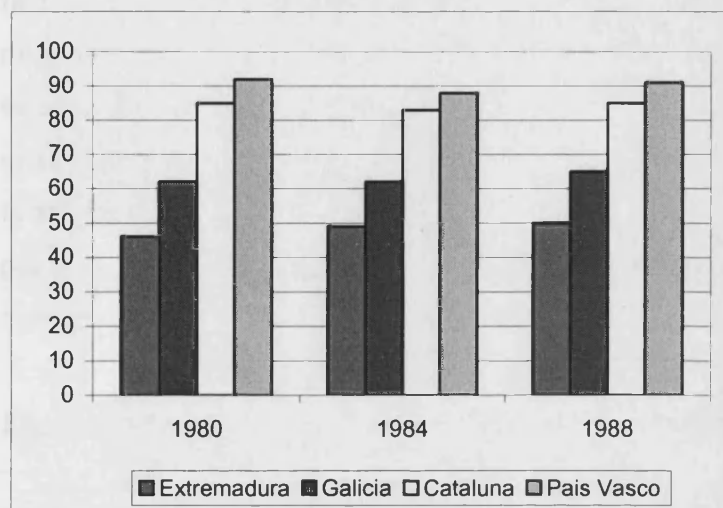
Figure 4.7. Sigma Convergence for the EEC-9 Regions



Source: own calculations

In the case of Spain, regional per capita GDP from 1980 until 1988 remained almost unchanged. In Figure 4.8 the regional GDP as percentage of national GDP of four selected Spanish regions is depicted. Both Cataluña and País Vasco have been chosen as representative of high-income level regions, while Extremadura and Galicia represent poorer regions. Even though Spain joined the Community in 1986, and so its non-convergence cannot be taken as representative of other European regions, it is still interesting to see how membership did not make any noticeable changes.

Figure 4.8. Regional GDP as Percentage of National GDP in Four Spanish Regions



Source: own calculations

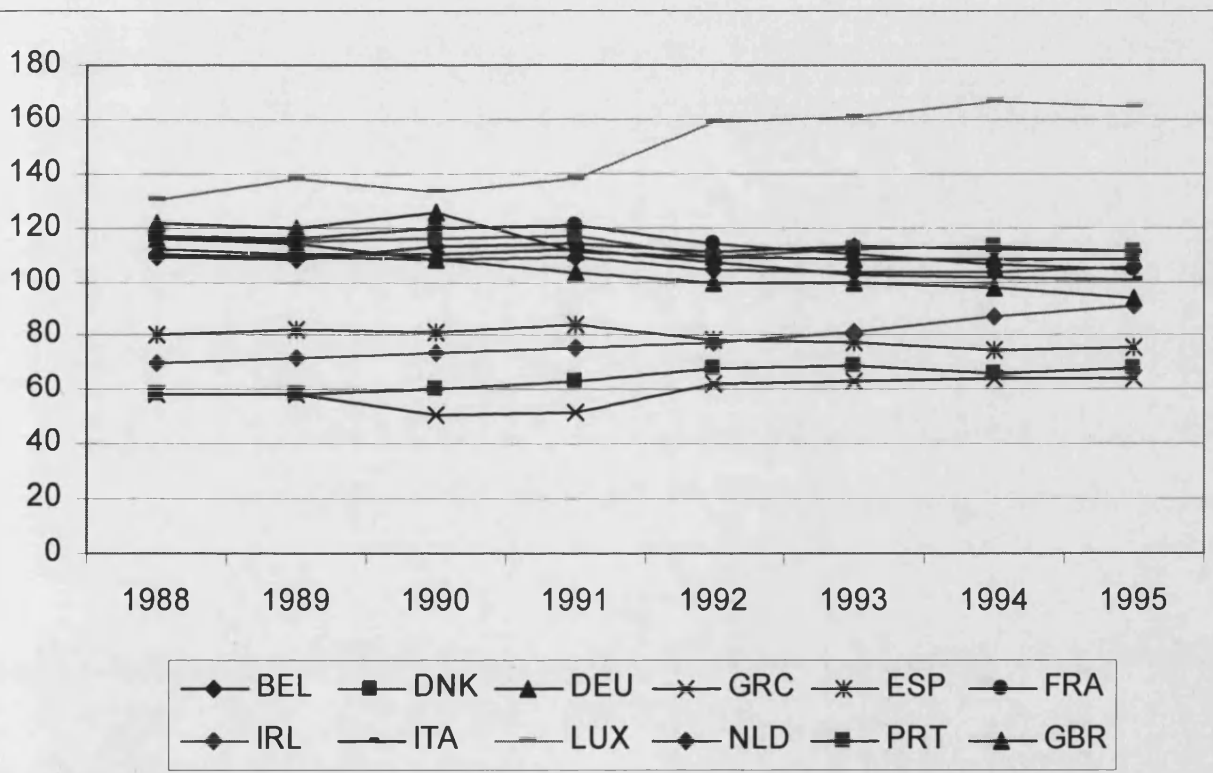
In Italy, Gianola and Imbriani (1984) investigated inequalities during the seventies with the ratio of the per capita GDP in the Mezzogiorno to the national average and by calculating the Theil index. The later not only showed that overall inequality had worsened, but also that the 'North-South gap' factor accounted for 85 per cent of the overall inequality index during the seventies.

Although the European Regional Development Fund was created in 1975, from 1975 to 1980 expenditure was marginal compared with national regional assistance, accounting for 4.5 per cent of Community budget. Kiljunen (1980) mentions that in 1978, the British government spent internally on regional policy double the amount spread throughout the EEC-9 by the ERDF. The measures undertaken in this period consisted of sectoral policies, support for certain industries (such as steel) or important sectors (agriculture) instead of a regional development policy (Gianola and Imbriani, 1984). In fact, some of these policies might have worked against the equalisation of disparities. Marques Mendes (1990) estimated that even in the 1970s the EC would have contributed to reduction in disparities among members had it not been for the distortions that the CAP introduced.

3.4. The Growing Significance of Regional Policies (1988- Agenda 2000)

In this period, there was a boost to regional policies. The result was a reduction of disparities between member states. Although the emergence of a two speed Europe can be seen in Figure 4.9, particularly until 1992; the rapid growth of Ireland in the last five or six years is remarkable, increasing from 64 per cent of the Community average in 1983 to 80 per cent in 1993 and 90 per cent in 1995. In 1997, Ireland reached EU average GDP per capita and continued to increase until 1999 when it was 10 per cent above EU average, at the same level of the Netherlands and Belgium (EC, 1997).

Figure 4.9. Share of European Average GDP 1988-1995



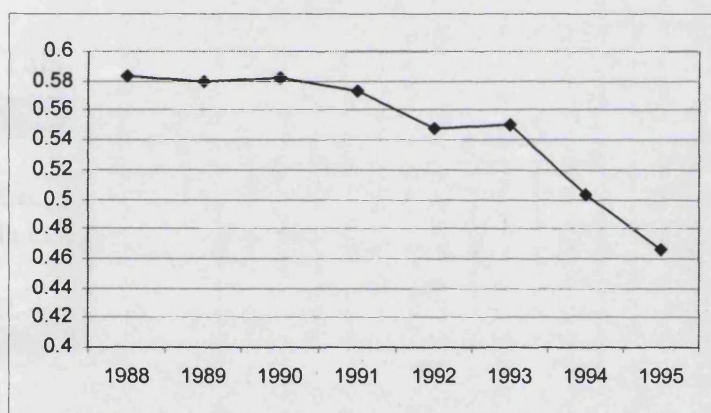
Source: own calculations

The Spanish economy grew until 1991 and then GDP per capita decreased until 1995. After 1997, the Spanish economy grew markedly and reached almost 82 per cent of EU average GDP per capita. Greece and Portugal had similar percentages of GDP per capita in 1988 and 1995 (58 and 64 per cent for Greece and 58 and 68 per cent for Portugal).

However, while Portugal increased its GDP steadily throughout the period, Greece experienced a reduction in the per capita GDP as percentage of EU average in 1990 and 1991. Economic growth has been accelerating in Greece since the economic recovery began in 1994.

When looking at Figure 4.10, it can be seen that the sigma indicator has decreased in the period, but specially after 1993. In Table 4.4, the results of the β -convergence analysis are reported. In this period there was convergence between the twelve member countries of the EU with negative and significant coefficient, though convergence is weaker than for the previous sub-period.

Figure 4.10. Sigma Analysis for the EEC-12



Source: own calculations

On the other hand, disparities between regions still remained almost unaltered (Cuadrado Roura, 1998) and the poorest 25 regions in the EU increased their per capita income only by 2 per cent in the period (CEC, 1997c). Cuadrado Roura (1998) attributes this stagnation to two factors, both because regional migration stopped but most importantly because of the re-adaptation and re-structuring of the regional economies to international competition. The evolution of GDP per capita of some of the poorer and the richer regions in Spain and Italy over the period 1988-1995 is shown in Figures 4.11 and 4.12 respectively. The four Spanish regions selected are the ones of the previous section.

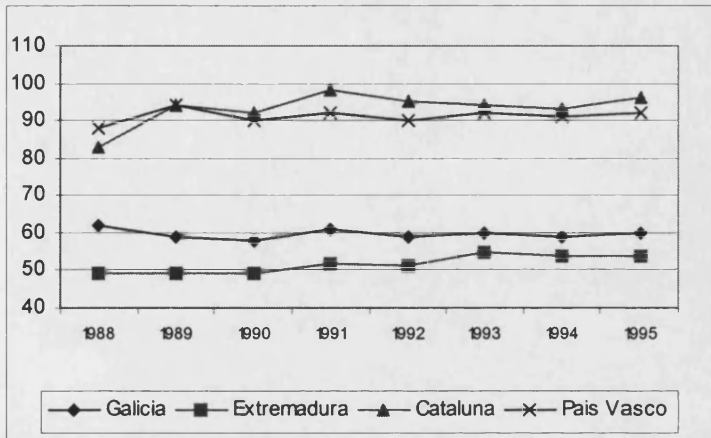
Regional differences show no strong convergence for the entire period 1988-1995, in spite of having received funds after joining the Community in 1986. According to Villaverde Castro (1993) all Spanish regions experienced growth from 1985 to 1992, albeit not at the same rate. In fact, comparing 1985 with 1992 this shows a slight increase in disparities. By depicting a Lorenz curve he concludes that EC aid has always helped to reduce regional disparities in Spain, although the reform of the structural funds in 1989 has made no further impact. He points out that most investments were in infrastructure works, mainly in relation to the transport network. In the case of Italy, again four regions have been chosen on the basis of providing four extreme examples (Piemonte and Lombardia the richer regions and Basilicata and Calabria for the poor regions). Similarly, no convergence can be seen here and it is clear that the North-South divide in Italy present since 1958 still persists.

Table 4.4. Absolute Beta Convergence (1988-1995)

1995-1988 Countries				
	Coefficient	Std.Error	t-statistic	
Constant	1.15	0.19	5.95	
ln (1988)	-0.24	0.08	-3.09	
R-squared	0.49			
1995-1988 Regions				
	Coefficient	Std.Error	t-statistic	
Constant	0.52	0.06	8.49	
Ln (1988)	-0.15	0.07	-2.87	
R-squared	0.08			

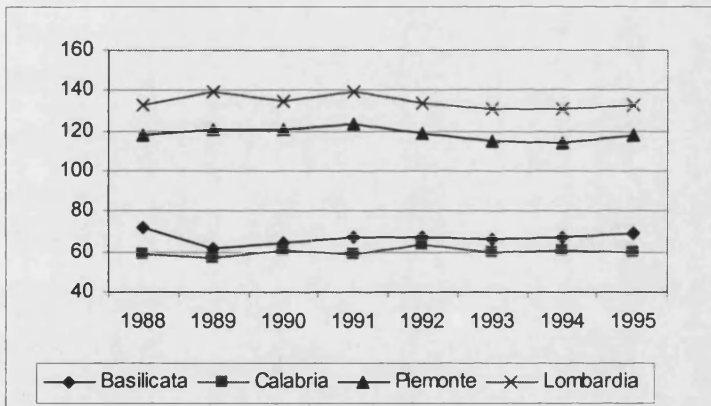
Source: own calculations

Figure 4.11. GDP Per Capita as Percentage of National GDP in Spain



Source: own calculations

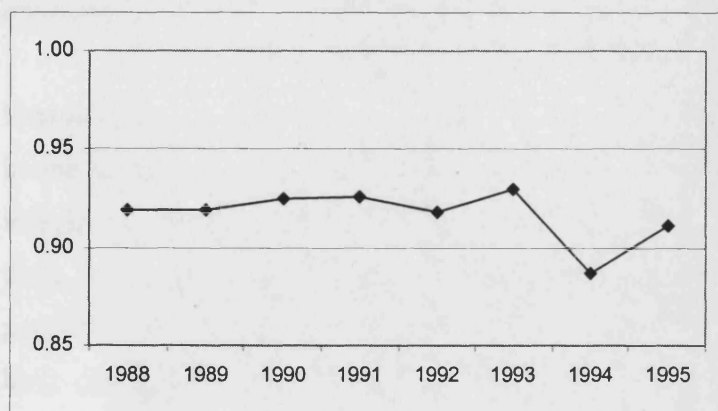
Figure 4.12. GDP Per Capita as Percentage of National GDP in Italy



Source: own calculations

I also tested for σ -convergence in this period and, as Figure 4.13 shows, a constant trend can be seen between the regions. Further, an absolute beta test reinforces this argument showing no convergence for the period (Table 4.4) with a negative though not significant coefficient on initial income and a low R-squared. Once again, even when there is a clear trend towards convergence among the countries, the regions lag behind, despite policy efforts.

Figure 4.13. Sigma Analysis between the Regions



Source: own calculations

3.5. Other Studies

As mentioned above, several authors have studied disparities within the European Union. An interesting study was performed by Tavèra (1999), who tried to determine the convergence in Europe for the period 1965-1990. He used the rate of growth of production per labour unit in logs. When analysing the whole period it can be seen that there has been β -convergence among the European countries (Tavèra includes the 15 EU members, regardless of their membership status at the time). However, when analysing different sub-periods, he shows that periods of convergence coexist with periods of non-convergence. In particular, he shows a clear trend towards β -convergence in the period 1965-75, while during 1975-1980 and 1980-1985 this appears no longer to be the case and finally converging again in 1985-1990. When analysing the speed of convergence he finds a decrease in this indicator following the oil shocks between 1973 and 1977. Another reduction in the speed of convergence is seen from 1982 to 1986 following the second oil shock. The average speed for the whole period 1970-1990 is 2.4 per cent. He emphasises that even for the whole period there seems to be convergence - as most long term studies as will be seen later in the thesis - when analysing sub-periods major differences can be found (Tavèra, 1999). Figures from Tavèra, 1999 are presented in Appendix I.c, page 304. Again, as mentioned in the previous chapter, when comparing β -convergence results for the whole period versus different sub-periods differences are

found. However, Tavèra only analyses convergence between countries and does not consider those within countries.

Ioannides and Petrakos (2000) show that there was a reduction in inequalities in Greece in the seventies and eighties using σ -convergence for a number of welfare indicators. Petrakos and Tsoukalas (1999) test the hypothesis proposed by Berry (1988), whereby there would be a positive correlation between regional inequalities and macro-economic performance and their findings indicate that this seems to be pro-cyclical. This seems to be in contradiction with the evidence for Europe (Dunford, 1993), as seen in the literature review (page 56). The link between macro performance and growth in the European Union has also been mentioned by Tavèra (1999), and as mentioned above, he shows that periods of economic crises - such as the oil crisis - seem to be associated with a slowing down of the process of convergence. According to Tavèra (1999), when performing sigma analysis there seems to be no major changes in the period, and, in fact, there appears to be an increase after 1985. Another interesting study that has already been mentioned in chapter 3 (page 83) considered the impact of politics in Greece and Spain. Petrakos and Tsoukalas (1999) found that increases in spatial concentration in Greece could be associated with the country's deviation from democracy. Moreover, Tavèra (1999) attributed the poor growth of the Spanish economy in the sub-period 1970-1975 to the major political changes that caused significant internal and external imbalances.

Villaverde Castro (1993) applied shift-share analysis to the Spanish regions for the period 1985-1989. He finds that, overall, regional economic structure did not play an important role in relation to the rate of growth attained by the different regions. On the other hand, there was no clear direct correlation between regional productive structure and regional growth. His findings show that infrastructure of transport and communications (particularly the latter) are the ones with higher impact on economic development while the most important effects within the social infrastructure indicator are education and health care. Villaverde Castro (1993) then tests whether differences in infrastructure endowments are relevant in explaining the level and evolution of inter-regional disparities within the Spanish regions in the same period. He concludes that the inter-

regional dispersion of the general infrastructure indicator is quite pronounced and in fact this dispersion is greater than in the case of per capita income.

Overall, European regional policy has been rather successful, with a real catching up between countries. All cohesion countries, except Greece, qualified for joining the Monetary Union, which shows a certain nominal degree of convergence. However, regarding the regions, income gaps remained mostly unaltered and in some cases worsened within member states, despite regional policy efforts (Glöckler, G. *et al*, 1998).

This section has shown that achieving convergence is not easy. It may take many years (Ireland) and GDP can be extremely reluctant to converge (Greece); but above all is by no means an automatic process. However, the gap between the entrant countries and the average GDP together with the general economic conditions present at each period can determine success in terms of convergence. At the regional level, things are more complicated, with backward regions lagging behind in spite of the implementation of several regional policies. In the following section, the effect that certain EU policies had on disparities will be addressed.

4. Effects of Policies on Disparities

It is worth considering the regional policies that had been put into practice in the EU in order to draw conclusions that might be useful for MERCOSUR. Therefore, the main objective of this section is to study certain policies introduced in Europe and investigate whether they contributed to an increase or decrease in disparities. The Structural Fund is the main instrument for reducing regional disparities and the Common Agricultural Policy (CAP) is the most controversial and far reaching of all Community policies; therefore particular attention will be given to these two policies.

4.1. Common Agricultural Policy

The objectives of the CAP were to increase efficiency, reduce prices for consumers and sustain high living standards for the agricultural population. Given that those objectives

were in conflict with each other, since the beginning a clear orientation towards maintaining agricultural incomes prevailed over the efficiency and price objectives (Lopes Porto, 1997).

The financial instrument or European Agricultural Guidance and Guarantee Fund (EAGGF) is divided into two sections, Guidance and Guarantee. The former represents a small part of the whole Agricultural Fund and is part of the Structural Funds. It supports restructuring of agriculture in the poor areas of the Union through several methods such as subsidies for land consolidation, investment aid and direct subsidies. After the 1988 reform of the Structural Funds, more emphasis on regionality was given to this section (Armstrong and Taylor, 1993).

The Guarantee section expenditure covers price policies, stocks and export subsidies. This section has the higher percentage of EU budget and is the most controversial of EU policies. Although it has been reduced over the years, the EAGGF-Guarantee reached 91.8 per cent of EC budget in 1971; 71.2 per cent in 1980; 61.5 per cent in 1990 and still 50.5 per cent in 1996 (Lopes Porto, 1997). In Agenda 2000, the percentage of the budget allocated to the CAP for the period 2000-2006 is still 40 per cent (CEC, 1997a).

The CAP set prices that were above international ones, thus creating a distortion for consumers. The price was put increasingly higher in order to fulfil the objective of sustaining agriculture income. This led to fixing prices that were well above those that equilibrated the market, which resulted in excess production. However - unlike competitive economies where producers would adjust by reducing production - producers continued output at higher than equilibrium prices since community preference and financial solidarity would intervene by buying the excess production. It is not surprising, then, that production expanded more rapidly than consumption. On the one hand, the result was an excess production while on the other; a higher proportion of poor families' income was spent on food products. This implied significant costs not only in terms of production but also in consumption distortion. Industries linked with agricultural products were also damaged since the price of their raw materials increased. Furthermore,

accumulated stocks grew constantly and given the lack of competitiveness of European products in international markets, exports began to be subsidised (Lopes Porto, 1997).

The first step towards reforming the CAP was taken in 1984, in order to introduce incentives to reduce overproduction by applying the co-responsibility principle. Two types of instruments were used, production quotas and stabilisers or thresholds beyond which farmers would either not receive any benefits from the guaranteed price scheme; they would have to pay a co-responsibility levy or would not be able to sell the surplus to the intervention authorities. Structural policies were also introduced as well as a tighter budgetary discipline (Glöckler, G. *et al*, 1998). However, it was not until the 1992 MacSharry reform, that a significant change was made, to some extent as a consequence of the complaints filed during the Uruguay Round but also due to future enlargements and the limited results of the previous reforms. Prices had not fallen enough to have an impact on production and stabilisers and quotas had not been sufficient to reduce expenditure in the long run.

The 1992 reform included several items: a significant reduction in several products' prices (particularly cereals and meat) to converge to world prices - which are compensated with direct payments to farmers; the extension of the set-aside mechanism; programmes for reconverting land into forestry production; early retirement scheme; productivity incentives and greater concern for the environment (Lopes Porto, 1997; Glöckler, G. *et al*, 1998). This reform was successful regarding excess production, although the objective of reducing the cost of the CAP was not entirely accomplished. By 1999, less than half of the community budget was assigned to the CAP; while in Agenda 2000 more than 40 per cent of the budget for the period 2000-2006 is allocated to the agricultural sector (Lopes Porto, 1997). The main achievements of the 1992 reform were the reduction of stocks and greater flexibility of the CAP. Given the enlargement towards the Eastern European Countries, a further reform of the CAP will have to take place. The agricultural sector in the CEEC's is larger both in terms of percentage of GDP and employment than the EU's and the agricultural surface is two thirds as big as the EU's.

With internal CEECs agricultural prices well below those of the EU, an unreformed CAP will be an incentive to increase production in those countries (Glöckler, G. *et al*, 1998).

The regions with lowest incomes per head within the Community are by and large those in which agriculture is the predominant occupation, with incomes lower than in the industrial sector and little opportunity of local alternative employment. Therefore, the redistributive regional role of the agricultural policy is crucial (Robertson, 1962).

The precise impact of certain policies is often difficult to assess, because it involves comparison with a hypothetical situation. However, the Common Agricultural Policy, despite being the only policy with a major structural impact, has not helped in reducing or eliminating regional inequalities since regional policy remained outside the CAP. After an initial phase, there was awareness that policies should not only aim at reducing historically given disparities but should also be careful to prevent regional inequalities arising or worsening as a result of Community policies (Giannola and Imbriani, 1984).

It is clear that the CAP has not met expectations regarding its re-distributive role. This is not only because income differentials in agriculture remained large, but also because the CAP has worsened the regional and income inequalities inside the Community (Tsoukalis, 1991). Given that the CAP does not take adequate account of specific regional needs, it has in some cases exacerbated regional disparities in agricultural incomes (Sutherland, 1986). In fact, differences in productivity and income between the poor and rich agricultural regions were larger in 1980 than before the Community was created (Gianola and Imbriani, 1984).

Seidel (1994) analysed the effect of several regional policies on the widening of disparities. He ranked regions according to their per capita income. The percentages of population are represented along the horizontal axis, while the percentages of payments received from Community policies appear on the vertical axis. Each point along the resulting curve indicates the cumulative percentage of payments received by the corresponding percentages of population. In this way he is able to show to what extent

payments are concentrated on the population of the least favoured regions. In order to determine whether the policies are working against the elimination of disparities the resulting curve can be compared with a 45° line that would imply equal per capita distribution.

If the curve is always above (below) the diagonal line, then backward regions are receiving a more (less) advantageous treatment, therefore contributing to reducing (increasing) existing disparities. However, even if the curve is to the left of the 45° line it is not clear how strong the re-distribution is working in favour of reducing disparities since this will depend on the size of the payments involved and the convexity of the curve. When the curve is above the diagonal, the steeper its slope for the lower income percentages the higher will be the re-distributive effect of the policies. Whenever the curve intersects the diagonal, there is a shift in the accumulated financial flows from less than proportional to more than proportional (European Parliament, 1997).

In order to investigate the effects of agricultural payments over the period 1986-1989, Seidel (1994) differentiated among the products. The findings reveal that regional distribution varied according to specific products. In general, agricultural policy was tailored more to the needs of the richer regions of the north and only some of the poorest regions benefited from the Guarantee payments. In the case of sugar, the richer regions benefit, as well as in the case of cereals and rice, sugar, milk, oilseeds, beef, poultry and dairy products. The richer regions in Northern European countries were favoured since those products accounted for about 70 per cent of all guarantee payments in the period 1986-1989.

The European Parliament, using the same methodology as Seidel (1994) compared the distribution curves for the EC12 with those for the EC10 (before the enlargement to Spain and Portugal). It concludes that guarantee payments made in the EC10 seem to have had a more substantial effect on regional income distribution while no such effect is observed in the EC12. The curves for tobacco, beef and veal have remained unchanged when compared to the Community before enlargement (European Parliament, 1997).

Therefore, the richest producers reaped more benefits and about 70 per cent of EAGGF-Guarantee (or 40 per cent of the entire Community budget) was destined to the richest 20 per cent and was thus working against Community regional policy objectives. Considering that the CAP accounts for almost half of the whole EU budget, the effects are more significant. Only for tobacco, olive oil, sheep and goat meat and to a lesser extent wine, fruit and vegetables are the poorer regions benefited. But these products received less than 20 per cent of the guaranteed payments (Seidel, 1994; Lopes Porto, 1997).

4.2. Regional Impact of Structural Funds

The three structural funds in the EU are the European Regional Development Fund (ERDF), the European Social Fund and the EAGGF-Guidance section. The ERDF is intended to 'help to redress the main regional imbalances in the Community through participation in the development and structural adjustment of regions whose development is lagging behind and in the conversion of declining industrial regions' (Article 130c, Treaty of Maastricht).

The ERDF grants are the main factor in reducing the regional disparities within the Community, and this effect has been growing throughout the years. In 1989-1990, an average of 80 per cent of investment support grants went towards the 20 per cent of the population in the most disadvantageous regions. Seidel (1994) decomposed the ERDF investment grants into infrastructure and industry for the years 1986-1987. There is a marked difference between the two, since most of the regional assistance has been directed to infrastructure measures. For industry, the poorer regions with 10 per cent of Community population received less than 5 per cent of investment subsidies to trade and industry while the highest 40 per cent received 20 per cent. By contrast, in the case of infrastructure, the poorest 20 per cent received about 70 per cent of infrastructure investment grants, while the richest segments of the population received negligible amounts.

Using a similar procedure, Villaverde Castro (1993) analyses the impact of the ERDF on Spanish regions over the period 1986-1991. Most of these regions were classified as Objective 1, which includes lagging regions with a GDP per capita less than 75 per cent of Community average, and Objective 2, comprising those regions affected by industrial decline and restructuring. He reaches two conclusions. The first one is that ERDF subsidies have contributed to reducing regional disparities in Spain given that the less developed regions are the ones that received the highest per capita subsidies, with the poorest 50 per cent of the population living in those regions receiving more than 80 per cent of the grants. On the other hand, by comparing the concentration of ERDF funds for the period 1986-1988 (Figure 2 in Appendix I.d) to that of the period 1989-1991 (Figure 3 in Appendix I.d) he concludes that there is no evidence of any major improvements after the 1988 reform of the Structural Funds since both curves are almost identical.

As in the case of the ERDF, the ESF is a significant mechanism in reducing disparities. The most striking feature of these curves is that they are less steep than those corresponding to the structural funds. The reason is that both long-term as well as youth unemployment are not just regional problems but they affect the whole Community. Seidel (1994) draws three curves for the period 1986-1989, and it is observed that almost half of the subsidies went to the lowest fifth of the Community's population and the top 40 per cent of the population received 20 per cent of the investment grants.

Regarding the EAGGF Guidance section, it is oriented to the improvement of agricultural structures and granting investment subsidies. In 1986 and 1987 almost half of these grants went to the poorest 20 per cent while the top 40 per cent received only 20 per cent of the subsidies.

4.3. Impact of Other Policies

The loans granted by the European Investment Bank (EIB) have had an equalising effect in regional income distribution. Nevertheless, in the poverty area the curve is below the 45° line for the period 1986-1987. But this could be linked to the fact that the EIB credits

involve both spending in industrial credits as well as infrastructure, the former being less significant in terms of reducing disparities.

Regarding the ECSC credits and aids, data for the years 1986-1987 for the EEC-12, show that ECSC credits exacerbated regional inequalities and that the lowest 15 per cent of the population derived no benefit from them, particularly in Spain and Portugal (Seidel, 1994). In the case of ECSC aid, the exacerbating effects are even more pronounced than in the case of ECSC loans. The reason is that this sectoral aid favours companies and workers in regions dominated by coal and steel production, which are not necessarily among those with the lowest income per capita within the Community. Therefore, the poorest regions derive no benefit from these schemes. However, both the credits and the aid are not very significant in size and do not surpass a 5 per cent of the Union's expenditure.

Although the amounts granted by the EC for Research and Development projects are small, these subsidies benefit developed regions more than less developed ones. The report on the regional impact of Community Policies (European Parliament, 1991) attributes this to several reasons. Firstly, highly skilled staff is required to carry out R&D, and such qualifications are not usually available in underdeveloped areas. Secondly, businesses tend to either locate their research operations within reasonable distance from the headquarters or to employ local research institutes. Finally, as long as the economic structure within the Community remains regionally unbalanced, the effect of R&D operations will continue to be concentrated in the more developed regions. Over the period 1983-1990, more than 40 per cent of the resources were channelled to the top 20 per cent of the population, whereas the lowest 20 per cent of population received less than 10 per cent of R&D contracts (Seidel, 1994).

In brief, it can be said that the ERDF, the ESF and the EAGGF-Guidance section work in favour of the elimination of disparities. Nevertheless, it should be noted that in the example provided by Villaverde Castro, there was no evidence of further improvements after the 1988 reforms. It can be seen in Figure 1 in Appendix I.d that the Structural

Funds have altogether an equalising effect on disparities. When the other structural interventions are considered, a reduction in the equalising effects is evident. This is partly attributed to the ECSC credits and aid and R&D expenditure, that although small in size have an adverse affect, and partly to the EIB credits that are more dispersed regionally throughout the Community. However, when the Guarantee section of the EAGGF is taken into account there is a marked effect against the equalising effects of the Structural Funds and the curve approaches the diagonal.

4. Concluding Remarks

In this chapter the evolution of disparities within the European Union has been analysed. According to neo-classical models prediction as seen in section 2.4, the creation of an economic area is expected to generate several benefits for the countries involved, mainly because the migration barriers will be removed and agents will be able to move freely within the boundaries of the area. It is indisputable that an economic union will bring benefits. However, the way in which these benefits will be distributed between the member countries is not clear. When not only states but also regions are included in the analysis, the issue of equal re-distribution of the benefits becomes crucial.

Following the interpretation of regional economics, balanced growth is not likely to be the outcome and, in fact, regional disparities might tend to persist through time depending on forces other than those advocated by free trade. Indeed, unbalanced growth might be the result when some of the assumptions of classical economics are removed and other factors such as agglomeration and location economies are allowed into the analysis as the main critiques to neo-classical economics suggested.

As seen in this chapter, the European Community was initially reluctant to create supranational institutions for regional policy. However, these have developed over the years and now economic and social cohesion constitutes one of the pillars of the European Union. This growing concern for regional policies highlights that these policies would not be in place if it had not been recognised by the European Commission that

convergence was not the rule within the Union. The European experience shows that convergence between countries was easier when the differences in income levels were not very pronounced and economic conditions were favourable, which is significant when considering countries in Latin America, characterised by differing incomes and unstable economic environments. In the case where new member countries in the EU had a GDP well below the average, such as Greece and Ireland, convergence was harder to achieve. Regarding disparities within countries, these did not show significant improvements either, even when disparities became one of the pillars of the European Union. In fact, disparities between regions persist to a large extent despite policy efforts, which is another interesting conclusion for less developed areas such as MERCOSUR.

Moreover, disparities have seemed to be dependent not only on the economic and social situation of new entrant countries, but also on the general macroeconomic conditions and external shocks to the economic area. This follows what was already mentioned in previous chapters, and it is an interesting first result that even in the European Union, external shocks such as the oil crisis seems to have made an impact on the dynamics of disparities and the period that shows strongest convergence is the seventies. Besides, both my own calculations as well as those performed by Tavèra (1999) for different sub-periods show that convergence varied according to the periods analysed and one should not make a strong statement over the whole period without a closer examination of the sub-period as well.

This chapter concludes Part I of this thesis. As summary of this first part it can be said that convergence does not seem to be automatic in contrast to neo-classical models of economic growth. Therefore, a strong institutional framework for regional policies becomes evident in order to provide a more equitable distribution and to achieve cohesion within the single market. However, the European Union has not been entirely successful in closing the gap between poorer and richer regions though this seemed to have happened for countries. Further, a tentative conclusion regarding macro and political variables seems to indicate that there is a link between them. Nevertheless, it is difficult to draw conclusions regarding macro and growth in the seventies, because the

enlargements also created large disparities. In the light of these significant findings for an integrated area among – mostly – developed countries, in Part II of this thesis I will further investigate disparities in Argentina and Brazil in order to draw conclusions for MERCOSUR and other Latin American integration schemes.

Part II

MERCOSUR Case Studies: Argentina and Brazil

Economic Disparities in MERCOSUR

1. Introduction

The second part of this thesis studies regional disparities within MERCOSUR. As noted in the general introduction to this thesis, the main objective is to determine how disparities originated and whether these will decrease through time without any government intervention or whether, by contrast, policies targeted to correcting imbalances should be implemented. Further, would integration schemes favour convergence or on the other hand would worsen disparities between poor and rich areas? This issues will be of prime importance in a region as MERCOSUR, where disparities between countries is significant – as seen in Figures 1.1 to 1.3 in the Introduction to this thesis. In the previous chapter, I discussed the development of disparities in the European Union, both between as within member countries. Given the results obtained using both sigma and β -convergence analyses, convergence was not automatic, particularly between regions and, most importantly, external factors do seem to lead countries and regions away from the convergence path. As observed in Part I of this thesis, convergence was present for the longer periods but when dividing into sub-periods, it was shown that convergence and divergence alternate.

Created by the Treaty of Asunción in 1991, the member countries of MERCOSUR are Argentina, Brazil, Uruguay and Paraguay (Bolivia and Chile are associate members). In the following section, a brief review of the process of integration in MERCOSUR is presented, followed by a descriptive analysis of the data and both sigma and β -convergence analyses. In the following chapters of Part II, I will study in greater detail disparities within Argentina and Brazil. For each country, a historical chapter discussing the origin and evolution of disparities since colonial times is presented, followed by a

more detailed analysis of the process of convergence over the last fifty years, using mainly sigma and beta analyses. I will try to assess the impact not only of external factors but also macroeconomic and political ones. As noted earlier, I have decided to focus on Argentina and Brazil because they are the largest countries within MERCOSUR, both in size and population but also in terms of income. Besides, neither Uruguay nor Paraguay present as much reliable data, and, given that they are smaller, disparities are not as pronounced as in the case of the larger ones.

2. The Evolution of MERCOSUR

Economic integration in Latin America has gone through different stages. During the sixties and early seventies, there was extensive state intervention. Integration efforts at this stage were linked to the ISI model as discussed in chapter 2, since regional integration was regarded as a way of providing the basis for a more efficient industry and creating economies of scale by enlarging the domestic markets. The Latin American Free Trade Area (LAFTA) was created in 1960 with the objective of abolishing all tariffs by 1971. Although some progress was experienced in eliminating intra-regional trade barriers and establishing a Common External Tariff (CET), by the beginning of the seventies there was a sense of frustration at the modest progress of LAFTA. In addition, the continent was going through the debt crisis and countries had to generate surpluses to service the debts. As a result, imports were cut. In 1980, LAFTA was replaced by the Latin American Integration Association (LAIA) and countries abandoned earlier objectives by focusing more on bilateral trade agreements and private sector initiatives (Bulmer-Thomas, 1994; Campos Filho, 1999).

In the nineties, economic integration gained an important boost as a result of international trade conditions. At this stage, Latin American 'new' regionalism was not regarded as a protective measure against foreign competition or as a way of promoting ISI strategy but, rather, as a way of increasing Latin American exports internationally and insert the economies into the world markets. The Free Trade Area for the Americas (FTAA) initiative launched in June 1990 in the same period as the North American Free Trade Area (NAFTA) and MERCOSUR. There was an increase in the signing of bilateral

agreements and the revitalisation of old integration schemes such as the Central American Common Market (CACM) and the Andean Pact. The new integration schemes in Latin America aimed to attain specialisation in order to gain a better insertion in the world economy. Among these new integrated areas, MERCOSUR stands out in importance. This relevance stems from the fact that the four countries that form MERCOSUR account for more than half the GDP, almost one third of population - 200 million - and 70 per cent of total land of South America. In addition, MERCOSUR enables the four countries to insert themselves into international trading areas as a bloc, as well as (at least in theory, if integration deepened) a way of providing a political and institutional stability to the region (French Davis, 1995; Campos Filho, 1999).

In the mid-eighties, with the return to democracy in both Argentina and Brazil, attempts began to increase cooperation between the two countries. In 1986, the Economic Integration and Co-operation Programme (PICE) between Argentina and Brazil was signed, with the objective of fostering the creation of a common economic region. Selective opening of both economies as well as a stimulus towards complementing some sectors was accorded by negotiations on a product-by-product basis. The adaptation of the sectors would be accomplished according to the principles of gradual adjustment, flexibility and equilibrium. Bilateral trade, basic food production, industrial investment and energy were first included, and with the additional protocols, this was extended to cover transport, communications and monetary co-operation (Behar, 1991). The most important aspect of the PICE was the protocol that dealt with capital goods, given that the creation of a customs union in this sector was a main objective of the PICE. However, several conflicts arised and the recurrent economic instability of the countries worsened these problems.

In 1989, both countries signed the Treaty of Integration, Co-operation and Development by which they agreed to the formation of a regional integration scheme within ten years. This included both tariff and non-tariff reductions in goods and services as well as the harmonisation of macroeconomic policies. The future inclusion of other Latin American countries was also considered. At this stage, there was a shift from a product-by-product

negotiation to tariff reductions of a general, linear and automatic nature (Campos Filho, 1999).

In 1990, the integration process was accelerated with the signing of the Buenos Aires Act whereby the creation of a bilateral common market between Argentina and Brazil was agreed for 1994. This included free movement of goods, services and factors of production. In the meantime, a list of excepted products from the tariff reduction process was contemplated. It started from a general preference of 40 per cent that would be reduced automatically by 7 per cent each semester. As this aimed to include most of the products, the integration process was given a new dynamism. Before this, only products that were already involved in trade had been promoted.

MERCOSUR was formally constituted when the Asunción Treaty was signed in March 1991, which also incorporated Uruguay and Paraguay. The deadlines and the mechanisms with which to attain the customs union were similar to those proposed by the Buenos Aires Act and were of fundamental importance in the increasing trade flows between the countries. A schedule for a progressive programme of tariff reductions was agreed between the four member countries. A preference of 40 per cent was granted for intra- MERCOSUR tariffs and a further 7 per cent would be granted every semester until 1994 with a final 11 per cent reduction to complete the elimination of tariffs. In December 1991, the Brasilia Protocol was signed, which dealt with the solution of potential controversies within MERCOSUR.

By 1994, an “imperfect” customs union was reached. MERCOSUR embarked on the second stage of the integration process, by moving towards a customs union under the Ouro Preto Protocol. The protocol refers to the institutional structure during the period of consolidation of the customs union and gave legal status to MERCOSUR according to international law. Moreover, a CET was agreed for 85 per cent of imports from other countries. A large group of items was excluded from this and a progressive convergence of tariffs was agreed upon. Brazil had high tariffs on capital goods while Argentina, Uruguay and Paraguay had low ones on these goods. In addition, some special

concessions were made to allow for particular situations such as Plan Real in Brazil and the effects of the Mexican crisis on Argentina's economy. Free intra-regional trade for goods was accomplished, with some exceptions that included about 20 per cent of all products, which was to be eliminated by 1999 in Argentina and Brazil and a year later for the two other member countries. In 1995, MERCOSUR agreed a five-year programme in which to perfect the free trade area and customs union (Campos Filho, 1999).

MERCOSUR has increased trade flows between its member countries, in particular Argentina and Brazil. The main problem in MERCOSUR is that the macro conditions of the two largest countries determine the trade flows and foster doubts about the viability of the integration deepening effort. Moreover, there is a serious lack of coordination on macro-policy. There is also a marked lack of regional institutions and supra-national entities. The Treaty of Asunción concentrated the power of decision-making in the foreign affairs and finance ministries while the other sectors involved were only consulted. The dynamism of the integration process will therefore be significantly dependent on the political will to reach agreements (Campos Filho, 1999; Hurrel, 2001).

3. Socio-Economic Comparisons Between the Member Countries

Disparities between the member countries of MERCOSUR are wide and extend not only to levels of GDP (Figures 1.2 and 1.3 on pages 20 and 21 respectively) and population (Figure 1.1 on page 20) but also education, infant mortality, life expectancy, urbanisation rates and variables such as density of railroads, telephone lines and vehicles per capita. The most straightforward picture of disparities is that regarding the distribution of the population among the four countries. When looking at Figures 5.1 and 5.2, it can be seen that Brazil's population comprised a 69 per cent of the MERCOSUR's population in 1930 and a further 79 per cent by 2000. Argentina and Uruguay, on the other hand, decreased their percentages in the same period from 25 to 17 per cent and 4 to 2 per cent respectively. All data used in this section is from Astorga and FitzGerald (1998) and the World Bank Website and can be seen in Appendix II.

Figure 5.1. Distribution of Population in the Four MERCOSUR Countries in 1930



Source: own calculations

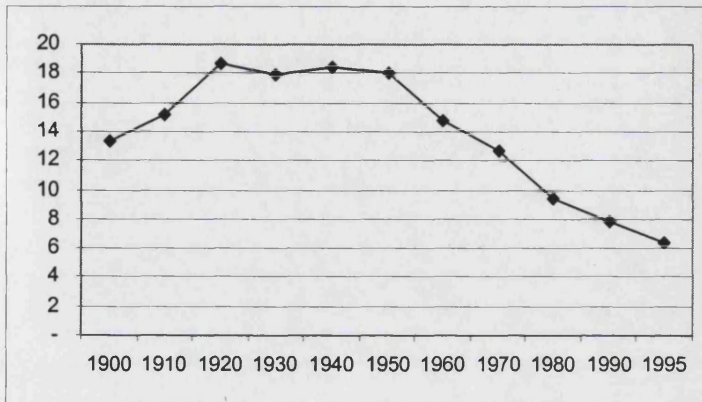
Figure 5.2. Distribution of Population in the Four MERCOSUR Countries in 2000



Source: own calculations with data from World Bank website

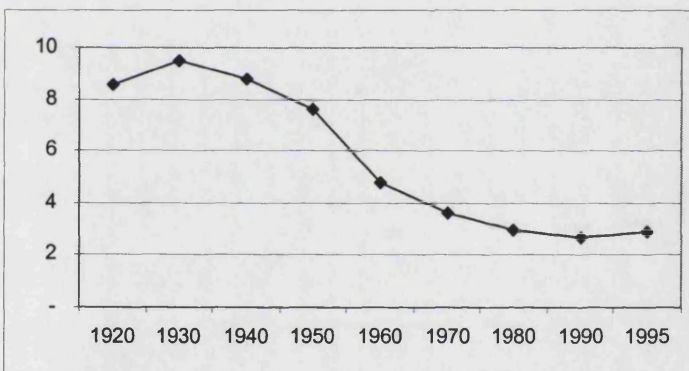
When performing sigma analysis to illiteracy rates between the four member countries, it can be seen in Figure 5.3 that there has been a reduction in the variability between the MERCOSUR countries over the last century in terms of illiteracy rates. The same results can be found in the case of life expectancy, as seen in Figure 5.4.

Figure 5.3. Sigma Analysis for Illiteracy Rates in the MERCOSUR Countries, 1900-95



Source: own calculations

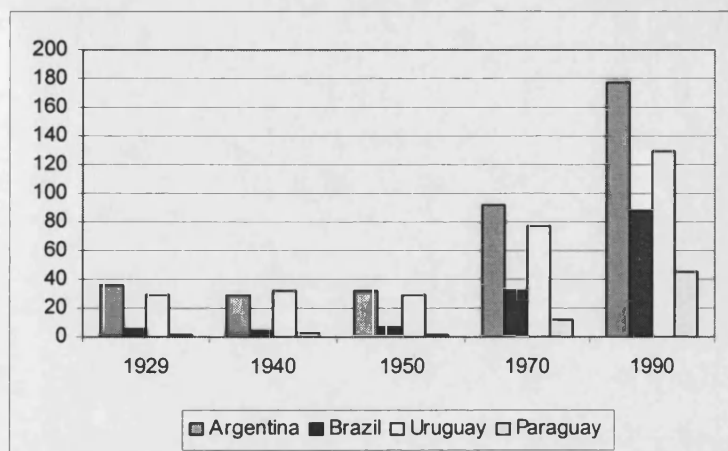
Figure 5.4. Sigma Analysis for Life Expectancy Rates in the MERCOSUR Countries, 1920-1995



Source: own calculations

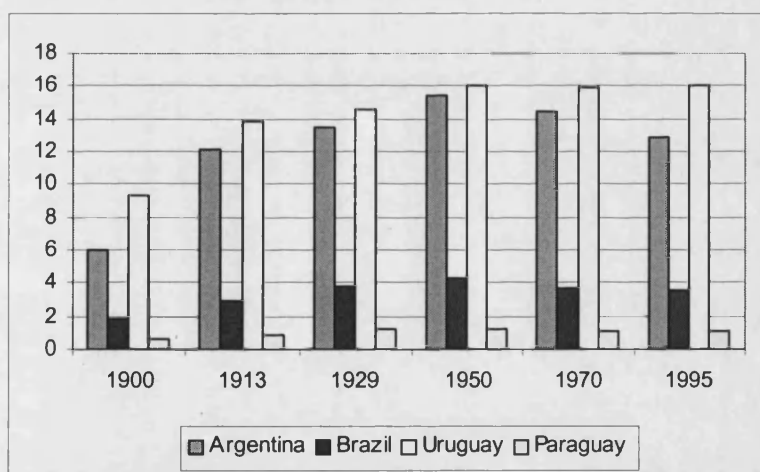
Figures 5.5, 5.6 and 5.7 show figures with data regarding vehicles per capita, density of railways and telephone lines per thousand inhabitants as proxies of development levels between the countries.

Figure 5.5. Vehicles per thousand persons in the MERCOSUR Countries, 1929-1990



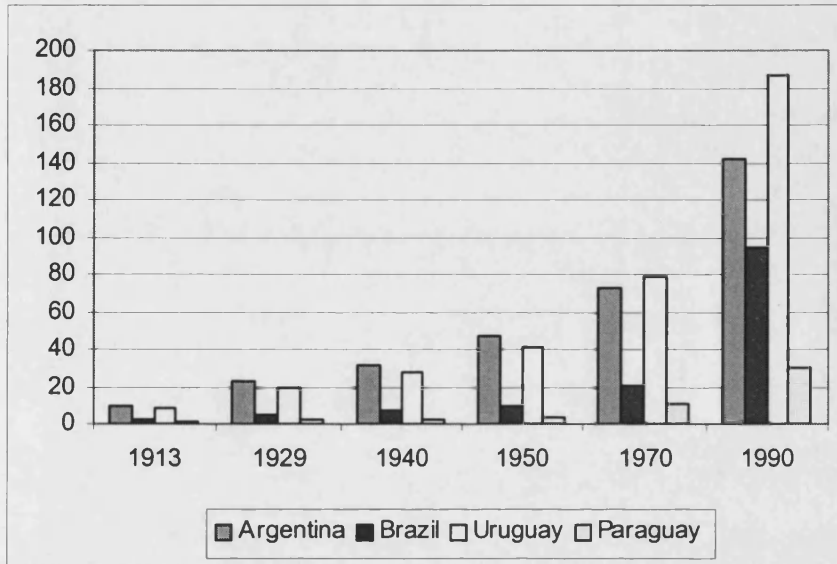
Source: own calculations

Figure 5.6. Density of Railway Lines in the MERCOSUR Countries, 1900-1995 (Km of Tracks per Thousand Square Km)



Source: own calculations

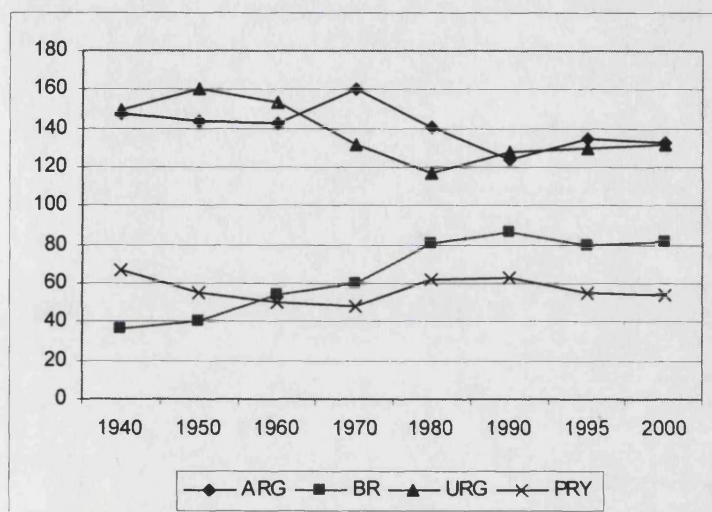
Figure 5.7. Telephone Lines per thousand inhabitants in the MERCOSUR Countries, 1913-1990



Source: own calculations

Figure 5.8 shows each country's GDP as percentage of MERCOSUR average. It can be seen that both Argentina and Uruguay are always above 100 per cent, which can be compared with the case of Luxembourg in the EU (compare with Figure 4.1, page 99). After 1970 and 1980 both countries follow the same declining trend. In the case of Paraguay and Brazil, both are below the average GDP per capita in MERCOSUR and can be compared to Italy in the fifties, Ireland in the seventies and Portugal and Greece in the period 1988-1995 (compare with Figures 4.1 and 4.9, pages 99 and 109). In Brazil, the level of GDP per capita increased specially after 1970 while in Paraguay it decreased in 1960 and 1970.

Figure 5.8. GDP per Capita as Percentage of MERCOSUR Average, 1940-2000



Source: own calculations

In the following section, the sigma and beta analyses that have been performed in the previous chapter for the European Union will be used here for the countries of MERCOSUR.

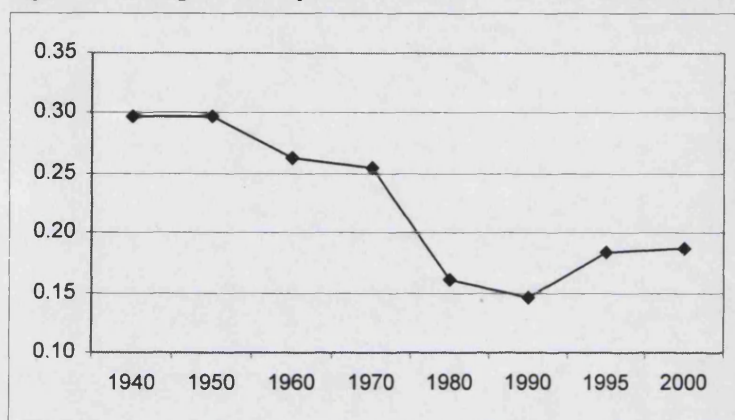
4. Sigma and Absolute Beta Convergence Analyses

In this section, I have performed both beta and σ -convergence to the four countries of MERCOSUR for the period 1940-2000. As mentioned in the introduction to this thesis (page 21) the MERCOSUR 'effect' cannot be captured accurately at this stage since it is a short period and due to the countries' economic volatility but most importantly due to the very small sample. Therefore, the conclusions of this section should only be taken as preliminary. The data on GDP per capita in real 1970 US\$ was obtained from Astorga and Fitzgerald (1998) and the World Bank website (Appendix II.a). As for the EU on the previous chapter, full readout of tables 5.1 to 5.3 can be found on Appendix V (pages 333 to 338).

As can be seen in Figure 5.9, the sigma indicator decreases slowly until 1970, there is a sharp decrease in the 1970s, remains stagnant in the eighties and finally exhibits a slight

increase in the first half of nineties while it remains almost unaltered for the rest of the decade. This strong σ -convergence in the seventies can be associated to both Argentina and Uruguay's (the two countries with highest per capita income) decrease in average MERCOSUR GDP per capita; while Paraguay and Brazil both increased their average GDP in the seventies and eighties (see Figure 5.8).

Figure 5.9. Sigma Analysis for the MERCOSUR Countries, 1940-2000



Source: own calculations

The paper by Cáceres and Sandoval (1999) mentioned in Chapter 3 (page 79) found a decrease in the period 1952-1982 of the standard deviation of income per capita, and particularly in the seventies. According to the authors this decreasing trend corresponds to the high growth of Brazil during the fifties, sixties and seventies; Paraguay in the sixties and seventies and for the low growth rates of both Argentina and Uruguay, the countries with higher incomes at the beginning of the period (See Appendix II.h).

When performing absolute β -convergence analysis for the four countries of MERCOSUR, it can be seen in both Table 5.1 and appendix V, that for the period 1940-2000, there was a high R-squared and a not significant F statistic, and the coefficient is negative but only significant at the 10 per cent level. Note that when doing the regression only until 1995, the results remain unaltered and therefore in the last 5 years there were no major changes regarding convergence between the four countries. The weak convergence found in this period implies that the lowest income countries have in average increased their GDP more

that the richest, probably due to Paraguay and Brazil increasing their GDP per capita during the seventies and eighties, as mentioned above.

Table 5.1. Absolute Beta Convergence between the MERCOSUR Countries 1940-2000

2000-1940			
	Coefficient	Std.Error	t-statistic
Constant	-1.43	1.07	-1.34
ln(1940)	-0.55	0.31	-1.77
R-squared	0.61		

Source: own calculations, for more details see page 339

Following the results presented on the European Union, sub-periods were considered for this analysis. Firstly, I divided the sample into two sub-periods: from 1940 to 1970 and from 1970 until 2000. Following the preliminary results of the sigma analysis, 1970 was considered the breaking point since the seventies seem to exhibit a converging trend. According to Rodrik (1998) – as mentioned above in page 84 - the slowdown in economic growth in the eighties in the MERCOSUR countries and in Latin America in general, can be associated to weak institutions that could not successfully deal with external shocks. He explains stagnation as being directly associated to the size of the external shock and the institutions' ability to solve conflicts. The results can be seen in Table 5.2, where both beta coefficients have the right sign, showing convergence, although for the first regression (1940-1970) the coefficient on initial income is not significant. For the sub-period 1970-2000 the coefficient is marginally significant at the 5 per cent level therefore indicating that convergence occurred after 1970.

In order to examine what happened in that sub-period, I have examined the behaviour of disparities in six sub-periods from 1940 to 2000. The results are presented in Table 5.3 and also explained in Appendix V, where it can be seen that periods of convergence are followed by periods of non-convergence. In particular, there is strong convergence only in the decade of the seventies and strong divergence in the last sub-period 1990-2000. Once again (as seen for the EU above), absolute β -convergence is observed for the longer

period but once sub-periods are considered, both convergence as well as divergence can be clearly identified.

Table 5.2. Absolute Beta Convergence between the MERCOSUR Countries, Sub-Periods 1940-1970 and 1970-2000

1970-1940			
	Coefficient	Std.Error	t-statistic
Constant	-0.65	1.06	-0.61
ln(1940)	-0.26	0.31	-0.85
R-squared	0.27		
2000-1970			
	Coefficient	Std.Error	t-statistic
constant	-0.74	0.46	-1.59
ln(1970)	-0.30	0.15	-2.03
R-squared	0.67		

Source: own calculations, for more details see pages 344-345

This strong convergence in the seventies can be explained, as already mentioned, by the growth of Brazilian per capita GDP in the decade (and to some extent Paraguay's) while the divergence in the nineties seems to be in accordance with the increase in Argentina's GDP during that decade. Dobson and Ramlogan (2002) also found evidence of convergence for the seventies for Latin America as a whole. MERCOSUR seems to have followed the same pattern as the rest of Latin America since the results for the eighties are not significant and again in the nineties while Dobson and Ramlogan (2002) find no strong evidence of convergence, in the case of MERCOSUR there clear evidence of divergence.

Table 5.3. Absolute Beta Convergence, Sub-Periods by Decades

2000-1990			
	Coefficient	Std.Error	t-statistic
Constant	0.93	0.13	7.25
Ln(1990)	0.28	0.04	6.58
R-squared	0.96		
1990-1980			
	Coefficient	Std.Error	t-statistic
Constant	-0.40	0.49	-0.82
Ln(1980)	-0.12	0.16	-0.73
R-squared	0.21		
1980-1970			
	Coefficient	Std.Error	t-statistic
Constant	-1.04	0.23	-4.59
ln(1970)	-0.38	0.07	-5.32
R-squared	0.93		
1970-1960			
	Coefficient	Std.Error	t-statistic
Constant	-0.07	0.46	-0.14
Ln(1960)	-0.05	0.14	-0.36
R-squared	0.06		
1960-1950			
	Coefficient	Std.Error	t-statistic
Constant	-0.41	0.49	-0.84
Ln (1950)	-0.14	0.15	-0.98
R-squared	0.32		
1950-1940			
	Coefficient	Std.Error	t-statistic
Constant	0.03	0.48	0.06
Ln (1940)	-0.02	0.14	-0.12
R-squared	0.01		

Source: own calculations, for more details see pages 340-344

5. Conclusions

It has been seen in this chapter that, even with the small data set, when looking at the entire period 1940-2000, absolute β -convergence appears to be present among the four countries of MERCOSUR. However, when further sub-periods are distinguished, more differences can be found and periods of convergence are followed by periods of non-convergence, which was also mentioned for the European Union, in particular by Tavèra (1999)- pages 113 and 304.

In the case of MERCOSUR, the decade of the sixties shows no convergence, while the seventies show strong convergence. In fact, the seventies were the decade in which convergence was strongest. As mentioned earlier, and due to the few observations, we cannot draw strong econometric conclusions based on these data. However, the results can be taken as indicative. Moreover, these results coincide with similar studies performed for the area such as Dobson and Ramlogan (2002) and Cáceres and Sandoval (1999), where due to the low growth of Argentina and Uruguay and the relatively high growth of Brazil convergence was present in the seventies.

The findings of convergence for whole periods, while divergence and convergence are found for sub-periods is significant, as will be mentioned throughout the thesis since this highlights the lack of automatic convergence and the presence of other variables. These variables can then either lower convergence or prevent it from taking place. As mentioned in previous chapters, political and macro variables may affect the process of convergence and this will try to be determined empirically for Argentina and Brazil in the following chapters. If subperiods of convergence and divergence are found for all areas under study, the case for external factors affecting convergence becomes stronger, and so does the case for regional policies and institutions that deal with disparities.

Argentina: Origin of Disparities

1. Introduction

The objective of this chapter is to analyse the development of regional economic disparities in Argentina from a historical viewpoint in the light of the theoretical framework described in Part I of this thesis. The dichotomy between the interior and Buenos Aires in Argentina was not present in colonial times and, in fact, Buenos Aires and its surroundings only gained importance after independence. The differences in income within the country at that time, therefore, were much different than the ones seen in Figure 1.4 in the introductory chapter of this thesis. The concentration of income around the Buenos Aires area after independence was aggravated by the export-led development model and later deepened by the import substitution industrialisation strategy that followed.

Although the economies of the interior had been the centre of trade during colonial times, they became increasingly isolated after independence and failed to achieve a self-sustainable status. In colonial times the north of the present territory of Argentina acted as a satellite economy for the mining centre in Potosí, its prosperity stemming from the role as commercial and trade centres. However, after independence, the balance of power shifted towards Buenos Aires and the littoral. With Buenos Aires becoming the main trading and commercial port, the north-east no longer was at the centre of any important commercial route, therefore propelling the decline of the economies of the interior.

The lack of regional development planning in the country together with the natural position of Buenos Aires as a port and commercial centre would accentuate these differences and gave the process a self-reinforcing nature. At the beginning of the

twentieth century, the agricultural export model gave the country a striking unequal development pattern with both the international port of Buenos Aires and the pampa at its core. The industrialisation process, by focusing on the substitution of imported consumption goods, privileged the domestic market and therefore reinforced this concentration trend. The shift of the economic centre from the interior to the littoral was of a permanent nature reinforced by large migration flows and disparities between these two areas far from converging are still significant.

The second section of this chapter provides a historical account of the process that shaped the balance of power between Buenos Aires and the provinces from early colonial times, highlighting the origins as well as the reinforcement of the concentration process. Section 3 of this chapter will briefly mention regional development policies that were put into practice in Argentina in the second half of last century and the effects they had, which will also be relevant for the analysis in the following chapter.

2. From Colony to Nation

2.1. The interior in colonial times (1516-1810)

The interior and littoral developed at different times in the viceroyalty of the River Plate. The littoral did not develop until the nineteenth century because of the patterns of international trade oriented to metal extracting industries. The centre of colonisation was in Potosí (Cortes Conde and Gallo, 1967). During the sixteenth and seventeenth centuries, the territories of the River Plate were among the least developed of all Spanish settlements and belonged to the viceroyalty of the Upper Peru. The most important settlements in the present territory of Argentina lay along a route that stretched from Buenos Aires towards the mining city of Potosí in the Upper Peru through the provinces of Santa Fé, Córdoba, Santiago del Estero, San Miguel de Tucumán, Salta and Jujuy (see Map of Colonial Argentina, p. 402). The silver mines, which had been discovered as early as 1545, had been producing a significant output since the last quarter of the sixteenth century, linking Potosí with the ports in the River Plate - both in Buenos Aires and in Santa Fé. Although the main settlements were founded along this route, there were

other minor ones. One of them was further west to La Rioja and Catamarca; another northward from Buenos Aires to Asunción del Paraguay along the Paraná River passing through the city of Corrientes; and a third in the Cuyo region, comprising Mendoza, San Luis and San Juan. Apart from those settlements, the rest of the territory was uninhabited (Rock, 1986).

The interior towns' economic structure developed as a supplier of the mining region of Upper Peru. The Andean region provided animals, food and textiles. Santiago del Estero not only traded mules but was also a significant exporter of cloth; Tucumán replaced Santiago as a major link on the route to Potosí, producing rice, cotton, mules and oxcarts. Córdoba's central location on the trade routes between Cuyo, Buenos Aires and the northwest, ensured commercial prosperity and it soon displaced Santiago del Estero as Argentina's main urban centre. La Rioja produced wines, wheat, textiles and mules, while Salta and Jujuy were focal points for trade. By contrast to these economies, the urban settlements of the coast lagged several decades behind those of the interior (Scobie, 1971; Halperín Donghi, 1975).

The second founding of the city of Buenos Aires in 1580 responded to the objective of establishing a military settlement rather than as an effort to exploit its potential as an Atlantic port. The city was not allowed to practise free trade since the Spanish Crown feared that non-Spanish goods would invade the markets in Peru and that untaxed silver exported through Buenos Aires would end up in the hands of Spain's enemies. Trade between Buenos Aires and Brazil was first authorised in 1587, but a few years later all trade was forbidden except that in Spanish ships authorised by the Crown.

In 1601 trade with the Portuguese was re-established, but Buenos Aires was only exporting cattle and importing some manufactured products. However, both slave and silver trade were still forbidden, which led to some traders to abandon Buenos Aires. Since it was still considered a key point of defence, in 1617 the area was divided into two; which gave Buenos Aires an administrative control over Paraguay. A new set of regulations was issued whereby two licensed Spanish ships were allowed to enter the port

each year. Nevertheless, dealings in silver and slave trade remained forbidden. Therefore, in order to prevent the exchange of slaves and silver the ships stopped at Brazil only on their way back.

This also failed and in an effort to control the flow of silver reaching the port of Buenos Aires, the Spanish set a tariff line in 1622 in Córdoba, named *Aduana Seca*. A 50 per cent *ad valorem* tax was imposed on goods passing through Córdoba, halfway in the route from Buenos Aires and Tucumán. Spain only allowed the exports of cattle from the port of Buenos Aires, and the import of European goods was to remain a Spanish monopoly. Overall, this system persisted for another 150 years, but the tariff line was moved from Córdoba to Jujuy in 1696. That move helped to bring Tucumán closer to the commercial influence of Buenos Aires. However, the *Aduana Seca* was not enough to stop silver from Potosí reaching Buenos Aires (Burgin, 1971).

The economy of the Upper Peru entered a period of decline that was partly stemmed in the 1730s, when a series of reforms were introduced. Taxes were raised to give incentives to production, and a more flexible labour system was introduced. As a result, between 1740 and 1790 the production doubled to reach that of the earlier century. This recovery had an impact on the southern areas of Upper Peru (Bolivia). In the case of Salta, the development of the mule trade was impressive, and it is estimated that between 1740 and 1810 up to 70,000 mules per year were traded in the market. Trade routes through Santiago del Estero, Salta and Jujuy recommenced (Rock, 1986).

By the 1770s, Tucumán and the provinces of Cuyo had increased their population dramatically. Mendoza, a town with only 1,000 inhabitants in 1724, had increased its population to 4,000 by 1754 and to 7,000 in 1770. In Santiago del Estero the population reached 15,000 in 1778 and in both La Rioja and Catamarca about 9,000. By 1809, population had expanded to 40,000 in Santiago del Estero and to 24,000 in Catamarca. The population of both Tucumán and Cuyo together reached about 250,000 in 1809. By 1750, Tucumán was the source of textiles, while Cuyo produced wines and liquors and the northeast sugar, cotton, *yerba mate* and tobacco. These communities were more of a

competitive than complementary nature, with the result of scarce trade between them. The main objective was to trade in exchange for silver to be able to buy imported goods from abroad. Tucumán became a trade centre linking the coast with the interior, while in Cuyo the main trading links were with Chile rather than with the coastal areas. The end of the Spanish commercial system contributed to the decline in both regions and it was not until the following century that these economies would recover. However, this recovery was not accompanied by changes in the system of production and did not foster any local economic integration. Therefore, these economies still remained static and relatively backward and subject to a series of crises (Rock, 1986).

Until 1776, the present Argentine territory was under the political and administrative control of Lima. However, the Bourbon reforms conferred upon the region a separate viceroyalty of the River Plate. As a consequence of this reform, Buenos Aires flourished as the capital of the viceroyalty, and its port became the centre of the trade between Spain and the newly constituted viceroyalty. In 1777 the *Aduana Seca* was abolished and coined silver from Potosí would be sent to Buenos Aires instead of Lima. It was also determined that the former would be the official port of access for supplies of Spanish mercury for the mines in Potosí (Burgin, 1971).

In the interior, and unlike Buenos Aires, the regions remained as satellite economies, changing the political and economic dominance of the Upper Peru for that of Buenos Aires. The main difference now was that before they were part of the trading route from Potosí to Buenos Aires, where silver would now be shipped to Europe. However, at this stage, Buenos Aires was free to trade directly with Spain without prior approval of Lima and so the trading route declined in favour of other manufactured products.

The Bourbon reforms constituted an attempt to diversify the colonial economies and export a wider range of colonial products, especially raw materials in need for the Spanish industry. The main objective was that the empire should be self-sufficient with the manufacturing industries located in Spain. Thus, competing products manufactured in the colonies, such as wines and textiles, were discouraged. In 1778, 'free trade' was

proclaimed in the port of Buenos Aires. This concept of 'free trade' meant that it was still a Spanish monopoly and any foreign goods imported by the colony would pay a duty double or more than that of Spanish goods. As a consequence of the favoured treatment received by the Spanish goods, wines and textiles from the interior were damaged after 1776 (Brown, 1979; Burgin, 1971).

Originally intended to strengthen the power of the crown, the Bourbon reforms had the opposite effect. 'Free trade', far from being entirely directed to Spain, was mostly conducted with foreigners. The wars in Spain and subsequent disruption of trade, particularly the imported supplies of mercury used in the Potosí mines, decreased silver production. The shortage of money induced economic depression and resulted in complaints from the interior. In the area of Cuyo, in the provinces of San Juan, Mendoza and San Luis, the proximity to the Chilean market had outstripped trading with the coastal areas. However, the increasing administrative control exercised by Buenos Aires weakened the links with Chile and after independence, trade between both nations became ever scarcer. With the exception of cattle, products at both sides of the Andes became more competitive and Mendoza lost its importance as a commercial centre. As in the case of Tucumán, it was only the railroads of the 1860s that would bring a certain recovery, providing Mendoza the opportunity for its wines of reaching the coastal areas. Neither of the other two provinces, San Juan and San Luis, experienced such recovery (Scobie, 1971).

In the 1760s, the Jesuits were expelled from the territory, and the Indian agricultural settlements along the Paraná River disintegrated. Their influence had been at its highest in the decades after 1680. Besides their supremacy in Córdoba and Buenos Aires particularly in the field of education, they had established thirty colonies in the Upper Paraná, and by 1700 the missions included 50,000 Indians. They subsisted on pasturing and agriculture. However, these missions were weaker than they seemed and ceased growing after 1730. Besides, the Jesuits' power within the Church began to decline. Conflicts escalated culminating in the expulsion from the territories. The area turned into a pastoral economy since the Crown lost all interest in it due to the lack of gold or silver.

The wars of independence led to a further decline of the missions. It was not until the following century with immigration flows and specialisation in *yerba mate*, tea, tobacco, rice and cotton that the area recovered from its decline (Scobie, 1971; Rock, 1986).

While the interior was facing economic difficulties as a result of the creation of the new viceroyalty, from the late 1770s onwards the city of Buenos Aires expanded at an accelerated rate. With only 5,000 inhabitants in 1680, the population rose from 20,000 in 1766 to 27,000 in 1780 and a further 42,000 by 1810. Besides, between the 1770s and the late 1790s, the volume of shipping in the port of Buenos Aires doubled. The city also saw improvements in paving, lighting and hygiene. Hospitals and schools were created and cultural activities developed (Rock, 1986).

2.2. Independence and the increasing importance of Buenos Aires (1810-1900)

Independence, supported by commercial and cattle interests in Buenos Aires, accentuated the economic pre-eminence of the coast and accelerated the interior's decline. It determined the isolation of the provinces and acted as a trigger to the expansion of Argentina's coastal area. The port of Buenos Aires became the centre of trade between Europe and the pampa. Not only was it the point of contact with the outside world but it also absorbed almost all investment, technology and immigration. Moreover, the livestock expanded due to the external demand and therefore the number of imports increased. These goods from the interior could not compete with European ones, both in terms of prices and quality (Cortes Conde and Gallo, 1967).

The Revolution of May 25th 1810 established a 'first' provisional government (*Primera Junta*) that would govern mainly as a reaction to the French invasion of Spain in 1808. In order to legitimise its power as well as to enhance it, representatives from the interior were invited to a congress that would determine the position of the viceroyalty towards the events in Spain. In many areas of the interior, such as Santa Fé, Corrientes, Cuyo and Salta, the revolution received immediate support particularly due to the crisis in trade that had been severely affecting those territories in the previous years. The secretary to the

Junta, Moreno, was in favour of a declaration of independence and the proclamation of a republic. Moreover, he insisted on full control of the revolutionary movement from Buenos Aires. Through this, he sought to enhance political centralisation and to allow Buenos Aires to maintain its free trade privileges. Rock (1986) considers this to be the first manifestation of the regional issue in Argentina. However, Saavedra, president of the *Junta*, was in favour of governing on behalf of the Spanish king and advocated for a shared government with the provinces. As a consequence, political tensions between the two erupted, which ended in the departure of Moreno. Saavedra then enlarged the *Junta* to include representatives from the interior as well as allowing the creation of provincial *Juntas*.

Economic disruption in the interior was more severe after 1810 since as the British increased their trade with Buenos Aires, cheap manufactures reached the markets, which meant more competition for the already fragile economies of the interior. At the same time, independence meant for the economies of the interior isolation from areas that during the colonial period had been integrated. Moreover, after 1810, markets and silver contracted even further and the economies of the interior collapsed. In addition, the wars of independence brought further strain to these economies. Thus, at this point, the provinces not only supported independence from Spain but also from Buenos Aires. The struggle of the interior against the centralist power of Buenos Aires would shape the relations between both areas for several decades (Burgin, 1971).

The 'enlarged' *Junta* - or *Junta Grande* - was dissolved and was replaced by a triumvirate government, which was insensitive to provincial interests. The provincial *Juntas* were dissolved and issued a provisional statute creating an assembly with limited powers. Although this was supposed to represent the interior, most of the delegates were from Buenos Aires. The triumvirate initiated aggressive efforts to enhance and defend the political primacy of Buenos Aires. These included the promotion of trade from the port of Buenos Aires, the appointment of officials, the strengthening of the city's financial activities, the creation of meat salt plants (*saladeros*) and land colonisation by European immigrants.

The triumvirate adopted an unprecedented free trade policy, which intensified the economic crisis throughout the interior. In 1811, a proposal for internal free trade by eliminating all provincial tariffs, excises and transit taxes was met by strong opposition by the interior. In 1813, a second triumvirate organised the congress that had been planned earlier for 1810. Even though it did not provide a full declaration of independence, it declared the newly named *Provincias Unidas del Río de la Plata* (United Provinces of the River Plate) making significant efforts to include the provinces in the interior.

The congress dismantled the intendencies of Córdoba and Salta, and these cities, as well as Corrientes, were granted self-government. By the end of 1814, most of the cities in the interior and the surrounding regions had been granted the status of provinces and governors had been appointed. However, regional tensions persisted with a growing division between centralists – *unitarios* - in Buenos Aires and federalists in the interior. Most of the conflicts lay in whether the revenues from the customs duties at the port of Buenos Aires would have to be shared among the provinces. As a result of the costly war against Spain, the triumvirate adopted a free-trade policy, which intensified economic crises in the interior (Rock, 1986).

The disruption of colonial trading system placed the northern provinces at the end of an extremely expensive trading route instead of being major trading links. For instance, by 1830, the cost of moving a ton of goods from Salta to Buenos Aires was thirteen times more expensive than moving it from Liverpool to Buenos Aires. Freight costs were the factor that prevented the products from the interior reaching the market and being able to compete with overseas imports. In the case of Mendoza's wine, half of its selling price in Buenos Aires was to cover transport costs. The only export products that reached the coast in competitive terms were dry hides, wool and horsehair. Since most trade went through Buenos Aires and provinces were free to apply levies, Buenos Aires collected the largest revenues. Each province charged whenever goods crossed its boundaries.

Therefore, provinces such as Salta and Jujuy had negligible revenues and made the interior even more dependent on Buenos Aires (Scobie, 1971; Burgin, 1971).

In 1816, independence was officially declared on July 9th in Tucumán. The congress moved to Buenos Aires and produced a centralist Constitution in 1819 reaffirming the supremacy of Buenos Aires that was repudiated by all the provinces. A new crisis then erupted and most provinces met in *cabildos abiertos* to proclaim self-rule. Provincial warlords (*caudillos*) formally took power. In 1820, Santa Fé, Corrientes and Entre Ríos defeated Buenos Aires. The Constitution of 1819 was eliminated, and Buenos Aires had to accept the principle of federalism through the election of its governor and legislature, free navigation of rivers and no further interference with the commerce of the littoral (Burgin, 1971; Scobie, 1971).

The dictatorial government of Rosas (1835-1851) placed Buenos Aires ahead of the rest of the country and deepened the gap between the two. The constitution of 1853, finally accepted by Buenos Aires in 1861, established a federal regime, an elected bicameral legislature and an independent judiciary. It also committed the state to increasing population through immigration, the development of communications and the promotion of new industry. The constitution banned all restraints to internal trade and provided for a national senate where the interior would be represented. In 1880, with the appointment of Buenos Aires as capital of the republic, the political struggle between Buenos Aires and the provinces was at least formally over (Burgin, 1971; Rock, 1986).

At the same time and throughout the interior, the pattern of local production still resembled that of a century earlier. Textiles had survived in Catamarca and Corrientes; Tucumán remained specialised in ox carts while in La Rioja, where silver mining had been a failure, cattle herding was combined with fruit farming. In Corrientes, *yerba mate*, tobacco, and fruits were cultivated besides the textile production. Through this period, the provinces had managed to maintain some of their colonial commercial links with neighbouring regions in an effort to protect from Buenos Aires. In the 1850s, Salta still

exported mules to the north and Cuyo subsisted by exporting cattle to Chile (Burgin, 1971).

The pre-eminence of Buenos Aires became more evident after 1860, as the nodal point of the new railroad system. The construction of the first railroad began in 1854, the *Ferrocarril del Oeste* (Western Railway) and a second rail line (Central Argentina Railway) linked Rosario and Córdoba. The former was mainly financed by local capital but the latter was owned and mostly financed by British capital. A second British railway, the Buenos Aires Great Southern, began its service in 1864. Other British railroad companies followed, and by 1880 there were seven of them covering a total 1,600-mile network. In fact, by 1870, more than half of the railways were owned by foreigners. At the end of the 1860s, the Central Argentine Railroad from Rosario to Córdoba was nearing completion. Colonies were established alongside the railroad. By 1880, the limits to southern expansion were removed after the “Conquest of the Desert” led by Roca, whereby indigenous settlements south of the Río Negro valley were destroyed. As a result, at the end of the 1890s the railways system was extended to Patagonia (Scobie, 1971; Randall, 1978).

Railroads provided the most effective force in focusing the Argentine economy towards the coast and city of Buenos Aires. The Argentine system, in contrast with Europe or the United States, was developed without any feeder lines or connecting links and its ‘fan-like’ shape with centre in Buenos Aires prolonged the isolation of the interior. Despite the railway mostly favouring the concentration in Buenos Aires, it also proved a significant change for some provinces. The most dramatic impact was in Tucumán and Mendoza. In Tucumán, as early as the 18th century, sugar was grown but it was overshadowed by the output of Brazil sugar. Once the railroad arrived in Tucumán in 1876, sugar could finally be transported in competitive terms to the coast and could serve the domestic demand. In the late 19th century Tucumán became the centre of sugar production with its best period being between 1890 and 1895 with output increasing by ten-fold. However, sugar failed to secure a balanced source of growth for the province; rural population was highly concentrated and seasonal work was attracted from

neighbouring areas. An overproduction crisis in 1896 followed by a five-year crisis translated in the closing down of several small businesses (Brown, 1979; Bethell, 1993).

The expansion of the railroad also changed Mendoza, where the production of grapes dated from colonial times. In the mid-17th century, wine was already being transported to Buenos Aires and during the 19th century continued to be the main export of Mendoza and San Juan, despite facing competition from Europe and the United States. After 1885, both the railroads and the tariff protection stimulated Mendoza's vineyards. For the other provinces, though, the railroads were not so beneficial since products not only imported but also produced in the coastal areas reached the interior. This competition ruined many of the interior's industries and accentuated the difference between both areas. The railway also facilitated the spread of an agricultural economy throughout Argentina. By 1880, Argentina was becoming a major world producer of temperate cereals. Between 1872 and 1895 the cultivated acreage in the pampa increased by fifteen times with cereals that had a negligible share of exports in 1870 increasing to a 50 per cent of export values by 1900. Argentina became a major producer of wheat. The sharp increase in the volume of exports of wheat can be seen in Table 6.1, where in only twenty years, from 1870 to 1890, exports increased dramatically (Scobie, 1971).

Table 6.1. The Wheat Trade, 1870-1895 (in Metric Tons, Five-Year Averages)

	EXPORTS	IMPORTS
1870-1874	77	2,110
1875-1879	5,700	1,200
1880-1884	34,400	6,100
1885-1889	115,200	600
1890-1894	782,000	300

Source: Rock (1986)

The country's population increased from an estimated half million in 1816 to 1.7 million in 1869 and reached almost 4 million by 1895 (Table 6.2). However, the rate of growth was much faster in the littoral than in the interior. Between the first and second national

census (in 1869 and 1895), the population of the province of Buenos Aires almost trebled; that of Santa Fé had increased more than fourfold, in Córdoba more than doubled and in Entre Ríos and Corrientes almost doubled. In Tucumán and Mendoza, the major growth centres of the interior apart from the littoral, population doubled between 1869 and 1895. By contrast, in Catamarca, population in the period only increased by 13 per cent and in Salta 30 per cent. Buenos Aires and Córdoba grew faster than ever before, the former becoming the largest city in Latin America. While in 1854 the population was 90,000, by 1869 it had increased to 187,000 and to a further 663,000 by 1895. Similarly, the people living in the city of Buenos Aires as a percentage of total population grew from 10 per cent in 1869 to 16 per cent by 1895. In 1869, 53 per cent of the national population lived in the provinces of Buenos Aires, Entre Ríos, Santa Fé and Córdoba but in 1895 this proportion had increased to 67 per cent (Rock, 1986).

Table 6.2. Population by Provinces, 1869- 1895

	1869	1895	Growth
Bs.As	308,000	921,000	199%
Capital Federal	187,100	663,000	254%
Catamarca	80,000	90,000	13%
Córdoba	210,000	351,000	67%
Corrientes	129,000	239,000	85%
Entre Ríos	134,000	292,000	118%
La Rioja	48,000	69,000	44%
Mendoza	65,000	116,000	78%
Salta	88,000	118,000	34%
San Juan	60,000	84,000	40%
San Luis	53,000	81,000	53%
Santa Fé	89,000	397,000	346%
Tucumán	108,000	215,000	99%
TOTAL	1,731,300	3,926,178	127%
Average	119,931	279,692	133%
Standard Dev.	75,416	257,249	98%

Source: Vázquez Presedo (1971)

The large differences between the rates of growth of population in certain provinces can be seen in Table 6.2, which are more impressive given the lapse of 26 years. While in

Capital Federal this accounts for 254 per cent, in Catamarca this is only 13 per cent. It can be seen that all the provinces in the pampa and the littoral have increased their population dramatically while the provinces in the north are those with lower growth rates. In particular, Santa Fé registers a higher growth than Capital Federal, followed by Buenos Aires province and Entre Ríos. The lowest growth is for Catamarca, as already mentioned, followed by Salta, San Juan and La Rioja. Tucumán, although having a lower than average growth in the period, increases its population more than any other province in the north because of the sugar production, with most of the population increase concentrated in the last few years (mainly from 1890 to 1895, when sugar production was at its peak) Moreover, according to Mulhall (1876) one eighth of the population was foreigner, with a marked predominance of Italians, Spanish, French and English.

2.3. The Early Twentieth Century

From 1860 to 1930, Argentina grew at a rate that has few parallels in modern global economic history. After 1840, wool exports gave a new stimulus to the economy. Between 1880 and 1900, grain exports rose from practically nothing to several millions of tons; after 1900, chilled and frozen beef exports became significant and rose very rapidly. The dynamism arising from exports of rural origin and the capital inflow associated with it spread to other sectors of the economy. The high propensity to import manufactures undoubtedly decreased potential backward linkages (Díaz Alejandro, 1970).

During the period 1890-1930, Argentina remained a producer of raw materials and food, living from the pampa and failing to diversify into manufacturing. The pampa was, after Buenos Aires, the most advanced in the country. A network of railroads covered the area and it was the richest and fastest-expanding region in Latin America. Economic expansion was led by agriculture, particularly wheat. By 1904, wheat had surpassed wool to become the country's largest export, and the disparities between the littoral and the interior became even more pronounced. The east was the centre of investment and consumption while most of the rest of the country remained backward (Rock, 1986).

In 1914, the population of Patagonia, a region which comprises about one third of the country's total territory, accounted for just over 1 per cent of the population, most of it settled around the Río Negro region and much of it of British or Irish origin. Although Entre Ríos had railroad connections with the Paraná ports, the northeast remained a small cattle region. Most of Corrientes was similar although some Guaraní peasant agriculture persisted and tobacco was also grown. Misiones, almost empty since the expulsion of the Jesuits, showed more progress. This area had begun to attract immigrants, mainly from Polish and German origin that established new *yerba mate* plantations.

Between 1900 and 1914, sugar output increased by three-fold in Tucumán. For a short period, sugar was exported but this came to an end when Europe prohibited imports of sugar that was subsidised. In the 1920s, Salta and Jujuy joined Tucumán as producers of sugar. However, sugar continued to be a mix of modern and old production methods, with *minifundios* being the rule. The manipulation of stocks was widespread and the sugar industry gained a bad reputation. In 1920 the two provinces contributed to about 16 per cent of the national sugar output but by 1930 their share had risen to almost 26 per cent (Bethell, 1993).

There was also growth in fruit production in the Río Negro valley, in cotton, rice, peanuts, fruits and *yerba mate* in Misiones. In the eastern part of Chaco, cotton crops had begun to be cultivated. In the north of Santiago del Estero, Santa Fé, and parts of Corrientes and the Chaco were devoted to the extraction of *quebracho* hardwood. In the region of Cuyo, viticulture continued to develop and between 1895 and 1910 the area devoted to wine quintupled. By 1914, the annual output was approaching 4 million litres, which exceeded Chile's production and doubled that of California. In Tucumán, sugar also prospered. Between 1900 and 1914, production had increased by threefold and this region was one of the few apart from the pampa to attract foreign investment (Rock, 1986).

Argentina had 1,800,000 inhabitants in 1869 and on the following half century received an injection of 2,500,000 Europeans. While in 1850s the annual balance of arrivals over

departures was about 4,000; by the 1880s it had increased to 50,000, and at its 19th century peak in 1889 net immigration exceeded 200,000. Except for Tucumán and Mendoza, the proportion of foreigners in the interior was negligible: population growth in the provinces was determined by natural increases. By contrast, in 1910, three out of four adults in the city of Buenos Aires were European-born. By 1914, Argentina had increased its population to almost 8 million of which 1,500,000 lived in Buenos Aires (18.75% of total population); 200,000 in Rosario (2.5%); 90,000 in La Plata (1.13%) and 60,000 in Santa Fé and Bahía Blanca (0.75% respectively) (Scobie, 1971).

Some of the provinces with lowest rates of growth in Table 6.2, such as Catamarca and La Rioja, present even lower growth rates for the period 1895-1914 (Table 6.3). The littoral, by contrast, still received strong migration flows, though not as strong as in the case of Capital Federal. On the other hand, the new territories- such as the provinces in Patagonia, as well as Chaco and Formosa- register high growth rates, but this is due not to significant quantities but to the importance of migration in previously uninhabited areas such as the expansion of the southern frontier after 1880. The most remarkable case in this period is that of the province of La Pampa, which registers an extremely high growth rate.

The strong immigration was accompanied by a drastic change in the population distribution over the territory. Urban centres, which in 1869 accounted for 28 per cent of the population, increased to 37 per cent in 1895 and to a further 53 per cent in 1914. The four largest provinces in the pampa (Buenos Aires, Santa Fé, Entre Ríos, and Córdoba), which accounted for 54 per cent of the population in 1869 and 67 per cent in 1895, reached 73 per cent in 1914. Taking into account only the province of Buenos Aires plus Capital Federal, in 1869 accounted for 29 per cent of the population while by 1914 included 46 per cent of the total population. By contrast, the provinces of the Northwest- Catamarca, Tucumán, Santiago del Estero, La Rioja, Salta and Jujuy- the richest and most populated during the Spanish period, saw their population share decline from 29 per cent in 1869 to 12 per cent in 1914. The provinces with lowest urbanisation rates were Neuquén and Río Negro, both with 8 per cent (Vázquez Presedo, 1971).

Table 6.3. Population by Provinces, 1895- 1914

	1895	1914	Rate of growth
Bs. As	921,000	2,066,000	124%
Cap. Federal	663,000	1,575,000	138%
Catamarca	90,000	100,000	11%
Córdoba	351,000	735,000	109%
Corrientes	239,000	347,000	45%
Chaco	10,400	46,300	345%
Chubut	3,700	23,100	524%
Entre Ríos	292,000	425,000	46%
Formosa	4,800	19,300	302%
Jujuy	49,000	76,000	55%
La Pampa	2,778	101,000	3,536%
La Rioja	69,000	79,000	14%
Mendoza	116,000	277,000	139%
Misiones	33,200	53,600	61%
Neuquén	14,500	28,900	99%
Río Negro	9,200	42,000	357%
Salta	118,000	140,000	195%
San Juan	84,000	119,000	42%
San Luis	81,000	116,000	43%
Sta Cruz	1,100	9,900	800%
Santa Fé	397,000	899,000	126%
S. del Estero	161,000	261,000	62%
T. del Fuego	500	2,500	400%
Tucumán	215,000	332,000	54%
TOTAL	3,926,178	7,873,600	101%
Average	163,591	328,067	311%
Standard Dev.	228,290	517,457	714%

Source: Vázquez Presedo (1971)

The rest of the country remained mostly unchanged, and the railroads had failed to induce a general, rather than regional, development. Conditions in the interior were distinctly poor and infant mortality rates often doubled or almost trebled those of Buenos Aires. While illiteracy rate in Buenos Aires was only 2.5 per cent, in provinces such as Corrientes, San Juan and Misiones it was above 40 per cent. By 1914, Argentina had thus evolved into an extremely mixed and diverse society where development and modernity only affected the littoral while the interior remained as backward as a century earlier

(Rock, 1986). By 1914, only 48 per cent of school-age children attended school in Salta and Jujuy and 44 per cent in Santiago del Estero in contrast with 61 per cent in the city and province of Buenos Aires (Díaz Alejandro, 1970).

Table 6.4. Socio-Economic Indicators at the Beginning of the 20th Century, by Province

	Mortality rate	Infant m.rate	Illiteracy rate
	1925-30	1925-29	1914
Bs. As	11.20	98.60	30.80
Capital Federal	13.20	77.90	20.40
Catamarca	10.50	113.20	50.10
Córdoba	16.10	134.70	37.50
Corrientes	10.80	101.70	56.80
Chaco	n/a	n/a	48.40
Chubut	n/a	n/a	34.40
Entre Ríos	13.20	117.10	40.70
Formosa	n/a	n/a	54.50
Jujuy	30.10	219.80	65.90
La Pampa	n/a	n/a	37.00
La Rioja	10.70	n/a	48.70
Mendoza	16.70	156.90	40.80
Misiones	n/a	n/a	56.10
Neuquén	n/a	n/a	61.80
Río Negro	n/a	n/a	50.90
Salta	26.80	197.70	55.00
San Juan	21.60	229.10	44.10
San Luis	13.20	123.80	36.00
Santa Cruz	n/a	n/a	21.60
Santa Fé	11.80	114.10	33.80
Sgo. Del Estero	12.00	n/a	65.60
Tierra del Fuego	n/a	n/a	25.00
Tucumán	22.50	169.90	56.10
Average	16.03	142.65	44.67
Standard Deviation	6.30	48.27	13.24

Source: Díaz Alejandro (1970); V. Presedo (1988)

3. Modern Disparities and Regional Policies

3.1. Argentina after 1930

The following sub-sections will focus on the national policies undertaken in Argentina after 1930 and their impact on industrial concentration, imbalances between regions, interregional migration and urbanisation. The first sub-section is a summary of the national policies followed after 1930, while the second one addresses some of the consequences of these national policies in specific areas. Finally, in Section 2.3 industrial promotion policies are summarised with particular emphasis on Tierra del Fuego since, as will be seen in the next Chapter, this particular industrial promotion scheme had an impact on regional disparities – see Figures 7.8 and 7.13 in Chapter 7 and the dummy analysis for Tierra del Fuego on Table 7.7 on page 209.

The period extending from the post-war and until the mid-eighties was characterised in Argentina by both economic and political instability. The industrialisation process in Argentina, which had started in the late nineteenth century, developed together with the agro-export model until the recession of the 1930's. At that stage the primary export-led model came to an end and industry became a more prominent sector in the economy through the process of import-substitution industrialisation (Kosacoff, 2000: 37). Kosacoff argues that 1930 is the end of the first of three periods that define Argentine industrialisation process, after a period from 1880 when the country integrated into the world economy as an agro-export economy (p 39).

Kosacoff identifies a second period for Argentina's industrialisation process, which extends from 1930 to the late 1970 and is associated to the ISI strategy in which foreign trade became less and less important in terms of GDP share. The first (easy) stage of industrialisation, therefore, developed under these conditions. In the following period (1946-58) industrialisation deepened under Perón by expanding the existing activities and the intensive use of labour and the expansion of the domestic market. The active role of the state in both production and policy such as quotas, financing of industrial activities (through the Industrial Bank) and the promotion of certain economic sectors (Kosacoff, 2000: 42).

At the time that Perón got to power, the economy was still mainly relying on beef and grain exports. The industrial sector that had developed after First World War and again during the 30s when all imports were limited, developed largely without any government support. The European immigration plus the internal urbanisation following the depression of the 30s, had developed into a major urban poverty problem. Therefore, Perón's solution was to redistribute wealth from agro export sectors to subsidised industry so that industrial workers would be benefited. He relied on several mechanisms for this. The first one was an institution (IAPI), which replaced the marketing boards in hands of agro exporters and exported at high process while paying the producers prices below world market. The difference would then be applied to governmental subsidies to new industrial enterprises. He also concentrated in significant public work programmes and established a wage setting apparatus and a social security tax system (Ascher, 1984: 54).

Perón initially outlined two five-year plans. However, in practise, these plans consisted more on exceptions of tariffs, taxes rather than a coherent plan. A massive public works program was launched. His wage setting mechanism was differentiated, that is not all workers had the same wages and this depended on each union's bargaining power (Ascher, 1984: 56).

The economic structure changed considerably. While agriculture decreased from 20per cent of GNP in 1946, it accounted for 11-12 per cent in 1983. Industry, on the other hand, increased from 20 per cent to 37 per cent in 1974 and since then a slow process of de industrialisation has been taken place. It can be seen in Table 6.5 that the share of manufacturing industry in the period 1900-1990 by decades. There was a continuous growth with a peak in the period 1960-9 and in the following period a process of de industrialisation begins. The decline was such that for the last sub period on the table the share of manufacturing industry in GDP is comparable to that of the 1940s.

Table 6.5. Manufacturing industry's share of GDP (at factor cost)

Period	Share (%)
1900-1909	15.35
1910-1919	16.54
1920-1929	18.65
1930-1939	21.06
1940-1949	24.22
1950-1959	24.80
1960-1969	28.18
1970-1979	27.23
1980-1990	23.60

Source: Kosacoff (2000:28)

As Di Tella and Dornbusch (1989:6) say it is the asymmetry between the export contribution of the smaller agricultural sector and that of industry that constitutes one of the striking structural imbalances in the economy.

The third period of ISI in Argentina began in 1958 and continued until the mid 70s. this was based on the petrochemical industry and on the complex metal products and machinery. This period corresponds to the most significant one in terms of industrial share in the total economy, as seen in the previous table. Industry then became the “engine of growth” for the whole economy as well as for job creation. However, as foreign technologies were being adapted to local production, the industry’s own trade deficit restricted the possibilities of achieving industrial growth without endangering the balance of payments. Solutions within the framework of ISI were sought. Among these, programmes of incentives to export manufactured goods were introduced as well as other attempts to deepen the ISI by reducing the country’s dependency on imports of basic industrial goods. This led to the promotion of some major industrial projects in order to produce these inputs locally (Kosacoff, 2000: 43).

Argentina's national policies have been quite frequently short-term, sometimes due to their inherent failures and others due to political interruptions. There seems to be a consistent lack of national development policies, and the only exception is the development plan carried out by Frondizi between 1958 and 1962. After the brief military government of 1955-58, Frondizi came to power and attempted a comprehensive development plan. This plan intended to accelerate the growth rate of the Argentine economy through and increase in investment and by concentrating on a few import-substituting sectors of the economy (Petrecolla in Di Tella & Dornbusch, 1989:108) His objective was to strengthen the industrialisation process initiated by Perón but without some of the distortions and the strong state intervention.

At the time, Argentina's position was deteriorating relative to other countries. The industrialisation had not been enough in order to break from the agro export structure and the growth rate was not enough when compared to Brazil. The growth rate was limited by its capacity to import which, in turn, depended mostly on agricultural exports. The objective was then to move from the light industry substitution towards basic industries. Given the country's lack of domestic savings – both for the private and state sectors – and the inability to supply the resources as well as the technology, foreign investors were granted incentives. A list of prioritised industries was made, which included petroleum and gas, chemical and petrochemical industries, steel, coal and iron and automobiles. The main idea behind this was the creation of linkages that would, in turn, foster development (Petrecolla: 109).

However, this was not enough in order to create the stimulus needed. A stabilisation programme was agreed with the IMF. However, the demand for imports was still high. The policy against agriculture in place since the 30s was aggravated in this period given the incentives granted to industrial activities (Petrecolla, 122).

In 1962 Frondizi was overthrown and a year later Illia was elected. His government was characterised by a lack of support as well as uncertainty during the period. The administration's objective was to promote rapid expansion and rectify imbalances in the

economy. The economic team in the government had been trained at ECLA and were thus under structuralist influence. Therefore, an active role of the state was carried out together with planning of the economy. The planning agency was formed – CONADE – and was directed to develop a five-year plan in order to coordinate all economic sectors. However, the growing opposition to Illia ended in his downfall in 1966 and the five-year plan came into effect only in 1965 (Ascher, 1984: 193).

After 1976, the Argentine economy began a process of liberalisation, with more openness and the reliability on market forces for resource allocation. In 1978 the policy applied was that of the monetary school. The main objective was to bring the inflation rate down by controlling the exchange rate so a pre-set exchange rate changes (*tablita*) was implemented. However, adjustment was very slow and the overvaluation of the peso together with an increasing openness resulted in an increase in imports. An unrestricted inflow of capital that served to compensate for the current account deficits derived in a strong level of foreign indebtedness in the economy. The combination of a low demand for locally produced goods (affected by foreign competition) and the damaging effect of the overvaluation on the export sector led to the worst crisis to hit the industrial sector (Kosacoff, 2000: 45).

The debt crisis was the turning point in the application of the ISI model, and it signalled a decade of economic instability and “stabilisation” programmes that ended in 1991 after the hyperinflationary periods of 1989 and 1990. Within this period, three economic plans aimed at stabilisation, control inflation and generate trade surpluses were implemented – Austral Plan, Spring Plan and Bunge and Born Plan. None of them achieved the desired results. The 1991 Convertibility Plan was passed, successfully achieving between 1991 and 1994 an increase in economic activity, a decrease in the rate of inflation and an expansion of international financing (Kosacoff, 2000: 47-57).

3.2. Effects of national policies

The import substitution industrialisation strategy that replaced the export led model accentuated the differences between rural and urban Argentina even further. The growth of

manufacturing in Buenos Aires, together with the contraction of agriculture from the late 1930s, attracted internal migration from rural areas, which constituted a large proportion of the new urban industrial working class. Between 1914 and 1935, 5 per cent of the growth of Greater Buenos Aires was due to migration from the hinterland; while between 1937 and 1947 that rate had increased to 37 per cent. As industrial growth accelerated, annual migration increased from an average of 70,000 in the period 1937-1943 to 117,000 in the following five years. This internal migration increased the population of the city of Buenos Aires from some 1.5 million in 1914 to 3.4 million in 1935 and a further 4.7 million by 1947. Altogether, between 1937 and 1947, some 750,000 migrants arrived in Greater Buenos Aires. An estimated two-thirds of migrants came from the pampas and about 40 per cent of them from the province of Buenos Aires. It can be seen in Table 6.5 that almost 60 per cent of migrants to Greater Buenos Aires by 1947 were from the littoral, comprising the provinces of Buenos Aires, Santa Fé, Entre Ríos, Corrientes and Córdoba (Rock, 1993).

Table 6.6. Migration to Greater Buenos Aires by 1947 from Places of Origin

	Migrants	Percentage of total
Littoral	1, 016, 000	59.6
Northwest	117, 000	6.8
Centre-west	61, 000	3.5
Northeast	17, 000	0.9
South	53, 000	3.1

Note: **Littoral** includes provinces of Buenos Aires, Santa Fé, Entre Ríos, Corrientes, Córdoba; **Northwest**: Catamarca, Tucumán, Santiago del Estero, La Rioja, Salta, Jujuy; **Centre-west**: San Luis, San Juan, Mendoza; **northeast**: Chaco, Formosa, Misiones; **South**: La Pampa, Neuquén, Río Negro, Chubut, Santa Cruz, Tierra del Fuego.

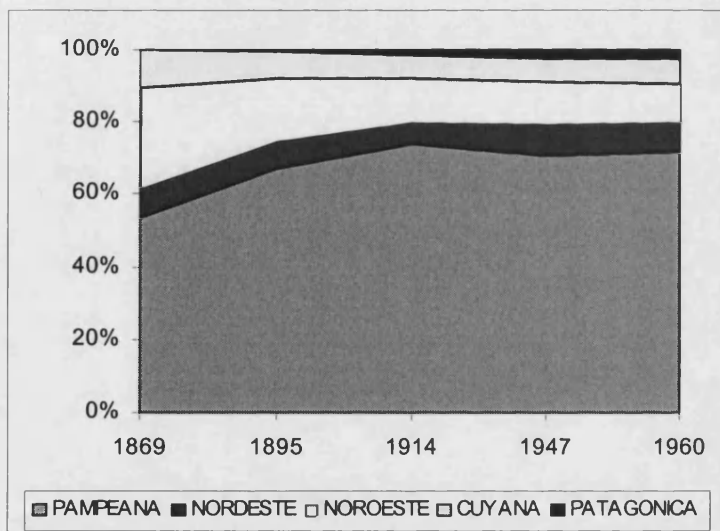
Source: Rock (1986)

Regarding the concentration of population, at the time of the fourth national census, in 1947, the population was twice the figure registered in 1914, reaching 15,800,000 people. The level of urbanisation achieved in Argentina in the 40s was remarkable. While at the end of the 19th century 1,500,000 people lived in urban centres; fifty years later this had increased to 10,000,000, representing 60 per cent of the total population. Urban growth had generated employment opportunities and salaried employment increased within the

economically active population. While at the end of the century salaried workers represented 36 per cent of the economically active population, by 1947 this had almost doubled. In addition, the creation of a vast middle class was also significant (Golbert and Fanfani, 1994).

The expansion of Greater Buenos Aires continued throughout the 1950s. While in 1947, a 29.7 per cent of the national population lived in Greater Buenos Aires, this reached 33.8 per cent in 1960. In 1947, the Federal District plus the provinces of Buenos Aires, Córdoba, Entre Ríos and Santa Fé accounted for 70.7 per cent of the total population. However, after 1960, this share remained mostly the same (Díaz Alejandro, 1970).

Figure 6.1. Distribution of Population by Region (1869-1960)



Source: INDEC, own calculations

The importance of internal migrations was considerable until 1960-70 and then it decreased. It is estimated that from 1895 onwards some 7 million people moved provinces (Velazquez and Morina, 1996). Lattes (1975) shows that until 1914 the migratory flows that predominate in Argentina are those among neighbouring provinces, while between 1914 and 1947 there is a transition period after which the main destination for migrants is Greater Buenos Aires regardless of the distance from to originating province.

This process of urbanisation and concentration aggravated already present interregional disparities. While Capital Federal was 100 per cent urban followed by Buenos Aires province (with almost 85 per cent in 1960), Formosa does not even reach 30 per cent by 1960. In the 60s and 70s four-fifths of internal trade was being conducted between the cities of Buenos Aires, Santa Fé and Córdoba. Although the growth of the oil industry and the development of temperate fruit production induced some migration towards the south, particularly Río Negro and Neuquén; Patagonia at large remained almost uninhabited. Demographic decline was also a feature of the north, and it is estimated that in the 1960s, 164,000 people left Tucumán; 100,000 left Santiago del Estero; and another 100,000 migrated from Corrientes. Some three-quarters of a million migrants settled in Greater Buenos Aires in the 60s (Rock, 1986).

As can be seen on Table 6.6, the highest rates of net migration are for the first two periods, in particular to the then newly constituted so-called *territorios nacionales* (national territories) that had to be populated via migration flows. In the period 1947-60 the highest rates correspond to Greater Buenos Aires as it is the main destination of most inter-provincial flows. Also Santa Cruz and Tierra del Fuego have high rates, although these, in practice, correspond to small volumes. In the first two periods 11 provinces lost population via migration flows, and this corresponds mainly to natives; while in the third and fourth periods the number of provinces losing population rises to 13 and 19 respectively. Conversely, net foreign migration was almost always positive (except for La Pampa in the last period, with a small negative number). However, these rates decrease in the last two periods. In the last two periods it is noticeable the loss of population in the provinces of La Pampa, Tucumán and Córdoba. Buenos Aires, on the other hand, continuously increased its rate of migration in the four periods.

In order to see the growing importance of the flows of native migration, Figure 6.2 shows the different factors that contribute to the provincial distribution of the population in the period 1869-1960. The importance of foreign migration, which accounted for more than 70 per cent at the end of the nineteenth century, decreased continuously until reaching

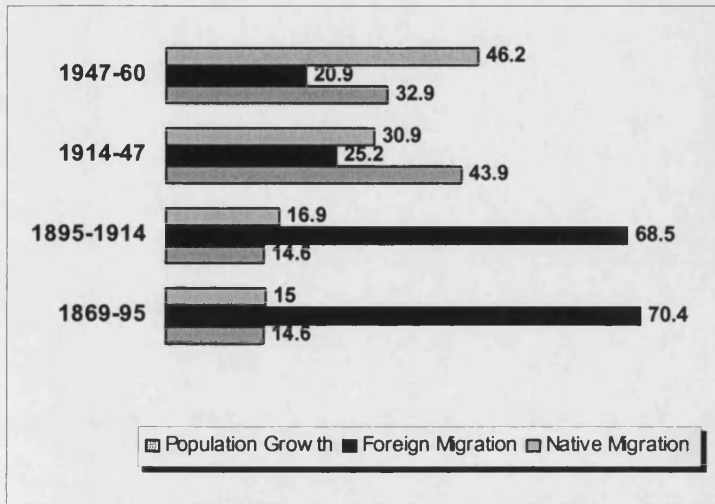
almost 20 per cent. This is counteracted by the flows of native migration that initially accounted for only 15 per cent of population distribution but became increasingly important until the end of this period in which it became the main determinant in the distribution of population. In the case of population growth, it was relatively small in the first two sub-periods considered and although in 1947-60 it accounts for over 20 per cent, it was particularly important in the period 1914-1947.

Table 6.7. Average Annual Rates of Net Total (Natives + Foreigners) Migration, by Provinces 1869-1960

Provinces	1869-95	1895-1914	1914-47	1947-60
Buenos Aires	29	27	10	14
Catamarca	-11	-10	-7	-14
Córdoba	5	21	1	-2
Corrientes	0	-6	-10	-13
Chaco	43	53	23	-9
Chubut	59	63	17	7
Entre Ríos	11	0	-7	-18
Formosa	77	55	22	8
Jujuy	9	21	9	6
La Pampa	81	47	-13	-22
La Rioja	-5	-10	-8	-13
Mendoza	11	31	4	5
Misiones	75	15	17	3
Neuquén	74	16	8	-3
Río Negro	47	48	11	10
Salta	1	1	5	5
San Juan	-4	3	1	1
San Luis	-6	-1	-11	-15
Santa Cruz y T.del Fuego	80	85	22	39
Santa Fé	44	21	1	-4
Sgo del Estero	-2	0	-10	-18
Tucumán	13	8	-3	-2

Source: INDEC (1999)

Figure 6.2. Factors Contributing to the Provincial Distribution of Population (1869-1960)



Source: INDEC, own calculations

Although the period after 1960 will be analysed more fully in the next chapter, it is worth noting some figures here. While 24.7 per cent of the national population lived in Buenos Aires in 1930, by 1980 this proportion had risen to 34.3 per cent; the Greater Buenos Aires being the third largest conurbation in Latin America. The city's population density also increased as high-rise apartments were built. Half the country's manufacturing industry was concentrated in the capital, employing a million people by 1980. Shantytowns began to emerge, with an estimated 1.7 million people living in them by 1970. In these, 70 per cent of the population had not completed school. The only countervailing force against Buenos Aires was Córdoba, which from late 1950s grew as an automobile-manufacturing centre. Between 1947 and 1970, Córdoba's population rose from 383,000 to 800,000. In the 60s, immigration from Paraguay was estimated at 400,000.

The second half of the seventies marked a significant change in terms of industrial development in Argentina. The process of dismantling the ISI model that began in 1978 started a period (until 1990) in which political interests determined the model to be followed and open economies policies as well as ISI models coexisted (Kosacoff, 2002: 190). The nineties, on the other hand, saw the reversal of the neoliberal doctrines and privatisations and openness became the rule.

3.3. Regional Development Policies

The geographical concentration of population in Argentina seen in the previous section was also accompanied by an industrial concentration of activities. By mid-40s, industrialisation became a high priority goal for the government of Perón. Immediately following the war, exports had fallen below the lowest point of the depression and imports followed suit. During the government of Perón (1945-1955), a strong concentration of economic activity in the city of Buenos Aires was fostered by a policy that taxed agriculture – the traditional export sector – in order to build up industry and also stimulated a disproportionate growth of the bureaucracy in the capital (Morris, 1975). This policy was done mainly through the creation of the *Instituto Argentino de Promoción Industrial* (IAPI- Argentine Institute for Industrial Promotion).

The industrial survey of 1947 showed that 85 per cent of industrial value-added was produced in the city of Buenos Aires and three provinces, namely Buenos Aires, Córdoba and Santa Fé. The rest of the country, with a population of 34 per cent only accounted for 14.5 per cent of industrial value added. Most of it was concentrated in a few 'poles', such as Tucumán and Cuyo for its production of sugar and wines respectively. In 1974, the industrial survey revealed that there had not been major changes. The four 'advanced regions' accounted for 84.5 per cent of the value added and the rest of the country, comprising a 32 per cent of the national population, had increased only one percentage point. In 1984, still more than 80 per cent of the industrial activity was concentrated in the mentioned four regions (Schvarzer, 1987).

Prior to 1960, there was no regional policy as such and regional incentives to industry were only in force in order to induce some decongestion of Buenos Aires or to populate distant deserted regions. Most of these incentives had little effect in inducing movement of existing firms since the benefits of the incentives would be counterbalanced by the disadvantages of provincial isolation. In the sixties, however, there was an international concern for regional disparities and national economic development, with planning playing a more significant role in national policies. The federal government acknowledged responsibility for improving physical infrastructure, transport and

communications, social infrastructure and the development of agricultural, mining and water resources. A fund for the regions, *Fondo de Integración Territorial* (Fund for Territorial Integration) was planned in 1965 and established in 1968 (Morris, 1975).

Industrial development in Argentina can be understood in two groups. On the one hand, the location of certain industries in strategic sites that paved the way for the industrialisation of specific cities, and, on the other hand, regional promotion of industries aimed at relocating firms in the interior. Among the first group of polarised development were the proposals to build industrial parks at Córdoba and San Nicolás; the development of new petrochemical plants in Buenos Aires province and Santa Fé; and for meat-packing plants (*frigoríficos*). In addition, the oil and petrochemical 'pole' in Ensenada, the petrochemical complex in Bahía Blanca, the aluminium plant in Puerto Madryn on a maritime port and close to the electrical supplier, and the paper plants in the cultivated forests in Misiones.

With respect to the second group, industrial promotional regimes have been present in Argentina's legislation since the 40s. In particular, in 1944, decree number 14,630 stipulated that industries of national interest would be those in which national inputs were used and its production directed to the local market, as well as those that produced goods related to national security. The first measures of regional promotion date from 1956. In that year, Law 10,991 declared '*zona franca*' that below the 42° parallel, commencing with a series of promotional legislation tending to favour Patagonia. A series of decrees extending the favoured zones within this law started in 1961, and within a year two-thirds of the national territory were covered under different protection schemes. This gives a clear indication of the lack of organisation and priorities and the resulting lack of success of these schemes (Schvarzer, 1987; Azpiazu, 1989).

There was a relocation of firms to Chubut, with its centre in Trelew, which is the closest city to parallel 42°. Patagonia will only be benefited in Chubut, while the rest of the region remained outside of the regime following a pattern that would be present in all regional promotion schemes, the location as close as possible to Buenos Aires. Trelew,

though still far from Buenos Aires, was the closest city to parallel 42° – and Buenos Aires. In spite of a number of firms opening between 1956 and 1974, a significant proportion closed due to their small size. About half of the firms corresponded to relocations of existing plants from Buenos Aires rather than new investments. This suggests that the incentives were not great enough to plan long-term locations. Moreover, the large number of firms that withdrew entirely from the market indicates the short-term profit strategy that prevailed. There was, then, a distinct lack of integrated development. Instead, at a high cost, this policy set isolated industrial enclaves that did not integrate to the local environment and did not generate any dynamics or linkages in the medium-term (Schvarzer, 1987).

In 1966, the first localised and specific promotional regime was approved, the '*Operativo Tucumán*'. This had the objective of smoothing the social crisis in that province, which was the result of the closing of sugar mills taken under government control with a subsequent lay-off of workers. The plan had the objective of promoting new industrial activity, which the military government considered necessary to avoid deepening social problems since a *guerrilla* movement had started operations. However, in the short-run, the credit and tax incentives offered did not succeed in attracting enough interested firms. In 1972, the law enhanced the benefits offered, and in 1974 additional benefits were considered. Many of the projects were approved at a very high speed and often neglecting proper controls, with a high percentage of firms being granted benefits. Again, in this case, many of the firms result from transfers from Buenos Aires (Schvarzer, 1987). Morris (1975) mentions Tucumán as an evidence of the failure of regional policy since it is a province that was a focus of regional poverty in both 1961 and 1971. The main problem was the over-concentration of sugar cane, which could only survive under barrier protections.

A definite regional orientation was sought in the 1971 Plan that involved a set of poles. Growth poles were to be set up in several groups of towns comprising the northwest, northeast and Patagonia. Besides, Tucumán and Comodoro Rivadavia were made *areas de promoción prioritaria*. Three of the poles were in Patagonia; which is likely to be

more related to military objectives than regional needs. Apart from Corrientes-Resistencia, those poles were sited around small towns, none of them large enough to absorb major industrial development without a preliminary expansion of infrastructure. Their economic development and growth poles were to be found on energy production (at Posadas, Oberá, Salta and Zapala-Neuquén), on primary metal or ore production (Puerto Madryn for aluminium, Sierra Grande for iron ore, Río Turbio with coal). Such activities did not have much multiplier effects on regional economies, since they employ few and have mostly forward linkages, which were extra-regional. Besides, there was little commitment of public money to the regions.

In 1970, 44 per cent of all federal and provincial public investment was in Buenos Aires City and province and a further 19.6 per cent in the provinces of Entre Ríos, Córdoba and Santa Fé. Private investment, on the other hand, was given little inducement to redress this imbalance with no efficient tax and credit incentive schemes that would push firms to re-locate in the provinces. When growth poles were dropped by Perón in 1974, given their initial limited investment, this scarcely represented a change.

In 1972, Law 19,640, gave Tierra del Fuego a special promotional status, which would have surprising results at the end of the decade. At that stage, there was a population of less than 15,000 inhabitants and there were sixty industrial plants. Through most of the decade, this remained little altered. However, in 1978, several exogenous factors at the national level resulted in dramatic changes for the province. First, the opening of imports affected the electronic domestic companies. Second, the promotion of the colour television sets was established by a special law and national firms found that the deadlines were not enough in order to design and produce the sets while the increasing competition was damaging their businesses (Schvarzer, 1987).

Tierra del Fuego became then an attractive place to locate firms, because its promotional status meant it could import parts from abroad. There was an enormous exodus of firms towards Tierra del Fuego, and by 1984 more than 150 firms were operating. The number of people employed rose from 581 in 1974 to 6,294 in 1984, and the population of the

island increased from 23,000 in 1980 to 40,000 in 1987. The increase in labour was concentrated in the electronic industry for consumption, which accounted for 76 per cent of the rise in workers between 1980 and 1984 in twenty specialised firms. The special customs area, created in 1972, that excepted from all national taxes and import duties those goods entering through Tierra del Fuego and allowing its re-exports to the rest of the country, started to operate in 1979. However, this system was unsuccessful in terms of productive efficiency and local integration. In 1985, the share of local sales was 10.9 per cent, while those to the rest of the country accounted for 88.8 per cent (Azpiazu, 1989; Schvarzer, 1987). Tierra del Fuego will be mentioned again in the next chapter.

In 1972, the establishment of new firms in the city of Buenos Aires was forbidden, and a distance of 60km from the city was agreed as 'green belt'. This was further modified in 1973, 1977 and again in 1979. However, the trend of reducing the industrial size of Buenos Aires seems to be more linked to lessening the social risks derived from the number of waged workers among the population rather than concerns regarding the disproportionate distribution of wealth between the provinces and the capital (Schvarzer, 1987) and therefore cannot be considered as intended to favour convergence.

In 1973, the country was divided into two areas with different intensity of socio-economic benefits. The most important covered Patagonia, the Northwest and the Mesopotamia; while the second comprised part of Mendoza, Córdoba, Santa Fé and Buenos Aires. Both Tucumán and San Juan, still favoured by the special regimes, were initially excluded. By 1974 this covered most of the territory, and a decree established the '*Acta de Reparación Histórica*', a special regime for Catamarca, La Rioja and San Luis. In 1979, the benefit of VAT exception was granted to those who settled in La Rioja. In 1982, the promotional benefits were extended to the firms in Catamarca and San Luis consolidating the proposals of the '*Acta de Reparación Histórica*'. (Schvarzer, 1987).

By 1988, two characteristics of industrial promotion in the country had become evident. The first was the multiplicity, overlapping and lack of articulation of specific regimes of promotion and its application depending upon a number of authorities. The national

regime depends upon the secretariat of industry and foreign trade (SICE) while in Tierra del Fuego, La Rioja, San Luis, Catamarca and San Juan the provincial governments have the authority to approve projects (Azpiazu, 1989). Finally, another attempt to move activities away from Buenos Aires was in 1987, when Law 23,512 approved the moving of the capital to the area of Viedma (Río Negro) and its neighbouring city Carmen de Patagones (Buenos Aires). However, this law was declared invalidated by a presidential decree in November 1989.

Industrial promotion in Argentina has been generally ineffective and failed to develop linkages in the local economies. Growth poles were scarcely real in terms of effective planning and conscious planning for the regions has in general had little impact. Economic arguments against growth poles in underdeveloped countries include their non-applicability because of the lack of an urban network to allow the spread of the effects. Further, the reduced size of the local market is a severe constraint to the development of new industries. According to Morris (1975), there is a very significant regional component to national planning and it may be called 'unconscious regional planning', which favoured the metropolitan region with the resulting promotion of centripetal rather than centrifugal development processes. Thus, it can be said that the failure of regional planning contributed to further reinforce the position of Buenos Aires.

4. Conclusions

Contrary to the prescriptions of neo-classical economics, this chapter shows that regional differences in Argentina have been accentuating rather than decreasing since independence. In early colonial times, priority was given to the silver economy in Potosí. During that era, the regions of the present Argentine Republic that were most dynamic, populated and wealthy were those that served as satellites from the Upper Peru. The north of Argentina prospered in this period since it produced ox carts, textiles and basic goods to be sold in the Upper Peru. It is precisely those provinces in the north that now display the lowest levels of GDP, as seen in Figure 1.4 in the Introduction to this thesis. By contrast, the littoral was scarcely populated. The centre of cultural activity and one of the most important cities at this time was Córdoba, whereas Buenos Aires was no more than a village.

When the viceroyalty of the River Plate was created, the importance of Buenos Aires rose as its port flourished as the direct link with Spain. The economies of the interior were now satellite economies of the central authority of Buenos Aires, but with poor infrastructure and specialised arcraft economy, the interior entered a period of sharp decline. This became even worse when independence was declared and the links with the Upper Peru and Chile ended.

Meanwhile, the geographic location of Buenos Aires together with the productivity of the pampa became a natural attraction not only for foreign migrants but also for those from the rest of the country. As Félix Luna (1999) put it, although Argentina has a varied geography and climate that allows for all kinds of production, there is only one entrance to this vast territory, and this is the port of Buenos Aires. Whoever controls it has complete power over the rest of the country.

This imbalance not only persisted but also grew worse and deepened over time, particularly with the import substitution industrialisation model. Migration flows, far from triggering the balancing mechanisms prescribed by classical economics, contributed to worsening the concentration in Buenos Aires and its surroundings where the

industrialisation effort was mostly located. The lack of serious public policies to develop other areas of the country and induce an efficient and long-lasting desentralisation process, together with the end of the import substitution industrialisation model and the subsequent liberal policies that followed, determined a situation that has endured to the present and constitutes one of the most dramatic features of 21st- century Argentina.

In the following chapter, the disparities in Argentina from 1960 onwards will be analysed. I will try to determine empirically if there has been convergence among the provinces and whether macro and political factors had any impact on the process of convergence. Further, I will try to determine empirically whether any of the regional policies applied in Argentina had any effects on convergence.

Convergence Analysis in Argentina

1. Introduction

This chapter intends to test for the dynamic of economic disparities in Argentina following the previous analysis of the history of the development of disparities from colonial times. Convergence among the twenty-four Argentine provinces in the period 1961-1995 will be empirically tested here. The main objective is to determine whether the dual economy present since the sixties is still the case in Argentina 30 years later (as seen in Figure 1.3 in the introduction) or whether the neo-classical model predictions holds and convergence has been the rule. Further, particular emphasis will be placed on the impact of industrial promotion regimes as well as macro and political imbalances.

The following section will explain the problems encountered with the data sets used in this chapter. In section 3, a more descriptive analysis of σ -convergence using social variables as well as the percentage of national average income is done, as performed in previous chapters. In Sections 4 and 5 of this chapter, both beta and σ -convergence analyses will be performed, though in a more extensive way than for both the EU and MERCOSUR. The β -convergence analysis included here will include both absolute as well as conditional, with extensions to test for the effect of macro and political variables.

2. Data Availability and Methodology

For the main sigma and beta analyses performed in this thesis, the data set published by Universidad de la Plata (1999) covering the period 1961-1995 was used. These data presented some gaps, however, for the provinces of Salta, Santa Cruz, Chubut and Tucumán until 1970 and it was available in total GDP in constant 1986 prices. By contrast

to the Brazilian case (as will be seen in Chapter 9), for Argentina data availability represented a problem. In addition to the UNLP (1999) data set, other (shorter) data sets were found. Data for the years 1953, 1958 and 1959 (first years for which provincial GDP is available) in current prices was available from CFI- Di Tella, 1965. Also, for the period 1965-1969, INDEC published data on provincial GDP in current prices, and for the period 1970-1985 information was available in constant 1970 prices for all provinces except Entre Ríos, Mendoza, Misiones and San Luis from CFI (1988). Data for those provinces except for San Luis was completed with CFI (1983). When calculating the series in constant 1986 prices and comparing with that of Universidad de la Plata, both series coincide. Another series for the period 1980-1991 was found in Argentina, Ministerio del Interior (1995), with series of provincial GDP in constant 1986 prices except for the provinces of La Pampa and Buenos Aires, which were in constant 1970 prices. This data is also quite consistent with that of Universidad de la Plata. For the period 1990-1995, there is data in both constant 1986 and current prices for all provinces. Again, when comparing with the data from Universidad de la Plata, the numbers coincide, particularly for the last two years. Finally, data for 1998 in current prices is also available from Centro de Estudios Regionales (2000) that will be used in the Appendix V- see methodological notes in that Appendix and in section Ve. There was a project by CFI in order to produce provincial GDP data every five years; according to this, the next series published would comprise the period 1995-2000. However, this has not yet been published. In fact, over the last decade, CFI has been restructured and data collection has suffered a loss of quality (see further explanation on Appendix III.g.). Data for the period 1996-2000 is not available from CFI, Ministerio de Economía or INDEC. Data for this period was found in a paper by Escudero et al (2002) - see Appendix III.g. - but given that the source is not mentioned and given that the main results are not significantly affected (see Appendix Ve) these data will only be considered as complementary and not part of the main analysis in this chapter.

Given the lack of continuity in all the above-described series, I have therefore decided to use for this analysis the data provided by UNLP (1999) after checking for consistency with bits provided from the other various sources, which mostly coincided. Given the

series for 1998 in current prices and the availability of the series including the year 1959, a regression has also been performed using both years in current prices, and this is also presented in the Appendix as a supplementary regression to this analysis, as mentioned above.

Therefore, in this chapter, the analysis will be performed with the data from Universidad de la Plata for the period 1961 to 1995, since not only is it the longest series available but it is also fairly consistent with the bits provided by other sources and thus I preferred to use the longest available series for this analysis. However, as mentioned above, even for the series from UNLP for some provinces data was only available since 1970. The following method was used in order to complete the gaps in the series. First, the data on GDP for 1958, 1959 and 1965-69 in current prices was interpolated in logarithms. Secondly, pairs of provinces (one for which data from UNLP was available and one that was not) were selected on the basis of similarities between them and a ratio of current prices (antilogarithms of the interpolated data) was calculated. Once this ratio was obtained, it was multiplied by the provincial GDP in constant prices from UNLP of the known province in order to obtain the GDP of the missing one. This procedure was undertaken not only for the missing years 1961 to 1969, but also for the rest of the series to check for consistency. Furthermore, it was performed with different pair of provinces for which data was known to check the consistency of the method. The resulting series matched the data from UNLP from 1970 onwards with extremely high levels of accuracy (99 per cent). As mentioned before several pairs of provinces were tried, but the ones that were used (the ones with high levels of accuracy) were the following: Chubut and Neuquén; Neuquén and Santa Cruz; Santiago del Estero and Salta; Tucumán and Jujuy. Since the data is in total GDP (in thousands), GDP per capita (in thousands) was calculated using population data from INDEC. In order to calculate sigma and β -convergence, logarithms of these values were taken. The GDP data used in this chapter is given in Appendix III.a.

Other data was used in this chapter both for the conditional beta analysis of Section 5 as well as the descriptive analysis in Section 3. Literacy rates are available from 1914 from

Vázquez Presedo (1991) and those for 1947, 1960, 1970 and 1991 from INDEC. The former considers illiterate population out of population over fourteen and the latter over total provincial population; therefore only data from INDEC will be considered in the analysis. The illiteracy rate for each province will then be defined by the ratio between illiterate population and total population. Infant mortality rates were taken from INDEC and Vázquez Presedo (1991). Information is available from 1938 onwards. Finally, data on the percentage of urban population is available from INDEC from 1869 onwards. Section 3 includes sigma analysis on those variables as well as a similar analysis as that done for both the EU and MERCOSUR with percentages of national average GDP since this is considered to be an important addition to both sigma and beta analyses. These data sets are also in Appendix III. Further, in Section 5, the hypotheses mentioned in this thesis referring to the impact of both macroeconomic as well as political factors in the process of convergence will be analysed. As a proxy for macroeconomic stability, the rate of growth of inflation was considered (data from INDEC). In the case of political instability, information on military coups and military periods will be considered.

A final methodological consideration is that of the grouping of provinces into regions that will be used along the chapter. Five regions will be considered as follows,

- *Cuyo*: San Luis, San Juan and Mendoza
- *Nordeste*: Formosa, Misiones, Chaco, Corrientes
- *Noroeste*: Salta, Jujuy, Tucumán, Santiago del Estero, La Rioja, Catamarca
- *Pampeana*: Buenos Aires, Capital Federal, Entre Ríos, Santa Fé, Córdoba, La Pampa
- *Patagonia*: Neuquén, Río Negro, Tierra del Fuego, Chubut and Santa Cruz

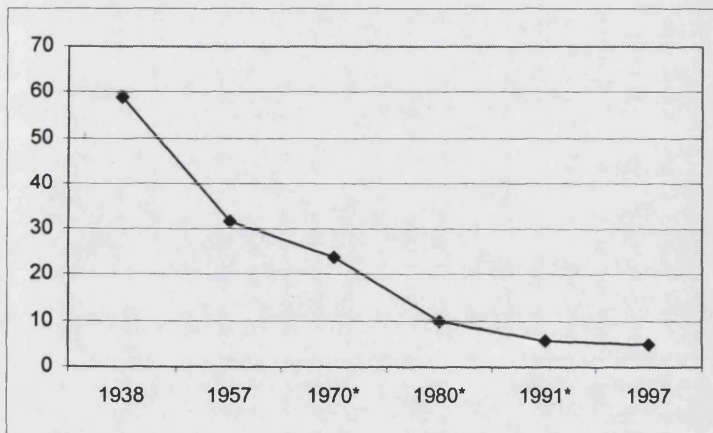
2. Socio- economic indicators

Sigma analysis is not restricted to analysing the convergence of GDP and other indicators can also be used. In this section, some selected indicators will be presented as well as the main findings by Marina (1998). Additional research was done for those cases in which data was available in longer series than those used by Marina (1998). The data used in

this section are own calculations from INDEC and they are also presented in Appendix III.

Regarding demographic indicators, life expectancy, infant mortality and masculinity rates can be included. Marina (1998) found convergence for all of them. Her analysis was done for the seventies onwards but given that data on infant mortality was available from 1938, I have depicted the deviation of these rates across the provinces in Figure 7.1. It can be seen that infant mortality rates show a strong σ -convergence for the period 1938-1997.

Figure 7.1. Convergence on Infant Mortality Rates (1938-1997)



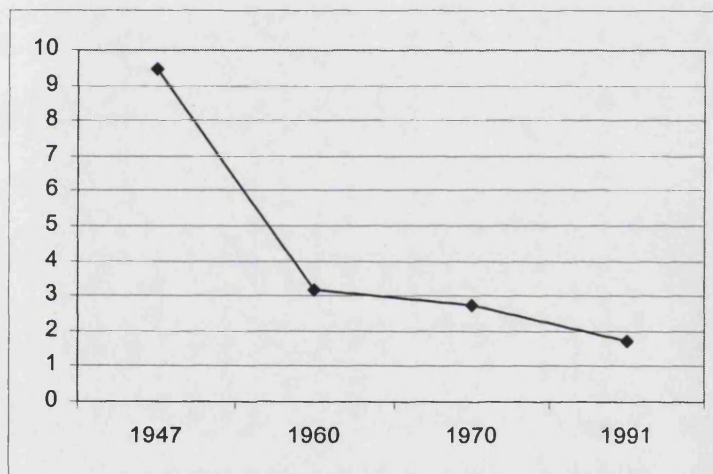
Source: own calculations

Health indicators can also be used. In this case, only the data reported by Marina (1998) will be referred to. The indicators considered were beds per 1,000 inhabitants, medical appointments per capita, patients per 10 inhabitants, doctors per 1,000 inhabitants and hospitals per 100,000 inhabitants. Sigma convergence was found in the period (1970-1990) for all indicators except for that of patients per 10 inhabitants and hospitals per 100,000 inhabitants.

When considering educational variables, and given that there is available data on illiteracy rates earlier than those analysed by Marina (1998) and therefore additional sigma analysis has been carried out. The analysis performed by Marina (1998) included

primary, secondary and tertiary school enrolment, personnel working in those three sectors, illiteracy rates, newspapers per 1,000 inhabitants, primary and secondary students per 100 inhabitants and primary and secondary students per teacher. Sigma convergence was found for enrolment at the three levels and also the gap decreased. For the other indicators, there is σ -convergence. Illiteracy rates show a constant σ -convergence for the period 1970-1991 with the average rates per province and the gap decreasing. Although the sigma indicator is almost constant after 1970, it can be seen in Figure 7.2 that when extending the period with the data from 1947, a strong convergence can be found.

Figure 7.2. Convergence of Illiteracy Rates (1970-1991)



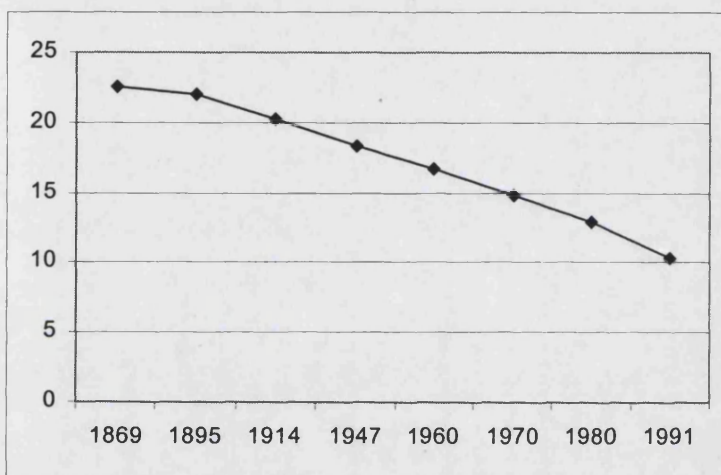
Source: own calculations

Urbanisation indicators have also been used, since the ratio of urbanisation is taken as an indicator of development. In the analysis performed by Marina (1998), the average percentage of population in urban areas increased from 1949 onwards and the gap as well as the coefficient of variation decreased considerably. This can also be seen in Figure 7.3, where the percentage of population living in urban areas covers the period 1869-1991 has been analysed. It can be seen that the dispersion halved during the period and that the trend shows a steady decline.

Marina (1998) uses labour force indicators, finding a significant decrease in the sigma coefficient for the activity rates; as well as consumption indicators (commercial and

residential energy per 1,000 inhabitants and cars and telephones per 1,000 inhabitants). There is convergence for electricity use but the most interesting result is that there is a significant gap between both groups of provinces that does not decrease. Regarding public spending, the findings reveal that for public employment per employee and for the expenditure per capita, the gap increased and the sigma indicator is constant. For public employment per 1,000 inhabitants the indicator decreased.

Figure 7.3. Convergence of Urbanisation Rates (1869-1991)

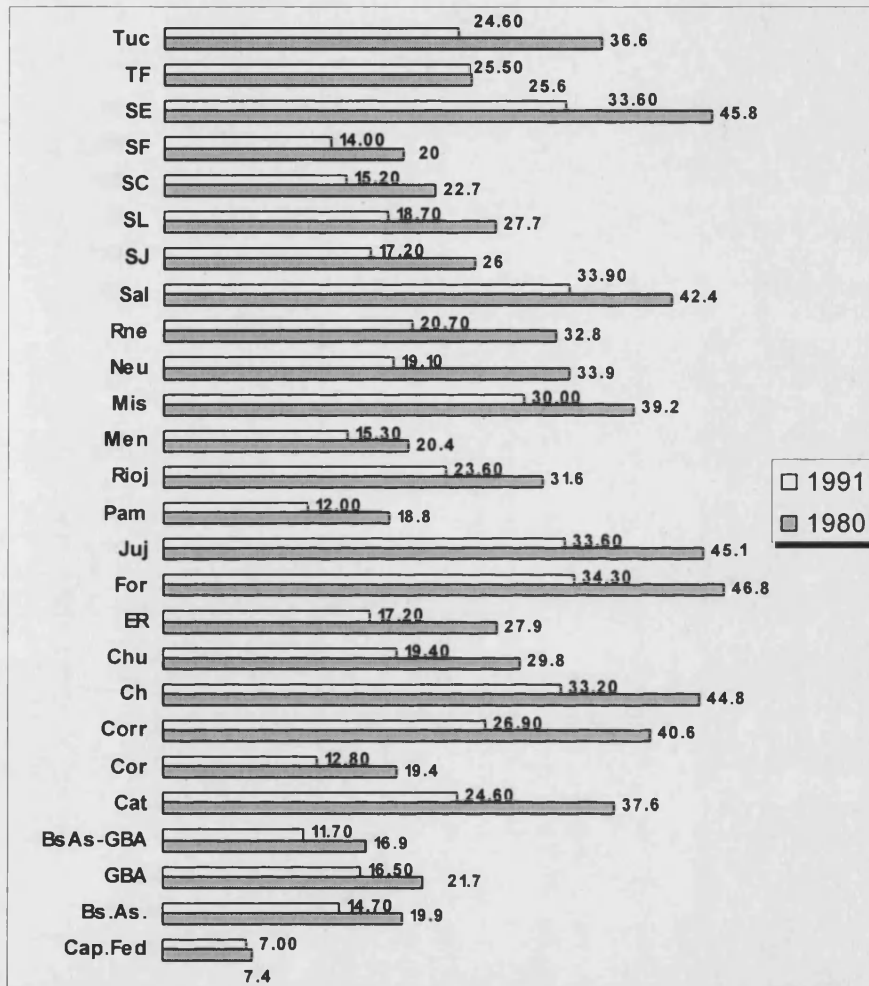


Source: own calculations

As a welfare indicator, Marina (1998) uses a development index calculated with the quality of living, level of education and number of cars per person. This indicator shows that the gap decreases and that there is σ -convergence. Here data from INDEC on the index of basic needs (NBI) has been analysed. Unfortunately, the last data available correspond to 1991. The most recent national census was carried out in November 2001 but the information has not yet been published. It can be seen in Figure 7.4 that the indicator has decreased for all provinces, i.e. poverty levels have been decreased between 1980 and 1991. Nevertheless, disparities have remained significant. The highest index, corresponding to the province of Formosa, followed by the provinces of Santiago del Estero, Chaco, Salta, Corrientes and Misiones in 1980. In 1991, the highest index still corresponds to Formosa and it is followed by the provinces of Salta, Santiago del Estero, Jujuy, Chaco, Misiones and Corrientes. The index for the city of Buenos Aires is 7, while

that corresponding to Formosa is 34.3 in 1991. The index for Formosa is for both years twice as much as the national average.

Figure 7.4. Indicator of Basic Needs, by Province (1980 and 1991)

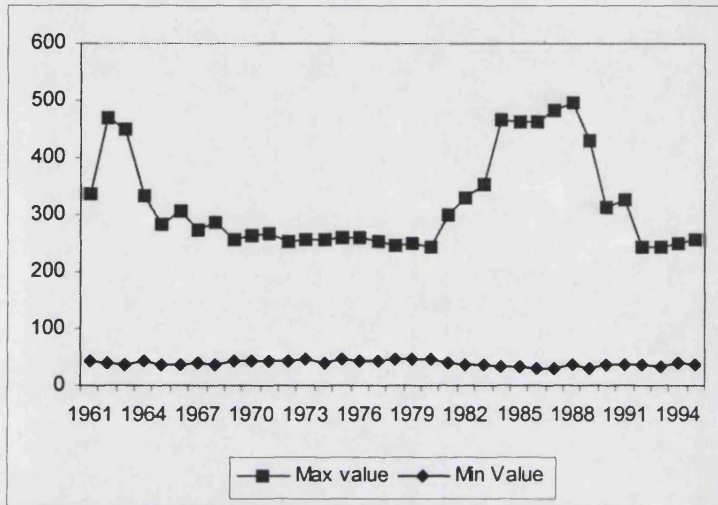


Source: INDEC

Regarding data on GDP, the following conclusions can be made. When looking at Figure 7.5 it can be seen that while the minimum percentage of national GDP remained mostly unchanged in the period 1961-1995 around 40 per cent; the maximum exhibits a constant trend in the late sixties and seventies and an increase at the beginning of the eighties with a later decrease in the late eighties and early nineties. Therefore, the ratio of extreme

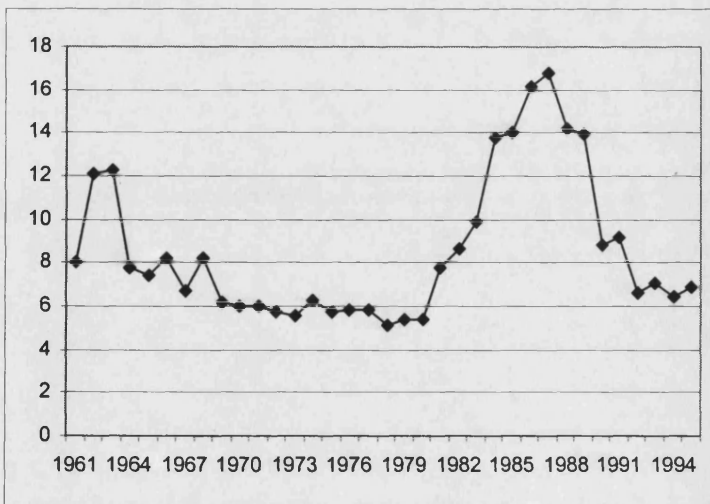
values followed the same trend, as can be seen in Figure 7.6, with a significant increase in the eighties that peaks in 1987.

Figure 7.5. Maximum and Minimum GDP values, by province as percentage of national GDP (1961-1995)



Source: own calculations

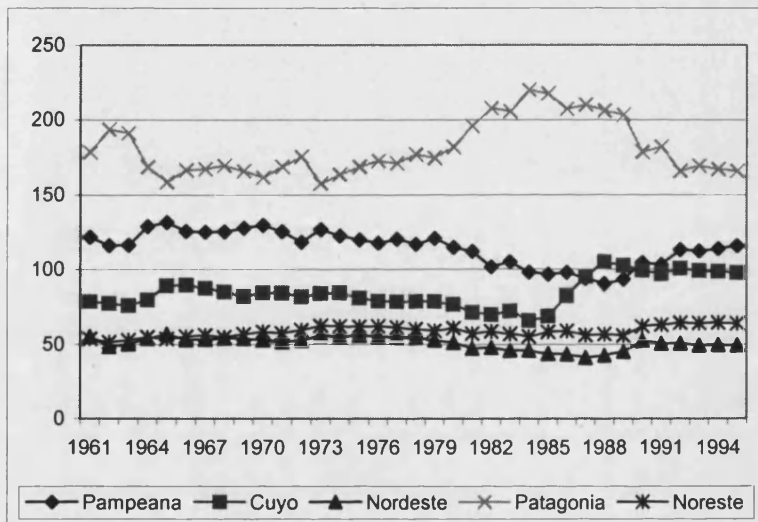
Figure 7.6. Ratio of Extreme provincial GDP Values in percentage of national GDP(1961-1995)



Source: own calculations

When depicting the percentage of average national GDP per regions, a clearer picture begins to emerge. As can be seen in Figure 7.7, the Nordeste and Noreste regions remain mostly unchanged, with an average of 50 and 80 per cent below the national average. Regarding the Pampeana region, it remains around 20 per cent above the national average, with a slight decline at the end of the eighties and small increase in the early nineties. Patagonia displays the same behaviour as seen in the maximum value curve. Cuyo, on the other hand, remains stable until mid eighties and then increases.

Figure 7.7. Percentage of Average National GDP per Regions

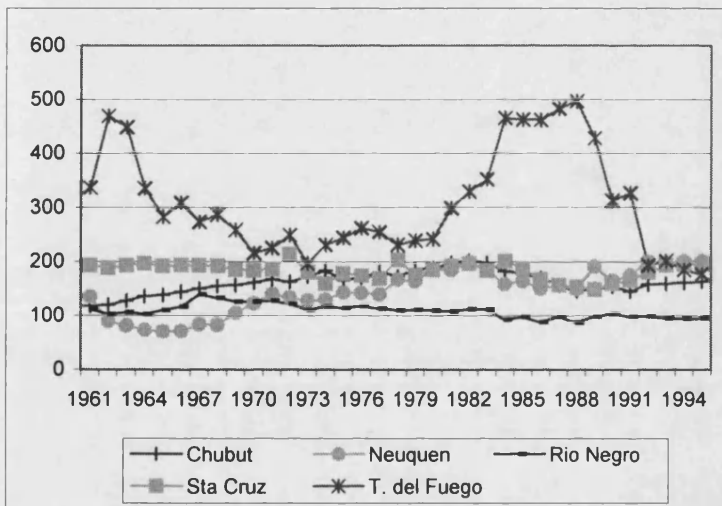


Source: own calculations

A closer inspection of both Patagonia and Cuyo region reveal that in the case of Patagonia (Figure 7.8) the five provinces display a different behaviour. While Río Negro and Santa Cruz remained mostly stable, Chubut exhibits an increasing trend in the sixties and seventies, decreasing in the eighties. In the case of Neuquén, the behaviour is more irregular but it an increase can be seen from the early seventies. The case of Tierra del Fuego explains the behaviour of the maximum indicator as well as the whole percentage of national average of the Patagonia region. In fact, Tierra del Fuego was not only above but had the highest percentage of national average GDP from 1981 to 1989. This is linked to the industrial promotion regimes referred to in the previous chapter and will be seen in the following sections of this chapter.

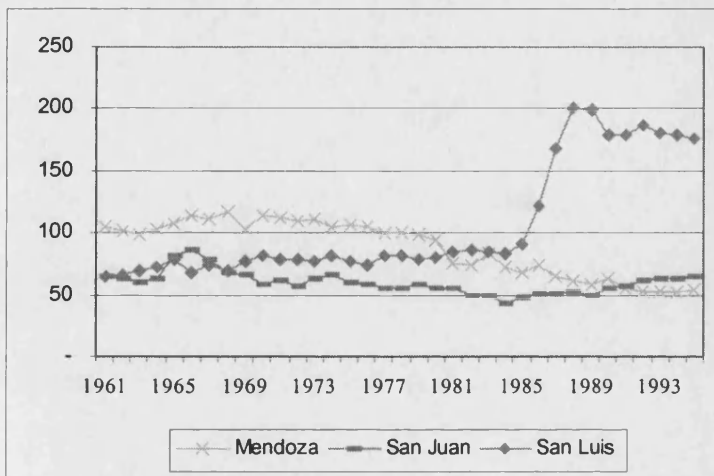
In the case of Cuyo, it can be seen in Figure 7.9 that while San Juan remained stable around 50 per cent of national GDP, and Mendoza- with above 100 per cent at the beginning of the period- declined slowly, specially in the eighties. San Luis, by contrast, started with 50 per cent and increased dramatically in the late eighties to reach 200 per cent of national average GDP peaking in 1989 and 1990 and, although slightly decreasing afterwards, remained high for the rest of the period. This can also be related to the promotion derived from the *Acta de Reparación Histórica* as seen previously.

Figure 7.8. Percentage of National GDP in Patagonia



Source: own calculations

Figure 7.9. Percentage of National GDP in Cuyo



Source: own calculations

4. Sigma Analysis

As mentioned before, sigma analysis is a good preliminary approximation to convergence, and is usually followed by the β -convergence. The dispersion of the logarithm of per capita GDP for the completed data set from Universidad de la Plata is shown in Figure 7.10. Two preliminary remarks can be made. First, when comparing the dispersion for the first and final years, 1961 against 1995, it can be seen that the dispersion has decreased from above 0.3 to 0.24. Secondly, although the indicator varies within a small range, a closer inspection shows that three main trends can be differentiated along the forty-year period.

The first one comprises the sub-period that expands until 1973, in which disparities decreased from a maximum level of 0.3 in 1961 to 0.21 in 1973; representing a 42 per cent decrease for the sub-period. Although irregular, this was a period characterised by convergence among the provinces, with an average annual decrease in the indicator of 3.2 per cent. There were two significant increases, one in 1968 and the other in 1970-72. The lowest indicator corresponds to 1973, which is also the lowest indicator for the forty-year-period.

The second main trend is a steady increase that continues until 1989. The indicator increased by 30 per cent between 1973 and 1989 with an average annual growth of 2 per cent and only two years of slight decline, 1985 and 1986, which coincide with the implementation of the *Plan Austral* (also 1988 shows a slight decline, after the *Plan Primavera* was launched). The increase takes place at a slower and steady pace until 1980, at an average of 1 per cent each year, but increases by 8 per cent in 1981. After this, the slower and steady trend continues until 1983, with a sharper increase of 6 per cent in 1984, followed by a decline until 1986, and a new increase of 5 per cent in 1987. Disparities were at a maximum between 1987 and 1989, reaching the maximum value for the entire period (0.28). The seventies and eighties were clearly a period of increasing disparities. This was also a period in which the Argentine economy was highly unstable. Finally, the third period starts with a sharp reduction in disparities in 1990, with a significant decrease of 14 per cent, representing the largest change in the whole forty-year period. After this year, the indicator remains mostly stable, oscillating with decreasing amplitude towards 0.24.

Figure 7.10. Sigma Convergence among the Argentine Provinces (1961-1995)



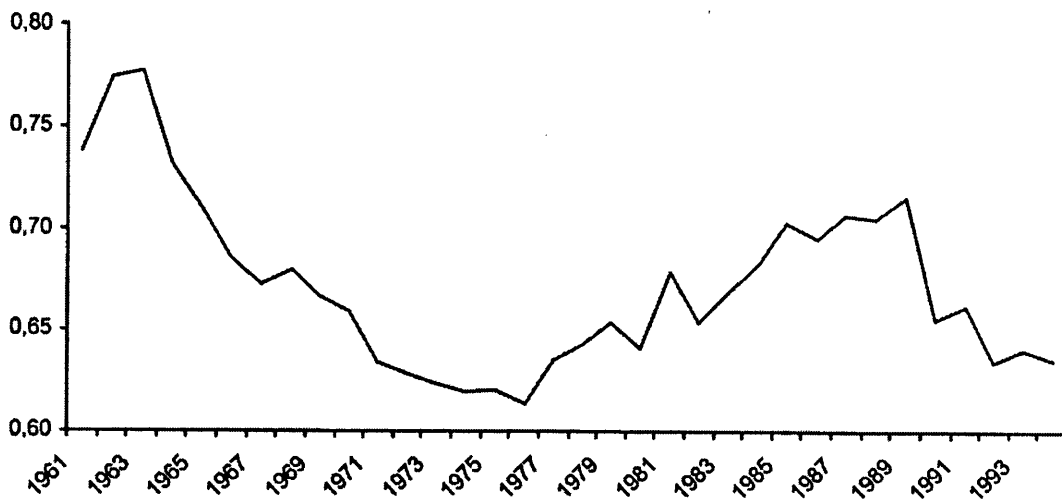
Source: own calculations

When comparing to the sigma analysis calculated with the additional data (1996-2000) – see Figure VeI in Appendix V.e. it can be seen that for the last years the indicator decreases steadily, in particular until 1999.

Other authors have also performed a sigma analysis for the Argentine provinces. According to Willington (1998), the variance of GDP increases over the period, but as Utrera and Koroch (1998) point out, he calculates the variance using the gross per capita products of the provinces instead of applying logarithms. Therefore, the growth of the variance includes the effect of the growth of the variable considered. When analysing the period 1960-1995 with data from CFI and INDEC, Willington (1998) concludes that there is a steady increase in the sigma coefficient throughout the whole period.

Utrera and Koroch calculated the dispersion of GDP across Argentine provinces over the period 1953-1994 (Utrera and Koroch, 1998) and for 1961-1994 (Utrera and Koroch, 1999). They used the data provided by INDEC and CFI and converted it into constant 1986 prices. They also find an overall decreasing trend with three main break points. There is a resemblance of Utrera and Koroch (1999) and the findings presented above, particularly regarding the existence of three break points with a declining trend in the sixties and an increasing one in the eighties (See Figure 7.11).

Figure 7.11. Sigma Convergence in Argentina according to Utrera and Koroch (1999)



However, there is a strong decreasing trend for them that goes well into the seventies, reaching its minimum level in 1976 and increasing again until 1990. The declining trend in the sixties is more noticeable in Utrera and Koroch (1999) than for the data of Universidad de La Plata. Utrera and Koroch conclude that there is an overall decreasing trend with their minimum indicator for 1976 being 0.61 and its maximum corresponding to 1963 (0.77).

Utrera and Koroch (1999) emphasize the distortionary effect that the provinces of Tierra del Fuego and San Luis have since, according to them, these provinces show breaks in the level of income that coincide with the implementation of industrial promotion regimes and their later reversal. When eliminating these provinces from the analysis, they observe a smoother trend and the three break points are no longer noticeable. In fact, it can be seen that there is an irregular but clear convergence until 1976 (See Figure 7.12). It then grows smoothly until 1981 when there is a jump. It then decreases until 1989 and in 1990 returns to its 1988 level and from then onwards it steadily increases. When comparing Figures 7.12 and 7.11, it can be seen that the trends diverge mostly in the eighties and at the beginning of the sixties, but the main difference is in the period after 1981.

Following their results, I have eliminated those two provinces from the data from Universidad de La Plata it can be seen that the trend smoothens and the three sub-periods can no longer be recognised either. The results presented in Figure 7.13 show an overall decrease as well, with the same initial and final sigma indicator. The main divergence between both curves is for the first half of the sixties but mainly throughout the eighties.

Figure 7.12. Sigma Convergence in Argentina according to Utrera and Koroch (1999) without Tierra del Fuego and San Luis

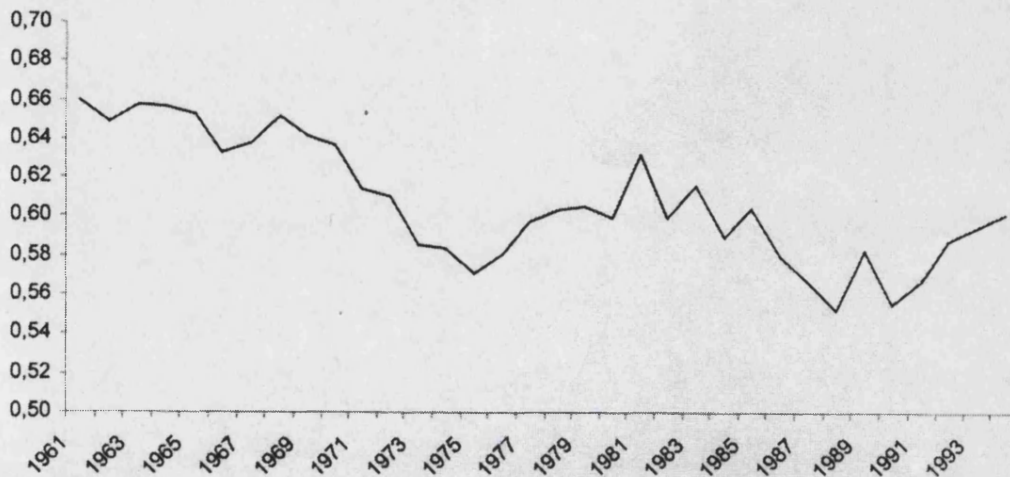
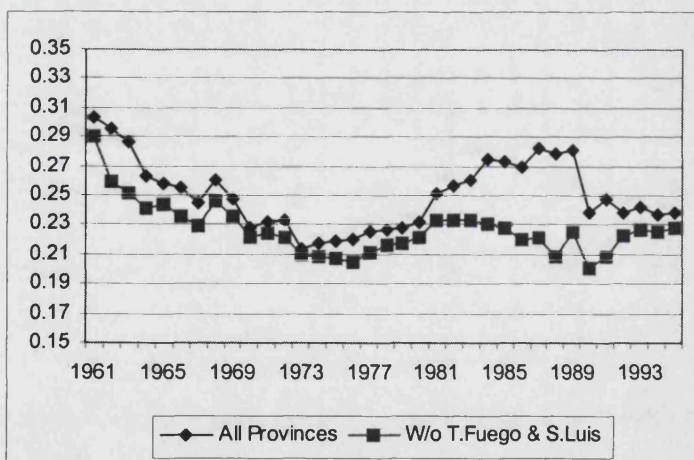


Figure 7.13. Sigma Convergence without Tierra del Fuego and San Luis



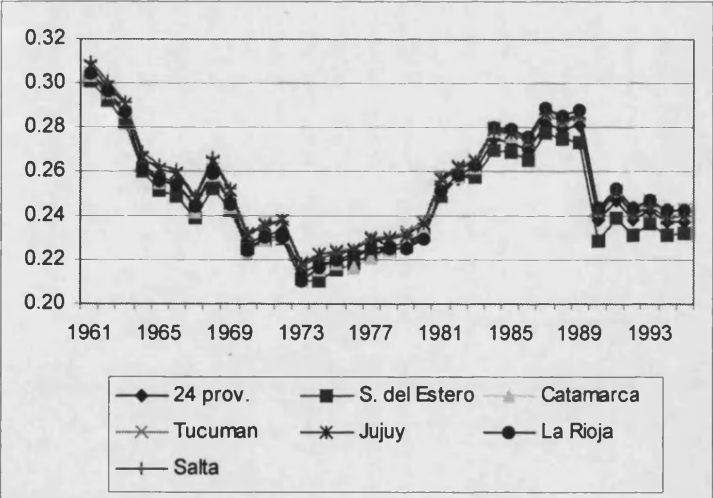
Source: own calculations

A further analysis was carried out here, and will also be performed for Brazil (see methodological notes in Appendix V). Instead of only eliminating the above-mentioned provinces, each of the 24 provinces was excluded, one at the time, in order to see what impact each of them had on the variability of the indicator. Figures 7.14 to 7.18 correspond to the five different regions as defined in the methodological section. Each Figure depicts a curve including the 24 provinces and one for each of the provinces in the

region. These curves include 23 provinces and each of the curves is labelled with the name of the omitted province. In Figure 7.19, the curve with the 24 provinces as well as each of the other 24 individual curves has been depicted.

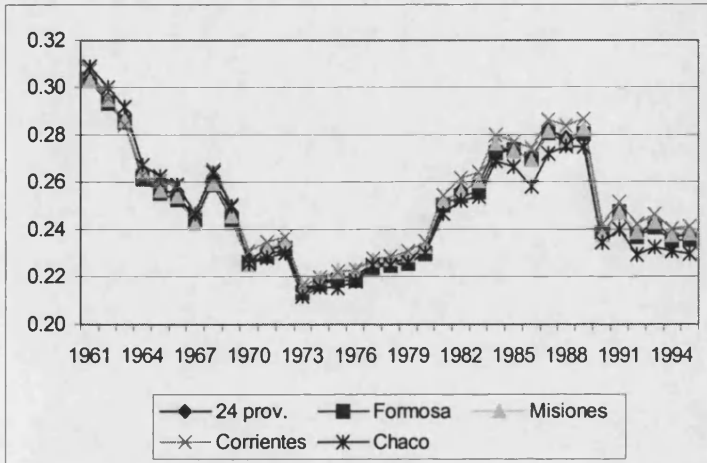
In Figures 7.14 and 7.15, corresponding to Noroeste and Nordeste regions respectively, it can be seen that there is no difference between the national trend and when omitting each of the provinces of those regions. In Figure 7.16, a slight difference can be seen when eliminating Capital Federal. However, this difference is in terms not of shape but of magnitude. The curve without Capital Federal is consistently much lower than the other, but particularly in the seventies and nineties. Therefore, although the Capital follows the behaviour of the rest of the country, it accentuates the pattern. The events of the seventies and nineties in terms of relative instability and stability respectively seem to have affected Capital Federal more than other provinces in the country.

Figure 7.14. Sigma Convergence in the Noroeste Region



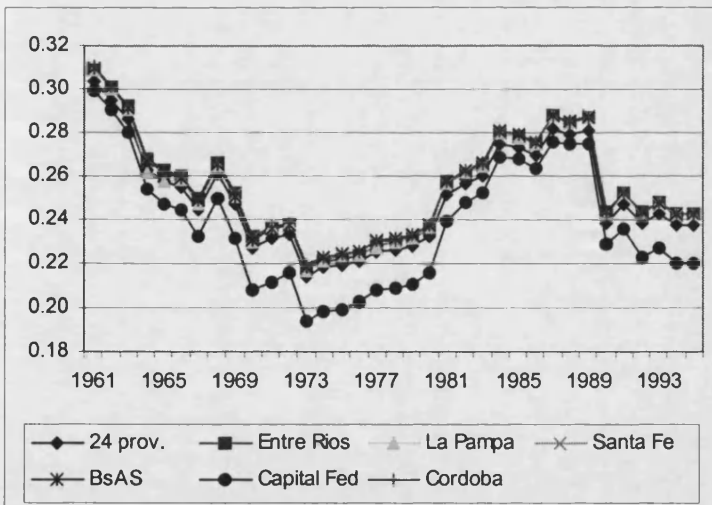
Source: own calculations

Figure 7.15. Sigma Convergence in the Nordeste Region



Source: own calculations

Figure 7.16. Sigma Convergence in the Pampeana Region

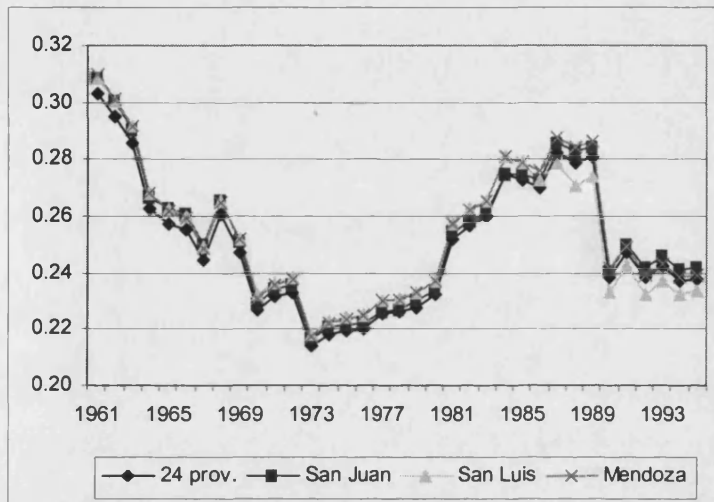


Source: own calculations

The most surprising results however, are found when looking at Figure 7.17, which contradict the conclusions of Utrera and Koroch (1999). For the Cuyo region, the same pattern as in Figures 7.14 and 7.15 can be seen: no significant difference when omitting each of the provinces. In particular, the province of San Luis does not alter the pattern of the sigma analysis at all. This is a very interesting result given what was seen in the previous section that San Luis dramatically increased the percentage of average GDP in

the late eighties. According to the sigma analysis, however, there is only a slight change and it is only in magnitude, but the dispersion of all provinces without San Luis does not show any major changes.

Figure 7.17. Sigma Convergence in the Cuyo Region



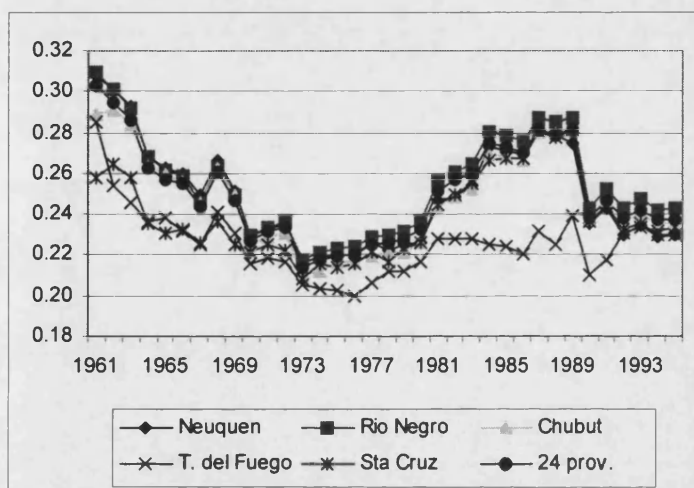
Source: own calculations

However, it is clear from Figure 7.18, that when omitting Tierra del Fuego, there is a significant change in the *shape* of the curve. In fact, we get a curve like the one in Figure 7.4 that replicated the analysis done by Utrera and Koroch (1999), but this effect is only achieved by excluding Tierra del Fuego (the province of Santa Cruz also shows a magnitude difference at the beginning of the period). Furthermore, Figure 7.19 depicts the curve for the 24 provinces plus each of the 24 curves that exclude one province at the time (for reasons of simplicity, I have omitted all labels). It can be clearly seen that despite minor differences of magnitude, particularly for Capital Federal and Santa Cruz, the only province that significantly affects the σ -convergence is Tierra del Fuego.

In 1972, Tierra del Fuego obtained a special promotional status whereby exception from all national taxes was granted alongside with import duties for those goods entering through Tierra del Fuego and allowing its re-exports to the rest of the country. This only started to operate in 1979 and resulted in a massive exodus of firms towards Tierra del

Fuego. The number of employed people rose from 581 in 1974 to 6,294 in 1984 and the population of the island increased from 23,000 in 1980 to 40,000 in 1987. That increase was concentrated in the electronic industry for consumption, which accounted for 76 per cent of the labour increase during 1980 and 1984 in twenty specialised firms.

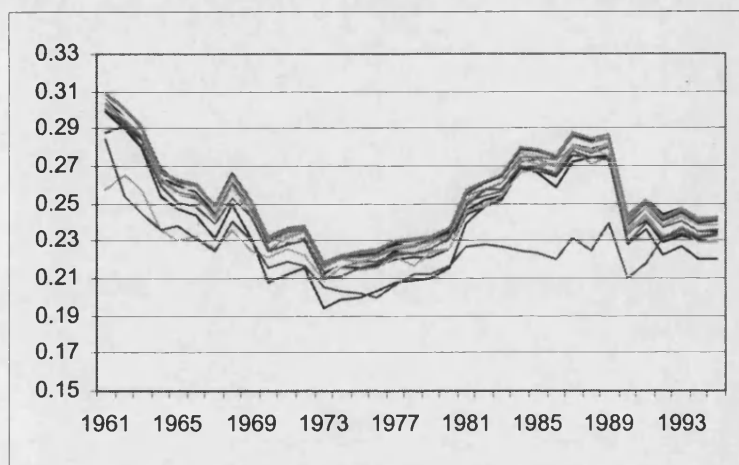
Figure 7.18. Sigma Convergence in the Patagonia Region



Source: own calculations

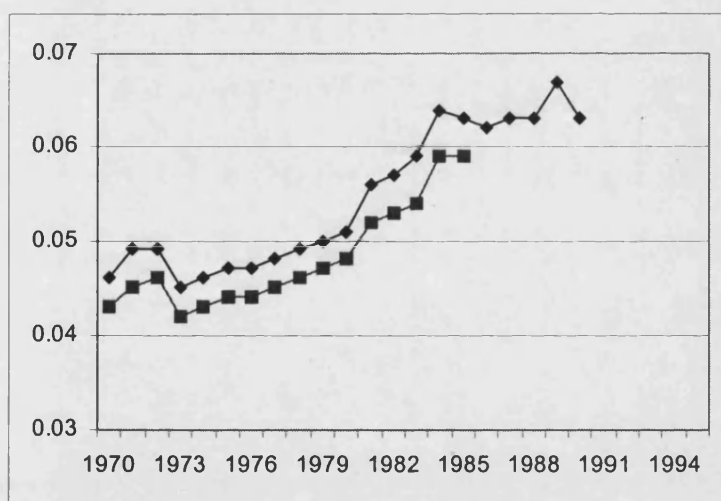
Marina (1999) depicts the coefficients of variation for different periods and different provinces according to data availability and this also allows confirmation of the above results. For the period 1970-1990 she includes 18 provinces (without La Pampa, Córdoba, Corrientes, San Juan, Entre Ríos and Corrientes) and for 1970-1985 she calculates the deviation for 22 provinces (excluding the provinces Entre Ríos and Formosa (See Figure 7.20). The curve showing the σ -convergence for 22 provinces from 1970 to 1990 is consistent with the one calculated here from the data of Universidad de La Plata. The main difference, however, is that the decrease in 1990 is small as opposed to the sharp drop found here, which was the sharpest change in the whole 40 years and meant that disparities were reduced to the levels of 1965.

Figure 7.19. Sigma Convergence by Provinces when Omitting One at the Time



Source: own calculations

Figure 7.20. Sigma Convergence According to Marina (1999), Selected Provinces

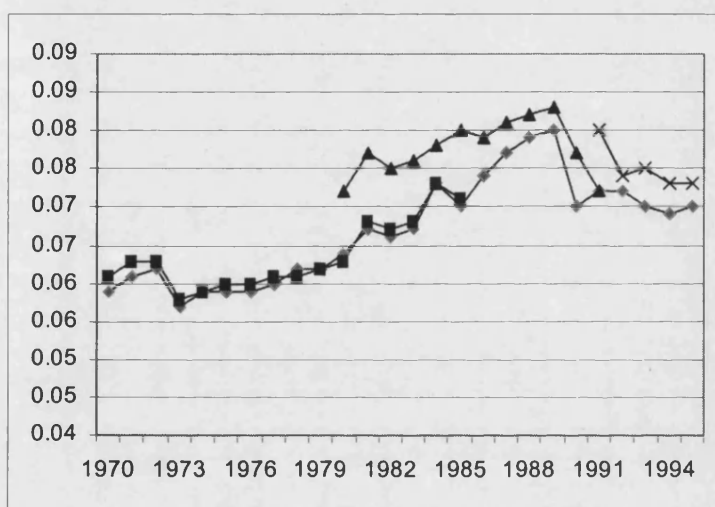


Source: own calculations

In Figure 7.21 additional curves were calculated. The curve for 1970-1995 includes 21 provinces (Misiones, Entre Ríos and Río Negro are excluded) and for 1970-1985 (omitting not only those three but also Tucumán, Formosa, Jujuy and Mendoza). Both curves coincide perfectly and also are consistent with that in Figure 7.10. This also follows when comparing with the curve for 1980-1991 (that excludes Misiones, La Pampa, Corrientes, San Juan, Neuquén, La Rioja, Mendoza and Córdoba).

It is interesting to look at the decrease for 1990, which is more pronounced in the 1970-1995 curve that includes 21 provinces than for the 1980-1991 curve including all provinces. The sharp decrease in the former is consistent with the results in Figure 7.10 and therefore it is interesting to note that the three provinces of Misiones, Entre Ríos and Río Negro, accounted for a sharper decrease as seen in Figure 7.21.

Figure 7.21. Sigma Convergence According to Marina (1999), Selected Provinces



Source: own calculations

Marina (2000) describes the development of Argentine provinces, as characterised by a marked level of inequality in which the process of convergence is practically non-existent among the provinces and the growth pattern is highly unequal. She concludes that according to the coefficient of variation there is a noticeable increase in disparities from 1953 until 1989, with a significant change afterwards, associated to the better functioning of economic institutions. The author also mentions the industrial promotion regimes since there is an increase of the coefficient of variation from 1984 to 1992 corresponding to the implementation of the mentioned regimes in the provinces of Tierra del Fuego and San Luis. This result is in accordance with what was shown here, although she also includes San Luis.

5 Beta Convergence

5.1. Absolute Beta Convergence

In this section absolute β -convergence has been calculated not only for the period 1961-1995 but also for different sub-periods, first by decades and then for the sub-periods 1961-1973, 1973-1983, 1983-1990 and 1990-1995. The study of sub-periods will also be performed for Brazil, as explained on page 331 on Appendix V and the methodological section of Chapter 9. The latter correspond to the main break points found in the sigma analysis of the previous section with the additional break in 1983 to allow for the differences in economic policy with the return to democracy in that year. For this analysis the data from Universidad de La Plata was also used with the missing data for the provinces of Salta, Tucumán, Santa Cruz and Chubut calculated as explained in Section 1. The reason for including the analysis of the sub-periods is, as was seen before, that when calculating convergence over a long period the results usually favour the hypothesis of convergence; while when considering sub-periods divergence and convergence appear as seen for both the European Union and MERCOSUR in previous chapters. As in the previous section, the additional data for 1996-2000, given the unknown source, will be used only as a reference and it is therefore not part of the main analysis but can be seen in Appendix V.e. In the same Appendix, results for the regression between 1998 and 1959 are presented. Also, the full econometric readouts and explanations for the β -convergence analysis (Tables 7.1 to 7.9) are in the Econometric Appendix V.

Table 7.1. Absolute Beta Convergence among Argentine Provinces

1995-1961			
	Coefficient	Std.Error	t-statistic
Constant	0.06	-0.24	-0.23
ln (1961)	-0.26	0.14	-1.81
R-squared	0.13		

Source: own calculations, for more details see page 346

It can be seen from Table 7.1 that the hypothesis of β -convergence cannot be rejected. This result is consistent with other studies referred to before for long-term data. The coefficient for the independent variable (logarithm in GDP in 1961) is negative and marginally significant. Comparing this equation with that for containing the additional data for 1996-2000, it can be seen (page 368-369) that the R-squared is lower and the F statistic is less significant while the t- statistics are all not significant. When comparing to the regression in current terms for the period 1959-1998 (as shown in Appendix V.e, page 370) the coefficient on initial income remains unchanged but it is now highly significant (the R-squared is better and the F-statistic is significant) showing a strong convergence for that period.

When dividing the period into decades, it can be seen that none is significant (Table 7.2), even when considering the regression with the additional data 1990-2000, it is still not significant (as can be seen in Appendix V). However, when looking at the different sub-periods related to the sigma analysis, significant differences can be found (Table 7.3). Convergence is found for the first sub-period, which extends from 1961 to 1973. In fact, the results are similar to those for the whole period and even though the beta coefficient is lower the R-squared is higher and the level of significance has improved. For the second sub-period (1973-1983), however, no β -convergence is found. There is a positive - though marginally significant coefficient at 10 per cent - and the R-squared is very low. These results coincide with that of the sigma analysis of the previous section, confirming that the seventies were a decade of non-convergence both regarding the mobility within a given distribution (beta) and the variability of the distribution (sigma). For the period 1983-1989, there is a negative but not significant coefficient. Again, these results coincide with the preliminary σ -convergence ones seen in the previous section, as well as the ratio of extreme values depicted in Figure 7.6. Finally, the period 1995-1989 is one of no convergence, with a negative and significant coefficient and a highly significant F statistic. Again, all these results were tested to check for heteroskedasticity and there was no correlation between the dependent variables and the error terms.

Table 7.2. Absolute Beta Convergence, by Decades

1980-1970				
	Coefficient	Std.Error	t-statistic	
Constant	0.22	0.09	2.44	
ln (1970)	-0.02	0.06	-0.31	
R-squared	0.004			
1990-1980				
	Coefficient	Std.Error	t-statistic	
Constant	0.24	0.13	2.44	
ln (1980)	-0.10	0.11	-0.97	
R-squared	0.04			

Source: own calculations, for more details see pages 351-352

Table 7.3. Absolute Beta Convergence, in Sub-Periods According to Sigma Analysis

1973-1961				
	Coefficient	Std.Error	t-statistic	
Constant	0.03	0.13	0.20	
ln (1961)	-0.17	0.08	-2.26	
R-squared	0.19			
1983-1973				
	Coefficient	Std.Error	t-statistic	
Constant	0.29	0.13	2.27	
ln (1973)	0.13	0.09	1.45	
R-squared	0.09			
1989-1983				
	Coefficient	Std.Error	t-statistic	
Constant	-0.06	0.13	-0.49	
ln (1983)	-0.01	0.09	-0.13	
R-squared	0.00			
1995-1989				
	Coefficient	Std.Error	t-statistic	
Constant	-0.16	0.09	-1.81	
ln (1983)	-0.21	0.07	-3.26	
R-squared	0.33			

Source: own calculations, for more details see pages 347-350

Several authors have also analysed β -convergence. Utrera and Koroch (1998) perform a regression analysis for the period 1953-1994, in constant 1986 prices. As can be seen in Table 7.4, their results indicate that there is no β -convergence for the period 1953-1994 (these results are only presented in this chapter and not in the Appendix). They find a positive and marginally significant coefficient. The same regression was replicated for the same period (with data from INDEC and SAREP and CFI), and the results were very similar to theirs. However, when analysing the period 1961-1994, Utrera and Koroch (1999) find evidence of absolute β -convergence.

On the other hand, Willington (1998) concludes that there is convergence among the Argentine provinces for the period 1960-1995, although very low, at a speed of almost 1 per cent. His results are also shown in Table 7.2. When comparing his results to those obtained here it can be said that although both results coincide in that there is overall convergence for the period, for Willington this is only weak while the results presented here indicate a stronger convergence. Marina (1999) calculated β -convergence for two sub-periods, 1970-1985 and 1970-1990. Her regressions include 21 and 18 provinces respectively, the same ones as in her sigma analysis. Her results indicate the lack of β -convergence for both periods, with very low values of R-squared and not significant coefficients. Her findings for the period 1970-1985 are fairly similar to the ones obtained here for the period 1973-1983. Marina (2000) also tested for the period 1953-1994 and found no evidence of absolute β -convergence.

It is clear from what has been analysed here that the difference in the base year changes the conclusions drastically. When taking 1960 (Willington) and 1961 as base years, there is evidence of weak and stronger convergence respectively. However, if the base year is 1953 (as in Utrera and Koroch, 1998 and Marina, 2000 and the results presented here), there seems to be no convergence. The sixties were a period of convergence, as seen not only in this β -convergence analysis but also in the sigma analysis of the previous section. In fact, most of the convergence for the whole period 1961-1995 can be explained by the sub-period 1961-1973. As seen in the previous chapter, during the sixties there was more concern for regional policies and several industrial promotion regimes were on place. The

period comprising the seventies and early eighties seems of clear divergence, as stated in Marina (1999) and the results presented here (both beta and sigma analyses). Again, this seems to point out to a link with both political and macroeconomic factors, since the seventies and eighties were characterised by instability.

Table 7.4. Absolute Beta Convergence, Other Studies

1994-1953		Utrera and Koroch (1998)		
	Coefficient	Std.Error	t-statistic	
Ln (1953)	0.01	0.02	1.73	
R-squared	0.14			
1994-1953		Data from CFI/INDEC		
	Coefficient	Std.Error	t-statistic	
Ln (1953)	0.01	0.02	1.70	
R-squared	0.12			
1995-1960		Willington (1998)		
	Coefficient	Std.Error	t-statistic	
Ln (1960)	-0.01	0.01	-1.85	
R-squared	0.14			
1985-1970		Marina (1999)		
	Coefficient	Std.Error	t-statistic	
Ln (1970)	-0.01	0.00	-0.97	
R-squared	0.04			
1990-1970		Marina (1999)		
	Coefficient	Std.Error	t-statistic	
Ln (1970)	-0.0005	0.0000	-0.0440	
R-squared	0.0001			

5.2. Conditional Beta Convergence

In this section, conditional convergence has been performed. Several variables were used, such as literacy rates, each region's share of industry and agriculture and a dummy variable to test for the behaviour of Tierra del Fuego. The main findings when adding literacy rates and the participation of industry and agriculture are shown in Table 7.5.

(Full econometric readouts and explanations can be found in Appendix V, pages 355 onwards). The first variable considered were the literacy rates corresponding to 1960. It can be seen that there is a stronger conditional convergence when comparing these results to the ones from Table 7.1, not only the R-squared has slightly increased but also the levels of significance of the coefficients. The coefficient for the literacy rate is positive, so that those provinces with higher initial levels of education had an average higher growth rate in the period and this coefficient is marginally significant at the 10 per cent. When doing the same regression but with the literacy rates corresponding to 1947, the results do not indicate an improvement in the fit when comparing with the original regression in Table 7.1, and thus the impact is not as significant as when adding the literacy rates for 1960.

When adding the participation of each province's agriculture and industry the results show that although the coefficient on initial income is significant, both agriculture and industry are marginally significant, the former only at a 10 per cent level. They also have both negative signs. Finally, when considering the literacy rates of 1960 together with the participation in agriculture and industry in 1970, the results indicate an even better fit, with an increase in R-squared and when comparing with the regression in Table 7.1 the coefficient for the initial year is higher and more significant. The significance of both agriculture and industry remains unchanged from the previous case while the education variables become significant only at 10 per cent. However, F statistic is still not significant (see page 356 on Appendix V).

Utrera and Koroch (1998) performed their regression for the period 1953-1994 including the literacy rates corresponding to 1947. They find convergence with a positive speed of convergence and the coefficient for education is positive and highly significant. The R-squared has also increased considerably. They test the sensitivity of their results by changing the period of analysis and estimate several periods (1953-70, 1953-75, 1953-80, 1953-85, 1953-90) and find their results to be consistent. Other variables such as the rates of population growth, distance from the capital cities to the nearest port, regional

dummies and total exports per capita were also introduced but without obtaining any significant results.

Table 7.5. Conditional Beta Convergence

1995-1961 Literacy rates (1960)			
	Coefficient	Std.Error	t-statistic
Constant	-3.72	3.00	-1.24
ln (1961)	-0.39	0.18	-2.22
lit (1960)	0.04	0.03	1.26
R-squared	0.19		
1995-1961 Literacy rates (1947)			
	Coefficient	Std.Error	t-statistic
Constant	-0.27	0.95	-0.29
ln (1961)	-0.28	0.16	-1.76
lit (1947)	0.00	0.01	0.36
R-squared	0.13		
1995-1961 Agriculture and Industry (1970)			
	Coefficient	Std.Error	t-statistic
Constant	0.34	0.28	1.18
ln (1961)	-0.34	0.15	-2.20
agr (1970)	-0.01	0.01	-1.26
ind (1970)	-0.01	0.01	-1.57
R-squared	0.25		
1995-1961 Lit (1960), Agr (1970) and Ind (1970)			
	Coefficient	Std.Error	t-statistic
Constant	-3.66	2.92	-1.25
ln (1961)	-0.47	0.18	-2.63
lit (1960)	0.04	0.03	1.30
agr (1970)	-0.01	0.01	-1.17
ind (1970)	-0.01	0.01	-1.73
R-squared	0.32		

Source: own calculations, for more details see pages 355-356

In Utrera and Koroch (1999) the literacy rates for 1960 have been included in their regression for 1961-1994, obtaining a higher R-squared though no changes in the coefficient or the level of significance. When public works and current spending are

considered, both papers differ. In Utrera and Koroch (1998) there is a positive effect in the case of public works and negative for current spending with significant coefficients. Then, those provinces with a higher initial expenditure on public works had a higher average growth in the period and conversely with those provinces with an initial higher current government spending. When including these two variables the R-squared (and also the adjusted R-squared) also improved considerably. In Utrera and Koroch (1999), both public works and current spending were not significant.

Willington (1998) also investigates the conditional β -convergence between the provinces for the period 1960-1995 including secondary enrolment data corresponding to 1960. He also considered the average public sector investment as percentage of the product, current public sector expenditure and the percentage of the product represented by the agricultural and mining sectors as a proxy of the endowment of natural resources. The coefficient for the income in 1960 has increased, as well as the t-values and the R-squared. The coefficients for education and real investment are both positive and significant, and that corresponding to public spending is negative and significant. Willington then concludes that there is conditional β -convergence for the provinces for the period 1960-1995.

Utrera and Koroch (1999) performed another regression eliminating the provinces of Tierra del Fuego and San Luis. When doing this, the beta coefficients became not significant but the remaining coefficients for the conditional variables increased their significance. Marina (2000) introduced the levels of education and provincial per capita public spending and found that there were no significant changes and there was still no convergence for the period 1953-1994.

Table 7.6. Conditional Beta Convergence, Different Studies

1994-1953 Utrera and Koroch (1998)			
	Coefficient	Std.Error	t-statistic
Ln (1953)	0.03	0.07	2.33
lit (1947)	0.12	0.49	4.10
R-squared	0.50		
1994-1953 Utrera and Koroch (1998)			
	Coefficient	Std.Error	t-statistic
ln (1953)	0.04	0.10	2.47
lit (1947)	0.21	1.16	5.54
P.Works	0.02	0.06	3.17
C.Expend.	-0.02	0.04	-2.19
R-squared	0.70		
1994-1961 Utrera and Koroch (1999)			
	Coefficient	Std.Error	t-statistic
ln (1961)	0.02	0.06	2.90
literacy	0.12	0.56	4.70
R-squared	0.67		
1994-1961 Utrera and Koroch (1999)			
	Coefficient	Std.Error	t-statistic
ln (1961)	0.02	0.09	4.37
literacy	0.15	0.72	4.77
P.Works	-0.34	0.24	-0.71
C.Expend.	0.01	0.00	0.03
R-squared	0.72		
1995-1960 Willington (1998)			
	Coefficient	Std.Error	t-statistic
ln (1960)	-0.02	0.08	-3.40
Sec. Ed.	0.03	0.11	3.86
Real I.	0.03	0.09	3.50
P.Spend.	-0.04	0.10	-2.80
R-squared	0.58		

Table 7.7. Conditional Beta Convergence, Dummy Variables

1995-1961			
	Coefficient	Std.Error	t-statistic
Constant	0.22	0.30	0.73
Dummy 1	-0.43	0.46	-0.95
Ln(1961)	-0.17	0.17	-1.02
R-squared	0.17		
1973-1961			
	Coefficient	Std.Error	t-statistic
Constant	0.44	0.12	3.67
Dummy 1	0.08	0.08	0.94
Ln(1961)	-0.67	0.20	-3.27
R-squared	0.34		
1983-1973			
	Coefficient	Std.Error	t-statistic
Constant	0.28	0.09	3.07
Dummy 1	0.45	0.20	0.94
ln (1973)	0.15	0.07	-3.27
R-squared	0.50		
1990-1983			
	Coefficient	Std.Error	t-statistic
Constant	0.16	0.14	1.13
Dummy 1	-0.04	0.32	-0.13
Ln (1983)	0.16	0.10	1.65
R-squared	0.15		
1995-1990			
	Coefficient	Std.Error	t-statistic
Constant	0.14	0.07	2.19
Dummy 1	-1.01	0.14	-7.38
Ln (1990)	0.00	0.05	0.05
R-squared	0.74		

Source: own calculations, for more details see pages 360-362

Utrera and Koroch (1998) found that including regional dummy variables had no impact when compared to the absolute beta results. Using the data from Universidad de la Plata, I have then added a dummy variable, which is 1 for Tierra del Fuego and 0 otherwise (i.e. for the rest of the provinces) and the results are presented in Table 7.7 and appendix V page 357 and onwards. It can be seen that the only two regressions that changed significantly when adding the dummy variable for Tierra del Fuego are those corresponding to the period 1973-1983 and those for the period 1995-1990. As was seen in Table 7.3, the period 1973-1983 was characterised by non-convergence. However, when I added the variable for Tierra del Fuego the R-squared increased significantly, the coefficient for the income on the base year is still positive and not significant and the dummy coefficient is also positive and significant implying no convergence.

For the period 1990-1995 the R-squared increased considerably and now the coefficient of the income for 1990 is positive and not significant while the dummy coefficient is negative and highly significant. A significant dummy implies that there is an effect from Tierra del Fuego that it is unexplained by this regression.

5.3. Beta convergence: Political and Macroeconomic variables

In this section, the impact of both political and macroeconomic variables has been analysed as suggested in Part I of this thesis. As seen in both the sigma and beta analyses above, there seems to be a link between instability periods and convergence. In this section, however, I will try to test these preliminary results empirically. Proxies for both macro and political instability have been selected. Regarding macroeconomic variables, the proxy chosen was the average inflation rate. According to the theory, the higher the macroeconomic instability the higher the dispersion. I will try to test whether in times of high inflation rates the dispersion is higher. Two regressions have been performed here. The first one comprises the period 1961-1974, where inflation rates averaged 28 per cent (with a maximum of 60 per cent in 1973 and a minimum of 7.5 per cent growth in 1979). The second sub-period is 1975-1990, where the average inflation growth rate was 569 per

cent (with a minimum of 90 per cent in 1986 and a maximum of over 3,000 per cent in 1989).

The results of this regression can be seen in Table 7.8 and on Appendix V, regression 19. According to the absolute beta analysis performed, in the first sub-period there was weak convergence (with marginally significant coefficients) while in the second one no convergence is found (the coefficients are negative but non-significant and the R-squared is 0.01) and not significant F-statistic.

In order to test whether the differences between both sub-periods are significant, a further analysis was carried out. Using a dummy variable and adjusting the number of years for both sub-periods, and giving 0 to the period with low inflation while 1 to that corresponding to high inflation. The results are also on Table 7.8 where it can be seen that although with the right sign, the coefficient of the dummy variable is not significant. Therefore, this implies that the hypothesis of both periods being statistically different is rejected.

Table 7.8. Beta Convergence, Macroeconomic Indicators

1974-1961			
	Coefficient	Std.Error	t-statistic
Constant	0.13	0.13	1.00
ln (1961)	-0.16	0.08	-2.03
R-squared	0.16		
1990-1975			
	Coefficient	Std.Error	t-statistic
Constant	-0.12	0.16	-0.76
ln(1975)	-0.06	0.12	-0.54
R-squared	0.01		
Dummy var.			
	Coefficient	Std.Error	t-statistic
Constant	0.13	0.16	0.81
ln(1975)	-0.16	0.09	-1.66
Dummy	0.09	0.14	0.67
R-squared	0.47		

Source: own calculations, for more details see pages 360-362

In order to account for political instability, I have again considered two different sub-periods. The first, from 1976-1982, was characterised by military governments and will be compared with the period 1983-1995 after the return to democracy. According to the theory seen in Chapters 2 and 3, in times of political instability - in this case successive military governments - divergence will occur via the absence of rule of law and decrease in investment and medium-term planning. It can be seen in Table 7.9 as well as in Appendix V, that in the first sub-period there is weak divergence of GDP per capita between the provinces; while in the sub-period 1983-1995 there is convergence. As undertaken before in order to test the hypothesis of difference between both periods, a dummy variable analysis was performed, with 1 for democracy and 0 for military period. The hypothesis is that in times of democracy, convergence would appear. It can be seen that the dummy coefficient is negative, implying convergence, and it is significant. Thus, the hypothesis of both periods being different statistically is not rejected.

Table 7.9. Beta Convergence, Political Variables (1976-1982 and 1983-1995)

1982-1976			
	Coefficient	Std.Error	t-statistic
Constant	0.17	0.09	1.91
ln (1976)	0.12	0.07	1.74
R-squared	0.12		
1995-1983			
	Coefficient	Std.Error	t-statistic
Constant	-0.18	0.12	-1.46
ln (1975)	-0.19	0.09	-2.10
R-squared	0.17		
Dummy var.			
	Coefficient	Std.Error	t-statistic
Constant	0.17	0.08	2.12
ln (1975)	0.12	0.06	1.93
Dummy	-0.22	0.08	-2.66
R-squared	0.14		

Source: own calculations, for more details see pages 364-366

However, when another period in which there were military governments is considered (1966-1972) the results differ from the above. As can be seen in both Table 7.10 and Appendix V, the period 1966-1972 was characterised by convergence. When performing the same test it can be concluded that between 1995-1983 and 1972-1966 the regression shows not significant coefficient and therefore the hypothesis of the extent of convergence being the same in both subperiods is rejected. Although there seems to be contradictory evidence regarding both periods of military governments, it can be said that the military governments of the period 1976-1982 were far less associated to any rule of law that was the previous period of 1966-1972.

Table 7.10. Beta Convergence, Political Variables (1966-1972)

1972-1966			
	Coefficient	Std.Error	t-statistic
Constant	0.07	0.14	0.48
ln (1966)	-0.09	0.08	-1.11
R-squared	0.05		
Dummy var.			
	Coefficient	Std.Error	t-statistic
Constant	0.07	0.15	0.44
ln (1966)	-0.24	0.19	-1.29
Dummy	-0.10	0.13	-0.80
R-squared	0.20		

Source: own calculations, for more details see pages 363-366

6. Conclusions

In this chapter, several methods for analysing disparities have been investigated. One important finding for the Argentine provinces is that although there is absolute β -convergence for the period 1961-1995, there is no clear pattern when dividing into sub-periods. In fact, the convergence or divergence among provinces varies according to the period analysed and it seems to be influenced by external factors.

The results presented here show that there was σ -convergence in the sixties. This result is consistent with that of Utrera and Koroch (1998). There is also absolute β -convergence for the period 1961-1973. During the sixties, there was an increasing international concern for regional disparities and national economic development, and thus national planning played a more significant role in national policies. Throughout the sixties, and particularly in the second half, major industrial projects were subsidised as the last stage of the industrialisation strategy and there was a state concern for improving both physical and social infrastructure, which is consistent with a declining trend in disparities.

In the seventies, disparities increased, as was shown not only by the σ -convergence analysis but also because of the lack of absolute β -convergence. These results are consistent with Utrera and Koroch (1999) and Marina (1999). The economic policy that characterised the military governments in the seventies relied on the liberalisation of the labour market, foreign trade and finance and a high level of deficit financed with foreign debt. The stabilisation programmes led to an overvalued peso, large current account deficits, which resulted in a debt crisis in 1981 with the rise in world interest rates.

Over the eighties, according to our sigma analysis, there was a strong divergence in GDP per capita across the regions, peaking in 1989. This is consistent with the lack of absolute β -convergence for the period. The democratic period starting in 1983 was characterised by a more closed economy with a stronger state intervention in expenses, price fixation, wages, exchange rates and interest rates. A series of economic plans were introduced, in 1985 the *Plan Austral* was launched, introducing a new currency and a freeze in wages, prices and exchange rates. By 1986 its initial success was overcome by the increasing fiscal deficit and external imbalances. In 1988 inflation accelerated. The adjustment measures of 1988 - *Plan Primavera* - were implemented too late and resulted in the 1989 hyperinflation, which coincides with the highest level of disparities in GDP per capita.

A strong σ -convergence is found after 1990, in particular for 1990, when the largest decrease in the whole period takes place. However, after 1990, there is an oscillating pattern. The absolute beta analysis shows no convergence for the period. After the 1991

Convertibility Plan is characterised by a more open economy with non-inflationary financing and price flexibility.

The most important conclusion is that convergence across the Argentine provinces varied according to the period analysed. The evidence for the period 1961-1994 indicates the presence of absolute convergence. This was also observed in Utrera and Koroch (1999) where they contradict the results from Utrera and Koroch (1998) when considering two different periods of analysis, 1953-1994 and 1961-1994 respectively. However, it is clear from the results presented along this chapter for both the sigma and beta analysis that this was not a continuous or regular process. In fact, there are sub-periods where convergence is the rule followed by others characterised by lack of convergence. Further, it seems that periods of economic crisis - in particular 1981 and 1989 - were accompanied by a slowdown in the process of convergence among regions. Moreover, there seems to be a clear link between political instability and divergence and an indicative, though not conclusive link with macroeconomic instability.

Brazil: Origin of Disparities

1. Introduction

In this chapter the development of regional disparities and income distribution in Brazil is investigated, in a manner already undertaken for Argentina. I will show that inequality of incomes and growth has been a characteristic of the Brazilian economy since the nineteenth century to the present and that it has proved to be far from exhibiting a convergence trend throughout the centuries. The main hypothesis is that the colonial socio-economic structure set the pattern for a concentrated distribution of income in modern Brazil.

Most importantly, each of the primary product export cycles benefited certain regions to the detriment of others, and these relatively short-lived export booms failed to create a balanced or enduring development. The process that continued shaping Brazil's inequalities is more closely linked to the primary export cycles than to political developments as has been seen in the case of Argentina. The change from colony to empire and subsequently to republic occurred without violence in Brazil and did not provoke a significant productive or commercial disruption; in fact, the dependence on the export-oriented economy from the colonial period continued as before.

While the sugar cycle in the sixteenth and seventeenth centuries benefited the northeast, the gold export cycle of the seventeenth and eighteenth centuries benefited the present state of Minas Gerais and neighbouring regions. However, the dynamic economy generated by the coffee export sector from the 19th century in the southeast was to develop later into Brazil's industrial centre. The southeast became the leading sector of Brazil's economy and principal beneficiary of economic growth. As in the case of Argentina, the rapid growth of the second half of the twentieth century was highly

concentrated in certain sectors and income distribution and regional imbalances persisted, leading to a divergence 'map' as depicted in Figure 1.5 of this Introduction.

2. The Origins of Disparities: Export Cycles

I have structured this section differently than for the case of Argentina. As mentioned above, while in the latter political events are quite tightly linked to the concentration process, in the case of Brazil this is more linked to different export cycles. These cycles often overlapped with each other, and so I have decided to concentrate in the different exports booms, providing a general picture of disparities for the whole period at the end of this section.

2.1. The Sugar Economy in the northeast

Brazil's first major export product was sugar. Its cultivation was introduced in the country around 1520 from islands under Portuguese power in the Atlantic. It was produced in the humid northeast coast *zona de mata* (forest zone), which was not only physically favourable for growing the crop but also conveniently located for shipping to Europe and for receiving slave labour from Africa. Sugar production was highly labour intensive and required significant capital investment. Since most of the sugar was grown on large estates, a powerful elite emerged and the income produced in the colony was mainly concentrated in the hands of the plantation owners. Furtado (1963) estimated that at least 90 per cent of the income generated by the sugar economy in Brazil was concentrated in the hands of sugar-mill and plantation owners (Baer, 1995).

Furtado (1963) compares the Brazilian colonial productive structure with that of the United States to investigate why the latter became an industrial nation in the nineteenth century, whereas Brazil remained an underdeveloped country throughout the twentieth century. The colonial structure in the United States was characterised by small agricultural properties, and income was more evenly distributed with a class of small farmers combining with modest and great merchants to dominate the economy. A large internal market appeared in the United States, setting the basis for an early development

of an independent and commercial industrial sector. By contrast, in Brazil, the ruling class consisted of large farmers and slave owners. This concentration of property and income together with the failure to establish a more diversified economy resulted in a very constricted domestic market that maintained the colonial economic structure in Brazil stagnant and showed no trend towards fragmentation (Wood, 1988).

Furtado (1963) stresses that the rigidity of the production structure determined the failure of the sugar export economy in having long-lasting effects on the economy. Most of the surplus went to the commercial classes who invested the gains abroad, or to estate owners who spent large amounts on imports, both consumption or investment goods, the latter also including slaves. Since the monetary economy was very limited, export stagnation had little effect on the economy as a whole and was only felt as a decline in the import of goods and slaves. Growth was associated with occupation of new land and the expansion of imports of goods and slaves rather than changes in the production process or increases in productivity. Thus, during periods of declining exports, the industry would undergo certain shrinkage but no structural transformations, which limited the possibilities for economic growth.

Sugar production increased steadily during the early seventeenth century when Brazil was the world's largest sugar supplier. However, at the end of the century, this export boom started to fade. Although the cost of Brazilian sugar was 30 per cent below that of the British Caribbean, according to Furtado (1963) the main reason for the decline was the increase in sugar production from the British, Dutch and French colonies, which had preferential access to those markets. Besides, the expansion of the mining industry in the south-central region attracted skilled workers and raised the price of slaves, which reduced the benefits derived from sugar production even further.

However, Leff (1972) argues that one of the main determinants of the decline of the sugar economy in the northeast was the growing importance of the coffee economy in the centre-south. Leff's argument is that as coffee exports grew, the exchange rate increased over the one that would otherwise prevail, affecting both sugar and cotton that demanded

a lower export tax. Then an increasing overvaluation of the exchange rate for sugar and cotton, together with the growing importance of coffee, resulted in a significant reduction of sales of sugar and cotton into international markets.

Overall, the sugar plantations did not disappear, and sugar continued to be an important crop in terms of volume, but its profitability had declined. Around Salvador some lands were switched to the production of tobacco and later, in the middle of the eighteenth century, to cocoa. During the sugar export boom, some linkages developed between the coastal sugar area and the interior (the *agreste* and *sertão* areas respectively), where cattle breeding and the agricultural surplus provided food to the population of the sugar zones (Baer, 1995). However, the expansion of the latter was subject to expansion on the sugar economy. The population that was engaged in cattle-breeding was very small, land occupation was extensive and to some degree nomadic due to the arid conditions in the interior. Given that land expansion implied higher costs since it was achieved through increases both in cattle and labour, its productivity showed a trend towards decline. When the sugar sector began to decline, the cattle economy in the interior turned into subsistence.

Baer (1995:14) considers that “the legacy of the sugar cycle on Brazil was negative” since the organisation of agriculture in the northeast regions remained primitive and in the coastal plantations in particular, agricultural techniques remained mostly archaic. Further, the slave trade kept human resources underdeveloped and therefore most of the profits were appropriated either by Portuguese and foreign intermediaries or by land and mill-owners who, in turn, spent it on imported consumer goods rather than on improving the production techniques or the existing infrastructure.

In the period stretching from the last quarter of the seventeenth century to the beginning of the nineteenth century, the economy of the northeast went through a period of stagnation, as real per capita income of the population declined steadily. The higher productivity sector – sugar - was losing its relative importance to the stock-breeding sector, where the productivity declined steadily as it expanded because that expansion

only represented growth of the subsistence sector. Therefore, the northeast, which had been a high productivity economic system, turned into an economy of subsistence with an involution in the division of labour and specialisation, resulting in a reversion to primitive techniques. Furtado (1963) defines this process as 'retrograde economic evolution' as opposed to economic growth and development, and argues that this process shaped the structure of the economy of the northeast, which prevails today.

2.2. The Gold Cycle in the Centre-South

Gold mines were discovered in what is today the state of Minas Gerais in the early 1690s, resulting in a shift in population to those regions. Gold production increased and reached its peak in the 1750s, relocating the centre of economic activity to the centre-south, and Rio de Janeiro emerged as a major port through which the mineral was exported and through which manufactured imports entered the country (Skidmore, 1999; Baer, 1995).

The mobilisation of resources to the mining area included mostly slaves from the northeast, migrants from southern Brazil, and for the first time large numbers of immigrants from Portugal. The high migration flows were consequence of the mining process that was undertaken on a small scale, and so was affordable for people of limited resources. This resulted in an urbanisation process and the emergence of several towns and cities. New captaincies were also created, and in 1763 the capital of the Portuguese colony was moved from Salvador to Rio de Janeiro to keep administrative control over the mining area in terms of shipping and trading of gold (Wood, 1988).

The gold cycle started its decline at the end of the eighteenth century due to the exhaustion of the most of the economically viable mines. Part of the mining population moved to central Brazil in order to take-up ranching; others went to southern Brazil to carry out agricultural activities, and many stayed in Minas Gerais turning mostly to subsistence production (Baer, 1995).

As in the case of the sugar economy, the mining sector of Minas Gerais created some linkage effects due to the increase in demand for food that stimulated agricultural

production and cattle-breeding in the neighbouring regions. Another linkage of the mining economy was due to transport needs, and mule-breeding developed on a large scale in the present state of Rio Grande do Sul. The mining economy thereby permitted a form of articulation between the southern regions of the country (Furtado, 1963).

There were significant differences between the sugar and mining cycles. First, in terms of the concentration of income, which was less strong in the latter, primarily due to the larger proportion of free labour engaged in mining. Secondly with respect to the market structure, since in the mining economy common consumption goods had a larger share than luxury goods in domestic consumption. Thirdly, the population was largely concentrated in either urban or semi-urban areas, as opposed to living in large plantations as in the case of the sugar economy. Lastly, the longer distances involved made it less profitable to import goods and therefore there was a development of activities connected with the domestic market and therefore the gold cycle generated significant linkages. However, no significant manufacturing industries were created, largely because the imperial policies prohibited manufactures of those goods produced in Portugal, but also because of the lack of local expertise (Baer, 1995).

Since no permanent activities developed once gold production ceased the system collapsed and retreated merely into a subsistence economy. As in the economy of the northeast, there was a process of 'involution' where a large part of the population drifted to the subsistence economy, and a region with high productivity regressed into a disconnected mass of population working at the lowest of their productivity. (Furtado, 1963)

2.3. Cotton and Rubber production

Cotton had long been grown in the northeast of Brazil, mainly in the Maranhão region. There was a first export boom in the eighteenth century at the time of the American Revolution. In the 1820s the cotton production exported to the United States and Britain outstripped sales of sugar. In the mid-nineteenth century, as a result of the American Civil War and the subsequent disruption in world trade, cotton production was further

promoted. Brazil gained a larger proportion of world trade, which brought some short-term prosperity to the northeast. However, in 1877 a drought struck the area with devastating consequences for cotton production (Wood, 1988; Baer, 1995).

The main drawback for expansion in the northeast cotton industry was the high transport cost from the interior to the coast. Fluvial transport was not significant, as in the case of the United States, where the steamboats had already started, and cotton transport in Brazil still relied on horses and donkeys. Even the first railway lines made little difference since sometimes it was cheaper to cover the distance to the port than to the railway station. The lack of a viable fluvial network and railway system reduced the value of the land used for cotton and resulted in land-intensive activity. The westward expansion of land was either abandoned or used for subsistence when cotton prices dropped. Another factor that undermined Brazilian cotton production were export taxes and specialisation - due to climate - in long fibre cotton, which demanded a labour intensive technique. The advantage of this kind of cotton disappeared with the extension of long fibres to other regions - namely Egypt and Florida - and with the invention of new machinery useful for producing high quality fabric only from short-fibre cotton.

Brazil had a natural monopoly of rubber, a product unique to the huge trees of the Amazon forest. The rubber boom developed in the Amazon region from the third quarter of the nineteenth century until the first quarter of the twentieth century. The deteriorating economic conditions in the northeast coincided with the rise in the demand for rubber used in the production of tires for vehicles in Europe and in the United States. Many workers had incentives to abandon the drought-stricken areas of the northeast in search of rubber trees in the Amazon. Between 1900 and 1910 Brazil was the world's only natural rubber exporter. However, this monopoly was decisively lost when both the British and the Dutch planted rubber trees in the East Indies, which were also based on more efficient systems of production rather than collecting from widely dispersed trees in the Amazon. The initial migration to the region resulted in an emigration in the 1920s (Wood, 1988).

2.4. The Coffee Cycle and the Emergence of São Paulo

Production of sugar, gold, cotton and rubber had an impact in the demographic and economic history of Brazil. However, none of them had a more lasting impact on contemporary agricultural and industrial production than coffee (Wood, 1988). Although coffee had been introduced in Brazil in the eighteenth century, its initial consumption was limited. It was not until the improvement in living standards in Europe and the United States due to the industrial revolution that coffee consumption increasing rapidly. Coffee exports accounted for 19 per cent of total exports between 1821-1830; while by 1891 this share had increased to some 63 per cent (Baer, 1995).

There were three distinct phases regarding coffee cultivation. Until 1880, most of the coffee production was concentrated around Rio de Janeiro, with rudimentary techniques relying mostly on slave labour. As the land became exhausted, production expanded to the state of São Paulo. With the introduction of British railways in the 1860s, production in São Paulo grew rapidly, and by the end of the nineteenth century Brazil accounted for three-quarters of the world supply. The final expansion was into the state of Paraná, reaching a peak in the mid-1950s. The possibility of expanding the land destined for coffee cultivation even further away from the coast was provided by the extension of the railways (Graham, 1968; Wood, 1988).

Furtado (1963) makes a distinction between the dominant sugar estate owners and the newly emerging coffee estate owners. The former never developed into outward-looking entrepreneurs given that commerce was a Portuguese monopoly. Coffee producers, on the other hand, were intimately linked to the commercial side of the sector and aware of the importance of state's support for their economic interests (Baer, 1995). Coffee shaped the social structure of Brazil and at the same time influenced the balance of political power. The increase in the external demand for coffee coincided with a peak in Brazilian production, which in turn was triggered by the introduction of the railways (Topik, 1987).

Coffee, like sugar production, was a highly labour intensive crop, but it required less capital. Land was abundant and expansion was only limited by labour shortage. Between 1850, when imports of slaves was suspended, and the abolition of slavery in 1888 the increase in slave trade within Brazil was significant but not enough to meet the growing demand. Labour was recruited from Portugal, Spain and Italy subsidised by the government. The flow of immigrants reached a peak in 1891-1900, promoting infrastructure both in urban and rural São Paulo; by the early twentieth century, São Paulo had become the most advanced region in the country (Wood, 1988).

The coffee production that caused the Brazilian economy to boom in the mid to late nineteenth century turned into a liability in the early twentieth century when the world coffee market ran a surplus, primarily due to Brazilian overproduction. High coffee prices and relatively low production costs in 1890 allowed land-owners to accumulate capital, encouraging them to open further land cultivation with the resulting greater harvests. Brazil was the largest world coffee producer - 75 per cent of world production in the period 1900-01. Export earnings declined with the subsequent drop in coffee prices and this, in turn, was exacerbated by an increase in the exchange value of the Brazilian currency after 1898 (Topik, 1987).

The three leading producer states - São Paulo, Rio de Janeiro and Minas Gerais - signed the Treaty of Taubaté in 1906, which was a valorisation agreement, in order to limit production and exports in the hope of raising international prices to pre-1900 levels by withholding Brazilian coffee from international markets. That year's harvest was over 50 per cent of the previous record. The Treaty imposed, among other things, a surcharge on coffee exports and the stabilisation of the exchange rate. The expenses of storage were financed with foreign loans, guaranteed by federal governments since 1907. This was only partly successful since it attracted other producers- mostly from Central and other South American countries while the profits were diverted, mostly going to foreign coffee brokers, bankers and federal governments. World War I reduced coffee exports dramatically. Prices began to fall after 1912 but the exports were not seriously affected

until 1917. The government intervened successfully to sustain coffee prices; which increased after the war (Topik, 1987).

However, coffee exports in Brazil remained extremely significant. The share of coffee exports in total exports increased from 56 per cent in 1919 to 75.4 per cent in 1924 and remained around 70 per cent until the end of the 1920s. The exchange rate was a key element in the protection of the coffee sector. The relative price policy undermined industrial growth. The 1929 crisis coincides in Brazil with the boom of the coffee industry, the result of investments of the 1920s. Given the adverse international situation, Brazil had an enormous excess production. However, due to economic downturn and less financial resources, the government had to abandon the programme of sustaining coffee prices. In the period 1929/1939, in contrast to the previous decade, coffee earnings provided an acceleration of the industrial development (Silber, 1978) as will be seen in Section 3.

2.5. The Impact of the Export Cycles on Regional Disparities

Table 8.1 clearly shows the relative importance of sugar, coffee, cotton and other products had in the Brazilian economy in different periods. It provides a complete picture since 1650 and extends to 1930 with the coffee boom. The importance of sugar, with 95 per cent of total exports in 1650 can be clearly seen and that of course explains the prosperity of the northeast in the period. Earlier in this chapter, it was noted that sugar continued to be an important crop in the northeast, and as seen on Table 8.1, it was not until the beginning of the twentieth century that its share in total export went below 10 per cent. However, the decline of the northeast between the end of the seventeenth century to the beginning of the nineteenth is also evident from the sharp decline seen on the Table.

Table 8.1. Share of Products in Total Exports

Years	Sugar	Coffee	Cotton	Other
1650	95.0	-	-	5.0
1750	47.0	-	-	53.0
1800	31.0	-	6.0	63.0
1841-1850	26.7	41.4	7.5	25.4
1891-1900	6.0	64.5	2.7	26.8
1921-1930	1.4	69.6	2.4	26.6

Source: Skidmore (1999:50)

The peak reached by the gold mines in the mid-eighteenth century can also be clearly seen from the Table, where it reaches a maximum of 63 per cent of total exports in 1800. Further, in section 2.2 it was noted that gold mining had relocated the centre of activity from the northeast to the centre-south and had derived in the emergence of Rio de Janeiro as a major port. This can be seen given that the decline of the sugar economy coincides with the increase in gold mining. The figures on Table 8.1 for other products get somewhat blurred thereafter, and it becomes more difficult to identify any particular product since it includes both rubber (with its peak in the early twentieth century) and manufactured products. It has been mentioned that in the first half of the nineteenth century, cotton exports managed to bring some prosperity back into the northeast. A devastating drought in 1877, however, had dramatic consequences for this crop, as can be seen in the table when comparing the figure of the beginning of the twentieth century to that of the previous decades. In the case of coffee, its emergence can be clearly seen in this Table, with an average of 41 per cent in the period 1841-1850 and an average maximum of over 69 per cent in 1921-1930. As seen previously, between 1821 and 1830 it only accounted for 19 per cent of total exports. It must be noted that these figures on this Table correspond to average values, while in section 2.3 I have sometimes referred to annual figures, which may well differ from these averages.

The relocation of activities had a significant impact on the socio-economic structure of the country, since population migrated from one region to another. As already mentioned, the origin of Brazilian disparities can be traced as far as the decline of the northeast and the emergence of alternative export products. By 1800, both Rio and Salvador (the two major centres of the time, of sugar and gold mining respectively) were the only cities

with a population in excess of 50,000. When the total population in Brazil is estimated to have been 2 million. By the time of the independence from Portugal in 1822, the estimated population was about 4 million, heavily concentrated around Rio de Janeiro, São Paulo and the south. Elsewhere, only Minas Gerais had also a significant population given that it had been at the centre of the gold cycle, with a 20 per cent of population. By 1850, however, total population had increased to seven and a half million, mostly concentrated in coastal areas. Of this, 40 per cent were located in the southeast provinces (Rio, Minas Gerais and São Paulo) and Rio had further increased its population to 180,000 inhabitants (Bethell, 1989).

Interesting data regarding early distribution of the population in Brazil can be found in Leff (1972: 253) who shows both free and slave population for different regions for the years 1823 and 1872. I have included this information on Table 8.2, where it can be seen that between 1823 and 1872 there was a decrease in the population of the northeast from 52 to 47 per cent while that of the southeast increased from 38 to 40 per cent. More interesting, though, is the differences between slave and free population. For the southeast, the percentage of slave population increased from 39 to 59 per cent in the period; while for the northeast the slave population decreased from 54 to 32 per cent. When looking at the free population, it can be seen that the percentages remain mostly unaltered. For the south and central regions the same pattern can be observed, with no differences regarding the free population but a five-fold increase in the south and a reduction from 3 to 1 per cent in the central west region. These results are particularly interesting given that Brazil did not abolish slavery until 1888. As Leff points out, the data on population of the work-force reflects the relative marginal value of labour and the relative rates of return on capital in the different activities. Therefore, the differences shown in Table 8.2 (increase in slave population in the south and south-east and decrease in the northeast) are the mirror image of the relative importance of those regions in export shares and show that migration was more significant for slaves than for the free population.

Table 8.2. Regional Distribution of the Population 1823 and 1872 (in percentages)

Region	Slave Population		Free Population		Total Population	
	1823	1872	1823	1872	1823	1872
North	3	2	3	4	3	3
North-east	54	32	51	49	52	47
Southeast	39	59	37	37	38	40
South	1	6	7	7	5	7
C-west	3	1	2	2	2	2

Source: Leff (1972:253)

By the first national census in 1872, total population in Brazil reached ten million inhabitants. The combined population of Rio de Janeiro and São Paulo was already 50 per cent larger than that of Bahia and Recife in the northeast (Rio had over 275,000 inhabitants, while Recife and Salvador had no more than 100,000). Moreover, between 1872 and 1900 the population of Rio increased at an annual rate of almost four per cent (as can be seen in Table 8.3) while São Paulo grew at a rate of 8.3 per cent. In the northeast, however, the population of Bahia grew at 2.2 per cent while Recife was mostly stagnant. Moreover, only a fifth of the free population was literate.

Table 8.3. Population Growth in Rio (1872-1906)

Years	Annual Growth
1872-1880	3.84%
1880-1890	4.54%
1890-1900	3.23%
1900-1906	2.91%

Source: Murillo de Carvalho (1998)

It is notable that between 1846 and 1875 the country received over 300,000 immigrants, half of which were Portuguese, although German and Italian immigrants were also important in number in this period. The concentration of capital favoured the improvement in urban facilities and changed big cities. By 1872, 84,000 people living in Rio were foreign-born. Numbers continued growing and the 1890 census showed that 22 per cent of São Paulo population were foreign immigrants and 28.7 per cent in Rio. Further, in 1890, 26 per cent of Rio's population was originally from other regions in Brazil. In fact, the percentage of population originally from Rio was only 45 per cent. Out

of the 150,000 foreigners in Brazil, 70 per cent were located in Rio, São Paulo and Minas Gerais and another 17.6 per cent in Rio Grande do Sul. Moreover, the abolition of slavery led to a further increase in labour supply, creating unemployment problems and migration flows from the coffee regions to urban centres (Bethell, 1989; Murilo de Carvalho, 1998).

Capital accumulation was significant, mainly due to the growth of coffee in total exports. As expected given the differences among regions, economic growth affected some regions more than others. The period after 1860 is characterised by an accumulation process that favoured the urban centres and the rural areas linked to the dynamic sectors of the economy. Between 1872 and 1890 Rio further doubled its population, while that of Salvador increased from 129,000 to 174,000 in the same period. According to the 1890 census, 30 per cent of the national population consisted of foreigners, and 70 per cent of those were from Portuguese origin. By 1888, streetcars had been introduced in the main cities, together with a telegraph line to Europe, and a significant improvement in sewage, paving, telephones and water facilities were available. Again, these improvements were concentrated in few cities in the southeast. Even so, accommodation, both in quantity as well as quality, continued to worsen with the spread of a number of diseases. In 1891, the infant mortality rate reached 52 people per thousand inhabitants. As mentioned earlier, the migration to urban areas put a further strain on labour supply and this, in turn, resulted in an increase in the cost of living (Bethell, 1989; Murilo de Carvalho, 1998).

Literacy rates improved in this period, although this was concentrated in urban areas, with an estimated 29 per cent of literate rural population. In 1835, literacy rate in São Paulo was 5 per cent, while it reached 45 per cent in 1882. Railways were also built in this period, with just over 900km built between 1854 and 1872 and a further 8,000 kilometres added between 1873 and 1889. Again, as in the case of the construction of the Argentine railways, these were mainly designed to facilitate the transport of products to the ports and the international markets since the export orientation strategy was at its peak in this period. Therefore, the railtracks were mostly concentrated in the coffee and sugar areas and directed to cities with international trading ports (Bethell, 1989).

The railways, as in the Argentine case, were at the core of the export-led economy. In Brazil, by 1930, over two-thirds of the ownership, and over half of the administration of the track, were in the hands of federal and state governments. This can be explained by the importance that Brazil attached to the railways not only in terms of economic growth but also for national security and territorial integration. According to Topik (1987), the federal railways were more influential in promoting domestic growth than exports. However, as can be seen in Table 4.8, the national rail system is concentrated in the centre and south of the country, which together account for more than 70 per cent of the country's railtracks (see Maps).

Table 8.4. Regional Distribution of Rail, 1930

	North	Northeast	Centre	South
% of national system	4.10	17.40	61.60	16.80
% of national population	4.80	35.80	47.40	12.00
Track (in 1,000 km)	0.73	0.42	1.12	1.21

Source: Topik (1987:124)

3. Modern Disparities

This section will address the development strategy followed in Brazil and its impact on industrial concentration, regional inequality, urbanisation and rural-urban migration. The first sub-section will provide a brief summary of the import substitution industrialisation strategy and the liberalisation of the nineties. The second section will accentuate the impact of these national strategies on regional issues such as migration, concentration and inequalities. The last sub-section will give a summary of the main regional-specific plans in place. This section, as Section 6.3 in the case of Argentina, is not intended to be an exhaustive review of regional policies but mainly a summary. Unlike the case of Argentina, where a clear effect of a particular regional policy such as the Tierra del Fuego industrial promotion scheme described in section 6.3 can be clearly seen – see Figures 7.8 and 7.13 in sections 7.2 and 7.3 respectively as well as the conditional beta analysis for Tierra del Fuego in section 7.4 In the case of Brazil, as will be addressed in

the following Chapter, no such effects were found (see Figures 9.9 to 9.12 and Figures 9.15 to 9.19 on sections 9.3 and 9.4 respectively).

3.1. The Industrialisation strategy

Industrialisation in Brazil started in the early nineteenth century, manufacturing for the domestic markets those products where the costs were lower than the competing imports - soap, construction material, beverages and textiles. However, industrialists acknowledged the pre-eminence of the export sector, and industrialisation took place without major state intervention until 1930, developing “in the shadow” of agriculture (Topik, 1987: 158). Industrialisation at the beginning was mostly intended as a way of protecting traditional exports rather than a deliberate industrialisation policy and, in fact, it can be said it was a by-product of policies aimed at other objectives. The country had been based on primary product exports and therefore there was no domestic market integration, only isolated centres linked to export markets. With the 30s depression and the subsequent decline in agricultural exports, particularly coffee, together with the concentration of investment in manufacturing activities and the increasing role of the state with the Vargas administration and the *Estado Novo*, would then initiate a period that would re-shape the country and where government intervention and industrial development played a major role (Furtado, 1965: 99; Amman, 2000: 29).

In the period between World War II and 1962 Brazil achieved the most successful import-substituting industrialisation in the less developed world. There were several external shocks that proved positive in terms of industrial production and that culminated in Brazil’s successful industrial development in the fifties, namely First World War, the 1929 crisis and the Second World War. In addition, it should be noted that had it not been due to the coffee protection, the industrial sector would have developed much more rapidly and before. According to Silber (1978), one of the most significant economic policies that contributed to delay the industrialisation in Brazil was the protection of the coffee sector in relation to other economic activities. The minimum price for coffee, in place for 30 years, distorted the relative benefits in the Brazilian economy, destroyed the comparative advantage of coffee production and thus prevented the optimal use of

resources and the diversification of the economy with industrialisation and development of services.

As mentioned above, the First World War, by depriving Brazil of its regular supply of industrial goods while exports were blocked, stimulated industrial growth and Brazil therefore experimented rapid industrial growth during the 1920s. In the late 1920s, the expansion of coffee due to the high prices led to an overproduction crisis. Brazil was faced with having to cut on imports due to external situation and also with the need to finance large surpluses of coffee in order to pursue its policy of supporting coffee prices. The latter caused inflation and depreciation of the currency. This depreciation, in turn, would act as a protectionist barrier for the domestic industry. Therefore, the volume of trade was reduced but the productive capacity of the country became more diversified. It is estimated that while in the period 1929-1937 imports declined by 23 per cent, industrial output increased by 50 per cent (Furtado, 1965: 101).

After 1930, industry will then become an increasingly important sector of the national economy, being located in the southeast region with São Paulo at its centre (Willumsen, 1985). Industrialisation was concentrated in the South and Southeast, particularly in the triangle formed by the states of Minas Gerais, Rio de Janeiro and São Paulo. In the 1920s, São Paulo overtook Rio in the number of industries and increased the state's share of Brazilian industry from 15.9 per cent in 1907 to 45.4 per cent in 1937 (Skidmore, 1999). As mentioned above, the phase of development based on external demand in Brazil came to an end in 1929.

The accumulated foreign exchange reserves after World War II fuelled an import boom in 1946-7, that, in turn, created a foreign exchange shortage, and so resulted in a new emphasis on promotion of coffee exports and placing import controls but not on actively promoting industrialisation. The government followed a policy of overvaluation of the currency. This policy, aimed at defending the international price of coffee, damaged industrialist groups. However, imports grew quickly exhausting the reserves and accumulating external debt. The government, then, decided to introduce controls on

imports (devaluating the currency would have damaged the coffee and therefore was not a preferred option), and thus protecting industry. The imports of 'similar' products were prohibited and exchange subsidies were granted (Furtado, 1965). The Law of Similar had its origins in post independence times and is intended to encourage domestic production of import competing goods allowing Brazilian manufacturers to request prohibition of any imports they believed could be produced locally. However, information on the price of domestic production was not formally adopted as a criterion for government's decision until 1967 and has generally been applied with little concern for efficiency issues. It was finally abolished in 1990 (Bulmer-Thomas, 1994: 285; Amman, 2000: 33).

It was not until the early fifties, during the Getulio Vargas' second presidency, that industrialisation and economic development were actively and purposefully promoted (Skidmore, 1999). During 1947-55 domestic production of consumer durables experienced a notable success. As imports were reduced, ISI moved into producer goods. Domestic production as well as imports of capital goods swiftly increased in the first phase (1955-9), with domestic production of intermediate goods expanding at a speedily. Manufactured imports as percentage of total imports declined, while imports of raw materials increased, as were now being required by the new industries. By the early sixties, the import substitution phase was almost complete. While the substitution of imports was successful, the exports stagnated. This was mainly caused by the structure of protection, which increased industrial prices more than those for agricultural products and the resulting overvalued export exchange rate deterred traditional exports, as well as potential manufactured exports (Bergsman in Rosenbaum and Tyler, 1965: 71).

Post war industrial development was also accompanied by a significant amount of public investments, such as transport network, electric power, among others. This was vital for the industrial process to continue, and needed to be carried out by a public authority (Furtado, 1965; Baer, 1965). In 1951 Vargas sent a plan to create a state oil and gas monopoly and PETROBRAS was formed in 1953. Its success contributed to create a national development ideology. It was in the second half of the 1950s, during the

consolidation of the heavy phase of industry above mentioned, that the less industrialised regions such as the northeast were incorporated in this process. That was achieved by the creation of infrastructure, especially transport and communication, as well as financial and fiscal incentives to attract productive capital to the less developed regions, as will be addressed in section 8.3 with the creation of SUDENE and SUDAM. Growth in the centre-west region had been originally linked to that of São Paulo. However, in the 1960s, the construction of a transport network and the founding of Brasilia, the new capital, induced the spread of agriculture further to the interior of the country (Willumsen, 1985).

Following the Vargas presidency, Kubitschek would implement a national economic development programme (*Programa de Metas*) in the period 1956-1961 for increasing production by sector in order to accelerate industrialisation and the construction of the infrastructure necessary to sustain it. His strategy was to concentrate on thirty chosen targets – given the lack of resources to follow a more comprehensive plan – covering industrial products and infrastructure and support their development through subsidies, tariff protection and subsidised credit. A system of multiple exchange rates and government incentives favoured the imports of certain chosen capital goods. Not all targets were met, however the plan was notably successful in achieving rapid economic growth and development, although this did not continue into the sixties and growth declined while inflation accelerated (Daland in Rosenbaum and Tyler, 1972: 36; Amman, 2000: 29).

By 1961, Brazil possessed an integrated motor vehicle industry and was creating subsidiary industries to vehicle production. There were also impressive gains in electricity generation and road building. Moreover, from 1957 to 1961, GDP increased at an annual rate of 7 per cent. However, the financing was the negative side to the growth strategy. Brazil's domestic savings remained low, thus keeping investment low. Foreign capital inflows were insufficient, and there were continuing balance of payments crises since export earnings remained stagnant while imports grew. There was also an increase in inflation; which redistributed income and wealth. Workers and lower income sectors

were mostly affected, since inflation acted as an inflationary tax by eroding incomes (Fausto, 1998).

Overall, the period 1945-60 was of rapid industrial growth in which domestically produced goods replaced imported consumer durables and intermediate goods. In the 1950s, development policy became inward-oriented; with an emphasis on import substitution industrialisation that would promote domestic production of imported manufactured products. Various types of exchange controls were implemented and foreign capital inflows were encouraged. However, ISI policies worked against the agricultural sector, and the state promoted industrial accumulation by shifting resources from the agricultural export sector to the urban industrial economy, with both discriminatory trade and exchange policies (Wood, 1988).

The main drawback of the process of industrialisation as a development strategy was the reliance on industrial imports. Although the replacement of import goods was successful, the need to import increasing quantities of equipment remained, putting a constant strain on the external sector. Replacement of imports in its first phase is a matter of meeting an existing demand. In the case of Brazil, as imported goods become more expensive, domestic products satisfied the demand. The expansion of certain products changed the composition of the demand for imports, creating the need to import intermediate products, raw materials and equipment (Furtado, 1965).

The substitution process, which began with manufactured non-durable consumer goods, was followed by the replacement of durables, intermediate products and equipment. However, this substitution process was likely to reach a saturation point in which certain products are more difficult to replace and substitution can become a major obstacle to development. The only way out would therefore be to develop an independent supply of domestic technology and equipment, which would be impossible unless having attained full economic development. Another factor necessary for the substitution process to work was the inflationary process. In the beginning, the inflation generated with the protection of coffee prices benefited the industrial groups, as mentioned above. Later, the

substitution process, by increasing relative prices on previously imported goods, also acted as a mechanism for transferring income to the industrial groups. Moreover, the exchange rate mechanism, by stabilising the rate while introducing selective import controls and increasing domestic prices, favoured even further the industrial accumulation (Furtado, 1965: 102).

Following a record growth year in 1961, inflation accelerated and the rate of economic expansion began to decline. The rate of growth decreased significantly in 1963 and remained low until 1968. Two development plans were proposed in 1962 and 1964. The second central planning experience was the *Plano Trienal* (1961-64) under the presidency of João Goulart. The plan was designed by Celso Furtado, who had been appointed as the first minister of planning of Brazil. This plan was of a more comprehensive nature. The *Plano Trienal* recognised the need for monetary control but was never implemented as it was unpopular and Goulart did not have enough political support to enforce it. Inflation worsened and the rate of growth came to a halt. However, the military government of Castelo Branco that came to power in 1964 implemented a plan that was very much like the Furtado plan, at least in the way intended to reduce inflation and stimulate development -the *Programa de Ação Econômica do Governo* or PAEG (1964-1966). This plan was also continued under Costa e Silva as the *Programa Estratégico de Desenvolvimento* –PED – in 1968-1970. It was not until 1968, when the industrial sector recovered, that the general rate of growth increased. In this year, the exchange rate was modified and instead of the occasional devaluation the government introduced a “crawling peg”, a periodic adjustment of the exchange rate corresponding to the movements in the inflation rate. By doing this, speculative capital flows were reduced and so was uncertainty. In fact, from 1968 until 1973 the Brazilian economy grew at an unprecedented accelerated rate, and this period is often referred to as the Brazilian economic miracle (Rosenbaum and Tyler, 1972: 18; Wogart, 1972: 167; Daland, 1972: 37).

The so-called miracle was the result of a development plan that aimed to control inflation, attract foreign investment and stimulate capital accumulation. GDP increased at

an average annual rate of 11.2 per cent. Tax incentive schemes aimed to stimulate and diversify exports into manufacturing products and so reducing the dependence on agriculture, particularly coffee, were passed. However, a weak side to this “miracle” – as already mentioned above for the industrial-led development strategy - was its excessive dependency on the financial system and international trade. There was also a further concentration of income and while there was a significant industrial potential in Brazil, there were very low indicators of health, education and quality of life (Fausto, 1998).

The main constraint to Brazilian growth was the balance of payments problem. Import-substitution industrialisation entails a decrease in the import coefficient (ratio of imports to GDP) so that a country would grow even without a proportionate growth in the country’s capacity to import. If a floor is reached, however, further increases in GDP should go hand in hand with increases in the capacity to import, i.e. the country’s exports. Therefore, if import substitution cannot lower the import coefficient, the growth of the economy as a whole is limited unless exports can grow at a similar rate. In the case of Brazil, ISI succeeded in changing the import composition. Since exports were stagnant until 1965 growth slackened and it wasn’t until the export sector recovered that the ISI strategy recovered as well (Rosenbaum and Tyler, 1972: 22).

In the 1970s, medium and low-income segments of the population did obtain some gains, and especially after 1976 while those with higher incomes did not perform so well. The reorganisation of the labour movement increased wages, and minimum wage levels were defined in collective negotiations. The deceleration of the economy after 1973 was a result of the oil crisis that had significant effects on the domestic economy. Measures were taken to expand the domestic demand, while import controls and export promotion programmes were introduced to fight the balance of payments deficit. The resulting excessive demand stimulated inflation. During the seventies, economic policies would follow this stop-and-go pattern of demand expansion to cover the balance of payments deficit, resulting in inflation and reduction in demand to curb price increases. In the 1970s, some improvements were made in the north with the construction of important roads and foreign investment being attracted to the aluminium sector and domestic

investment channelled to the lumber sector. The south, although it had not historically participated in the export booms, had increasingly been integrating with São Paulo and Minas from the eighteenth century and became the grain supplier of the country. In this modern period, therefore, the growing articulation of the domestic market overtook the historic predominance of the external market (Willumsen, 1985).

The Second National Development Plan (PND II) in 1974 directly favoured the capital goods sector. This plan was designed as a response to the economic conditions following the oil crisis in 1973. At this time, Brazil decided to deepen the process of ISI and gain technological self-sufficiency. However, by the beginning of the eighties, the foreign exchange problems, coupled with the second oil crisis in 1979 and inflation made the debt-led strategy unviable. In the eighties – and until 1987 – high tariffs protection was in place in order to eliminate the trade deficit. After 1987, liberalisation began gradually with the return to democracy under Sarney's presidency and from 1990 onwards a more radical trade reform was pursued under Collor de Melo with non-tariff barriers being abolished and tariffs cut and the *Abertura Comercial* and also the creation of MERCOSUR. Subsequent governments carried the liberalisation programme further with most industrial sectors facing reduction in tariffs and public investment and many public enterprises being privatised. While other Latin American countries reformed their economies within a decade, in the case of Brazil, and due to the lack of economic reform in the eighties, drastic changes were undertaken in few years (Gil Kinzo and Bulmer Thomas, (1995); Amman, 2000: 29, 46). The regional impact of the present liberalisation period will be further discussed in the following section.

3.2. The impact of development strategies on regions

Before the industrialisation development strategy, the inequality in the distribution of income of land was said to be responsible for the unequal distribution of income, given that the benefits derived from productivity growth in the primary export activities were distributed among few landlords. However, the process of industrialisation not only created but also aggravated pre-existing imbalances, mostly due to the rapid industrialisation process of the 1950s and 60s, which constitutes the most important

change of this period. In particular, it is said to have aggravated the existing differences between the northeast and the centre-south of the country. This was primarily due to a high capital intensity in the manufacturing sector, which did not require increasing workforce as production increased the excess supply of labour that permitted maintaining low wages and the small size of the market, which resulted in an oligopolistic structure. The result was an increasing dual structure in which existing inequality patterns were accentuated (Wells, 1976: 2). The industrialisation process not only located most of the industrial capacity in the centre-south, where it was already located, but also induced a worsening for the northeast. Post-war industrialisation thus accentuated the geographical concentration in Brazil with the Sao Paulo region having almost half of the share of national industrial output. Moreover, as mentioned in the previous section, inflation acted as an inflationary tax and thus redistributed wealth with lower incomes being adversely hit.

In this period, the south registered significantly high rates of population growth, mostly corresponding to migration from the northeast. According to Baer (1965: 173), it is estimated that the northeast lost over 640,000 in the 1930-40 and over 930,000 in the 1940-50 because of net migration. By contrast, the centre-south received 975,000 and 576,000 respectively from net immigration. It is generally said that this migration flows are due to the differing growth rates; however, government policies by encouraging industrialisation were also responsible for the aggravation of disparities as well as offsetting the redistribution effects of the fiscal mechanism. In fact, the northeast was forced through protective domestic policies to import from the more developed south rather than from abroad.

Consequently, the northeast suffered a decline in the terms of trade and it can be said that it subsidised the industrialisation in the centre-south. The northeast's lower industrialisation rate translated into a structure of import demand, which differed from the more industrialised south. The former had a higher participation of consumer goods in its import demand, which were taxed heavier. Given the inability to buy imported goods, the northeast had to buy those consumer goods from the centre-south. This meant a dual

structure similar to what Prebisch referred to, where the centre-south would have the role of centre while the northeast would be the periphery, with a constant deficit to the centre-south. Moreover, the high rates that north eastern importers had to pay were used by the government to sustain the coffee prices (based in the south) or *Banco do Brasil* used the excess balances to make loans (a high proportion of which are made in the south) (Baer, 1964: 176).

Capital transfer has also been done through the federal fiscal mechanism, but whether this has been enough to redress the imbalance is not clear-cut. Under the fiscal mechanism there is a transfer of resources from the south to the northeast. However, many of the government funds have been used mainly for drought relief. Under the 1946 constitution, the federal government is under the obligation to spend a minimum of 3 per cent of its revenues in the northeast. The industrialisation process neglected certain areas of investment, such as agriculture and education. (Baer, 1964: 283)

The regional distribution of income and population continued to become more concentrated. I reproduce below two tables that appear in Baer (1964:272). The first (Table 8.5) shows the regional distribution of the Brazilian population from 1947 to 1959, while Table 8.6 shows the distribution of national income for the same period. As can be seen, while in the north, east and centre-south shares are broadly similar; the northeast accounts for 25 per cent of the country's population but only 11 per cent of the income. In the south, by contrast, while the population is about 32 per cent, the national income is near 50 per cent.

Table 8.5. Regional Distribution of the Brazilian Population, 1947-1959 (%)

	1947	1949	1957	1959
North	3	3	3	3
Northeast	25	24	24	25
East	36	36	35	35
South	32	33	34	34
C-West	3	3	4	4

Source: Leff (1964: 272)

Table 8.6. Regional Distribution of Brazilian Income, 1947-1959 (%)

	1947	1949	1957	1959
North	3	2	2	2
Northeast	11	11	10	10
East	37	37	36	36
South	48	48	49	50
C-West	2	2	2	2

Source: Leff (1964: 272)

Graham (1969) compares 1940 with 1950 and concludes that a trend towards widening divergence of income per capita is observed in all states in Brazil. He determines the convergent or divergent pattern by using a weighted relative inequality measure calculated from the percentage distribution of total income and total population by states. The difference between both the shares of income and population (regardless of the sign) is considered as a measure of inequality per capita among all states weighted by their share of total population. The limits of the measure are zero (no relative inequality) or close to 200 (one state has all the income and practically no population). He concludes that between 1940 and 1950, there was divergence (or no convergence) within the low-income group of the north and northeast and a widening divergence within the higher income group of the south, southwest and southeast (from 33 to 43). Also, there is a significant increase between the upper and lower groups of states (from 29.8 to 41.6) and also between all states (Table 8.7).

Graham also compares 1960 with 1950 and concludes that the divergent pattern was reversed for all states. Although no strong convergence is observed, the divergent trend at least ceased. Observing the behaviour of each group, it can be seen on Table 8.7 that within the upper group a slight convergence appears (from 43 to 40). In the case of the lower group, it shows a slight divergence as in the previous decade. The most striking feature of this decade is the convergence between the upper and lower groups of states decreasing from 41 to 35; and a slight convergence among all states. Thus, the convergent trend of the fifties is mainly associated to a slight convergence within the upper group and a strong convergence between both groups. Therefore, Graham (1969) concludes that inter-group (north-south differences) rather than intra-group behaviour is the more important element behind the trends of convergence and divergence of the two decades.

Table 8.7. Differences Between Income and Population Shares 1940-1960

Sum of Differences	1940	1950	1960
All States	40.2	51.9	48.7
Between Upper and Lower States (each treated as a group)	29.8	41.6	35.6
Upper Group, treated separately	33.5	43.2	40.0
Lower Group, treated separately	12.7	13.8	15.2

Source: Graham, DH (1969:265)

Graham attributes this converging trend to internal migration in the decade of the fifties. The lower group of states was a net exporter of migration while the upper group was an importer of migrants. Further, he shows that long distance migration is more pronounced in the fifties than in the previous decade. The lower group of states was a “net exporter” of migrants while the upper group was a “net importer”. Also he adds that long distance migration was more significant in the 50s than in the previous decade, so the pattern of the 40s continued into the 50s with the lower group becoming an even more significant net exporter and the upper group a more important net importer of migrants. Therefore,

while for the 40s income differences among states played a tentative role in internal migration, the income differences in the 50s were clearly a major factor.

The process of import substitution and the rapid economic growth of the fifties and early sixties impacted on economic imbalances and contributed to intensify this already present dual economy. As mentioned before, the industrialised Centre-South region made more evident the economic disparities already present in the country. However, the ISI development strategy left agriculture out of the development strategy by solely concentrating on industry and therefore creating another co-existing dualistic pattern. Given that employment opportunities in urban areas failed to expand in order to absorb the excess labour due to high rates of population growth, both rural-urban migration and the low education levels aggravated the problem of urban unemployment (Rosenbaum and Tyler, 1972: 22). “Brazil has one of the highest rates of urban growth in the world and one of the lowest rates of labour absorption by industry” (Salmen in Rosenbaum and Tyler, 1972: 415). Therefore, as can be seen in the table reproduced below, by 1970, Brazil had become a predominantly urban country.

Table 8.8. Urban and Rural Population in Brazil (1940-1970)

Census Year	Urban (%)	Rural (%)
1940	31	69
1950	36	64
1960	45	55
1970	53	47

Source: IBGE Census. Quoted in Salmen. L, in Rosenbaum and Tyler (1972: 416).

The major cause of urban growth has been migration, although some was not to cities but from poor rural areas to richer rural ones as well as from the Northeast to the agricultural areas of the South and West. From 1960 to 1970 the two states that experienced highest average annual population increase were Parana and Goias (mainly due to agricultural booms in those states). However, the major migration flows were directed towards the cities given the disparities between rural and urban incomes. Between 1950 and 1970, the

population of the nine major metropolitan areas in Brazil increased by 161 per cent (Belem, Fortaleza, Recife, Salvador, Belo Horizonte, Rio de Janeiro, Sao Paulo, Curitiba and Porto Alegre) compared to a 77 per cent increase in the country's total population (Salmen in Rosenbaum and Tyler, 1972: 419).

With both the PAEG (1964-1966) and its continuation under Costa e Silva –PED – in 1968-1970 progress was evident in certain areas but the whole economy was not revitalized, particularly agriculture, and the gains were not evenly distributed in the population and area. Therefore, efforts of state planning were mainly effective in rich states, particularly in Sao Paulo but had little or no effect in the poorer areas.

On the following table, the distribution of the monthly income in services by regions can be seen. While Rio de Janeiro (RJ on the table) and Guanabara as well as Sao Paulo register well over 50 per cent of employers and self-employed with high incomes; the south and northeast are below. In the south, inequalities are not that pronounced, with similar percentages of population in the three categories of income. In the northeast, however, over 40 per cent of the population is located in the bottom-earning category, while the top one has less than 20%.

Table 8.9. Distribution of size of monthly income of employers and self employed in services, by regions, second quarter, 1969 (in percentages)

Region	Up to Cr\$49,99	Cr\$50,00-149,00	Over Cr\$ 150,00
R.J & Guanabara	12.6	27.7	59.7
Sao Paulo	12.0	18.8	69.2
Extreme South	31.6	30.5	37.9
Northeast	43.1	37.2	19.7

Source: Pesquisa Nacional por Amostra de Domicilios (PNAD), Anuario estatístico, taken from Salmen (1972: 418)

As a final step in promoting development of the interior regions, the plan for moving the capital to Brasilia was given new impetus. This was also done together with policies

designed to promote the occupation of Amazonia, as will be seen in the following section.

The “Brazilian miracle” led to a debate on the distribution of the benefits of rapid economic growth. Goodman (1976: 15) points out at the decade of the sixties as one of increased concentration of income and a deterioration of the distribution particularly in urban areas with the share of the poorer 50 per cent of the population of regional income decreasing from 18.6 to 16.3. Moreover, while there was a rapid industrial growth in Brazil, there were very low indicators of health, education and quality of life (Fausto, 1998). Despite the fact that in the 1970s medium and low-income segments of the population did obtain some gains, especially after 1976; income concentration, as mentioned by the Gini coefficients, increased from 0.497 in 1960 to 0.565 in 1970 and 0.592 in 1980 (Willumsen, 1985). Several factors are often mentioned as causing the growing disparities. Among them, the educational levels and demand for skilled-labour, wage differentials and labour market institutions are the most often cited ones.

Following the promulgation of the 1988 Constitution, decentralisation in both political and financial resources played a significant part. Decentralisation, however, had different impact in the regions, mainly given the existence of regional inequalities. Also, not every state has the same amount of power, and there are several centres of power that decide on national policies. Moreover, the subsequent weakening of the federal government might prove counterproductive for the reduction of disparities. Since 1946 Brazil has a fiscal system in which the redistribution of national income is done from the richer to poorer regions and this was extended by the 1988 Constitution. It is calculated that while the Centre-South generates around 80 per cent of GDP and national revenue, it only has 60 per cent of the expenditure. According to Souza the high level of entanglement of this system is the reason why when the economy of richer states slows down, so do the less developed regions (Souza in Gil Kinzo, 1997: 41).

The liberalisation policies of the 1990s are quite likely to increase disparities with market forces in Brazil might favour the more developed regions in the country. In fact the

“trickle down effects are very unlikely to overtake the polarisation effects from the centre south” (Hadad and Hewings, 1998: 38). If regional equity is part of the country’s development agenda, an active and comprehensive regional policy should be pursued in order to reduce regional disparities.

Over the last decade, there has been some discussion on the regional effects of the increased autonomy of the states in giving tax incentives, which has evolved in what is called the ‘fiscal war’. The Constitutional Amendment No 18, which was incorporated in the 1967 Constitution under *Imposto sobre a Circulação de Mercadorias (ICMS)* – a sales and services tax similar to value added - replaced the *Imposto de Vendas e Consignações (IVC)* of the 1946 Constitution. The mechanisms of fiscal incentives based on ICMS have allowed many states attract industries many times disregarding efficiency concerns. Complementary Law 24/75 prohibited states to grant incentives, unless these were approved by CONFAZ, which is a council formed by the minister of finance as well as the finance secretaries of the states. However, this law has not been observed. In the last decade, and following the *Apertura*, the fiscal war has intensified in order to attract foreign investment (Olenike, 2000).

In theory, decentralized industrial policies and fiscal incentives can contribute to reducing disparities in development levels across regions and stimulating expansion. From a government’s point of view this is a good development strategy provided there is investment flowing to a particular region where otherwise investment would not have gone and if this investment creates domestic linkages. However, in practice, once a particular state gets fiscal incentives, other states follow suit and a fiscal war starts, with all states participating given that failure to do so might entail the risk of losing production. As this continues to expand, there is a loss of efficiency as the fiscal incentive turns simply into a tax discount, reducing the private cost of production while increasing the social cost (since industrial activity location is determined not by efficiency but on ICMS devolution). In the medium term, those states with fewer resources and less levels of developed are unable to provide the private sector with the infrastructure required. In the end, only those financially strong states would win the war since they are the only ones in conditions to be able to continue providing incentives as

well as suitable production conditions and therefore the result is an increase in income disparities (Varsano, 2001:20).

The fiscal war is therefore a consequence of an aggressive inter state competition in order to attract investment. Although some might argue that it produces benefits in terms of industrial relocation, these benefits are likely to impact on the short run while in the long-term, as long as investment is associated with tax incentives rather than efficiency issues, the impact on the local finances will be negative (Rodríguez-Pose et al, 2001: 14). As local finances deteriorate, local production conditions worsen as well and therefore the incentives lose their initial attraction. The fiscal war hints at obvious signaling problems in the economy that create disparities between the national and states' goals and between long and short run development strategies (Varsano, 1997: 12).

Despite the argument in favour of the results of the fiscal war so far in terms of decentralising national development and moving away from the Sao Paulo, Rio de Janeiro Minas Gerais pole while allowing development to other regions that otherwise did not have resource to converge with the richer ones (Olenike, 2000); according to a report by BNDES (2000: 3), the fiscal war as an instrument to develop poorer regions is questionable. It is quite likely that as incentives are placed, the final redistributive effect of the fiscal war will be neutral. Recent GDP statistics by state do not show signs of decentralisation of national income. In fact, the study concludes that some less developed states that were notoriously more aggressive in the fiscal war have even experienced losses in their shares of national GDP, including the industrial GDP. In particular, BNDES concludes that the share of the southeast in national GDP decreased between 1970 and 1985 and increased at the end of 1998. Moreover, the northeast region, which had increased its share between 1970 and 1985, saw its share decline by 1998. When looking at industrial shares the southeast increased its share in the last period while the northeast has declined its industrial production.

As will be seen in the following chapter regardless of the many arguments in favour of the fiscal war, it can be seen from the sigma and beta analyses that disparities in the last decade have not decreased. The beta analysis for the subperiod 1990-2000 indicate that

no convergence was found- see Table 9.2 in Chapter 9.. Moreover the figures on percentages of national average GDP show that the while other regions remained mostly the same, the percentage of the centre west region has increased particularly over the last 15 years (see Figures 9.5 and 9.9 in chapter 9). Therefore, despite the fiscal war inducing some relocation of industries away from traditional centers it has not translated into convergence of disparities, which is, after all, the main reason for providing these incentives on the first place.

3.3. Regional government policies

Regional policies in Brazil date from the early thirties. However, as will be seen in this section, and in accordance to the Argentine experience, their main characteristic is a lack of co-ordination and coherence, which, in turn, reduced effectiveness. In 1930, the three main characteristics of the Brazilian economy were the significant role of the state in economic development planning, the highly concentrated and centralised power and decision-making process, and the structure of labour relations (Gil Kinzo, 1997). The 1930s are associated with the beginning of import substitution policies of development mainly in response to external conditions – as seen in the previous sub-section. Controls on foreign exchange were introduced in order to correct imbalances of the balance of payments given that prices of agricultural goods had been decreasing. These funds were then channelled into the development of an industrial base aiming at the substitution of former imports with local manufactures. During the Vargas administration the construction of dams, steel plants and Petrobras (the oil and gas monopoly) were encouraged (Daland, 1967).

However, it was not until after World War II that the Brazilian government intervened substantially in the economy, not only to deepen the industrialisation process but also to reduce regional imbalances. Many programmes were implemented, which ranged from building Brasilia, for reduction of illiteracy and poor health, subsidising industrial plants outside the heartland, agrarian reforms, land-use legislation and infrastructure investment (Henshall and Momsen, 1976: 247). As a result of these policies, the share of agriculture

in the gross domestic product dropped from 27 to 22 per cent from 1947 to 1961, while that of industry increased from 21 to 34 per cent (Daland, 1967).

At a *national level*, state intervention in this period was significant. In 1948, the SALTE plan (health, food, transport and energy) was submitted to congress, but it was not ratified until 1950. It was designed to co-ordinate the variety of existing plans and with the essential function of assigning funds to eligible agencies. In 1952, the National Bank for Economic Development (BNDE) was created with the objective of obtaining funds from both international as well as domestic sources. The following year, the BNDE together with ECLA formed a team of economists in order to prepare a comprehensive study of the Brazilian economy. This plan laid the basis for the first real economic plan although comprehensiveness was still lacking. The result was the Programa de Metas mentioned in the previous section, a five-year plan covering the period 1956-1960 comprising most sectors of the economy.

As a consequence of severe droughts that affected the northeast in 1958, a report was produced at the BNDE by Furtado that led in 1959 to the creation of the Superintendency for the Development of the Northeast (SUDENE), which will shortly be referred to in more detail. Furtado was appointed superintendent of the Council for the Development of the Northeast (CODENO). In 1961 the National Planning Commission (COPLAN) was created to work on three levels - emergency plans, five-year plans and those with a twenty-year perspective (Daland, 1967).

From 1940 onwards, the northeast experienced an employment crisis product of the increased competition (in both manufactured as well as agricultural products) from the more developed industrial regions. The increase in competition and market penetration was favoured by the improvement of roads and railroads, which took place mostly in the forties and fifties and some other important highways later in the sixties and seventies. Moreover, from 1960, a number of economic policies favouring the developed south depressed peripheral regions such as the northeast even further. Both government price controls of some basic staples as well as unfavourable world market prices for natural

fibres led to a long period of decline for many northeast crops during the sixties and seventies. The 1964 military coup established a highly centralised government and increased the dependency of the politicians of the interior, and in particular the northeast, on federal and state government (Hoefle, 1985: 5). The constitutions of 1967 and 1969 provided the military government a highly centralised authority, which contributed to an increase in federal executive authority (Rosenbaum and Tyler, 1972: 5).

In 1960, President Goulart launched the *Plano Trienal*, which covered the period 1963-1965. In 1963 a new planning office was created in an attempt to co-ordinate national planning. The following year, Roberto Campos was appointed as minister extraordinary for planning and economic co-ordination, and the Program of Action (PAEG) was launched. One year later, the advisory council (CONSPLAN) was created. These measures together constituted the first serious experiments in formal planning yet, despite the number of agencies and bodies dealing with planning and development created in those years, there were still no effective and coherent pattern of planning in Brazil, except for the BNDE that was concerned with micro-planning (Daland, 1967). The *Plano de Integração Nacional* (PIN), launched in 1970, involved taking funds from wealthier sectors and transferring them to projects in less developed regions, and it is seen as a culmination of the 1960 Plano Trienal. However, most of these efforts were channelled through a variety of sectoral and regional development agencies.

Besides the programmes already mentioned, there existed a national system of resource transfers from the federal government called the Fund for the Participation of States and Municipalities and Negotiated Transfers (*Fundo de Participação de Estados e Municípios e de Transferências Negociadas*), which today accounts to 4 per cent of annual GDP. The north and northeast regions receive approximately half of these transfers. Besides the federal fiscal incentives, state incentives have also been used since the end of the sixties, particularly the exemption of the ICM tax, donation of land and financial contribution via share holding (Diniz, 1999: 29). Many states increased the fiscal incentives to attract more investment deriving in the so-called 'fiscal war' referred to previously, which although contributing to the relocation of some industrial activity in states such as Minas

Gerais, Parana and Santa Catarina, they have not decreased disparities – as will be seen in the next Chapter.

During the seventies, economic policies would follow this stop-and-go pattern of demand expansion to cover the balance of payments deficit, resulting in inflation and reduction in demand to curb price increases. In the 1970s, some improvements were made in the north with the construction of important roads and foreign investment being attracted to the aluminium sector and domestic investment channelled to the lumber sector. The south, although it had not historically participated in the export booms, had increasingly been integrating with São Paulo and Minas from the eighteenth century and became the grain supplier of the country. In this modern period, therefore, the growing articulation of the domestic market overtook the historic predominance of the external market (Willumsen, 1985). Mention in this section- from above

In 1988, the Federal Constitution created the Fund for the Development of the North, northeast and Centre West Regions (*Fundo para o Desenvolvimento das Regiões Norte, Nordeste e Centro-Oeste*), which receives 3 per cent of the revenues from the income and industrialised product taxes, the values of which began to be calculated and assigned in 1989. Other funds benefit from specific sectors as well as incentives to exports and subsidised credit scattered all over the country. Even though there is a number of incentives in place, their effect have been small and of negligible importance (Diniz, 1999: 31).

In the 1990s there was a redefinition of the role that the state had played. The state-led industrialisation model was no longer viable under conditions of economic stagnation, high inflation rates and globalisation. The 1988 constitution set the basis for a decentralised country in terms of distribution of political and financial resources. In particular, it challenged the role of the state as a provider of social and economic benefits and the responsibility for working towards the reduction of inequalities among states and regions. As a result of decentralisation, the federal governments were sharply affected by financial constraints. On the one hand, state governors, in particular those of wealthier states, became the main centres of power in negotiating with the federal government. On

the other hand, however, the Brazilian experience shows that decentralisation might impede the reduction of the country's regional inequalities because of the financial and political weakening of the federal government (Souza, 1997).

The relationship between the federal and the state governments is also significantly complex and varies across regions. In order to counterbalance regional inequalities, since 1946 Brazil has adopted a fiscal system with the objective of redistributing national revenue from the wealthier to the poorer regions. This scheme was extended by the 1988 constitution. The fiscal system is therefore highly entangled and whenever the economy of well-off states slows down the less developed regions are also affected (Souza, 1997).

The regions comprised in the SUDENE and SUDAM programmes the northeast and north respectively, have attracted the greatest attention, primarily due to the magnitude of the areas involved (Henshall and Momsen, 1976). The *northeast* region has applied drought relief programmes since the 1930s with the main objective of retaining the work force that would otherwise have left the region. Fiscal policies specifically targeted at increasing the income per capita in the Northeast have been into effect since the fifties. The Bank of the Northeast (BNB) and the Superintendency for the Development of the Northeast (SUDENE) have been established in 1954 and 1958 respectively. The Superintendency of the São Francisco Valley (SUVALE), which later fell under supervision of SUDENE, focused on the same issues as both SUDENE and SUDAM but in a more restricted area. SUDENE usually attracts more attention because of the magnitude of the area concerned.

Originally, SUDENE was more concerned with infrastructure projects as stated in its First Guidance Plan for the 1961-69 period, in which road and power projects accounted for 70 per cent of the budget with only 15 per cent in education. In the Fourth Guidance Plan (1969-73), however, road and power projects accounted for 35 per cent of the budget while agriculture and sanitation to 10 per cent and education to 6 per cent. The main source of funding for SUDENE was the 34/18 tax incentive plans and the Bank of Brazil. The 34/18 tax was named after article 34 in the law approving SUDENE's First Guidance Plan (1961) and modified by article 18 of the law approving the agency's 1963-

1965 programme. It states that corporations in Brazil may deposit up to 50 per cent of their annual income tax obligation in a blocked account at the BNB. Therefore, this scheme gave all Brazilian corporate entities the possibility of cutting their tax liability by 50 per cent provided they invested the saved 50 per cent in projects within the northeast approved by SUDENE.

Although its prime objective is achieving an integrated approach to the development of the northeast region; in practice, however, it has been a supervisory body for the many projects undertaken in the area. Despite the federal government investing significantly in social capital through SUDENE, private capital, however, was slow to appear and it was only after 1964 that it was taken advantage of the Art 34/18. These funds could either be invested in corporations already operating in the region or could be lent for a period of 5 years at predetermined interest rates. Most firms deposited tax funds in the Bank of the Northeast and applied them with loans from BNB for business ventures (Wogart, in Rosenbaum and Tyler, 1972: 173).

SUDENE has favoured an increase in the per capita wage levels and provided alternative employment for rural population in the region. However, it failed to address the basic problem, which was to change the social and economic structure of the region that had been shaped in colonial times. Without addressing this issue no development effort would be entirely successful. In 1972, the PROTERRA plan was created in order to focus on upgrading the agricultural interior but only changed focus from industry to agriculture but still not addressing the main regional planning issues. Although SUDENE played an important role in the northeast, there was still a significant amount of overlapping and therefore lack of control for SUDENE, such as DNOC (National Department for Anti-Drought Works), CHESF (São Francisco Hydroelectric Company), SUVALE and other state development agencies (Henshall and Momsen, 1976: 250; Hirschman, 1968).

The *north region*, by contrast, remained largely unaffected by official development interventions until the sixties. The rubber industry that had been established in the nineteenth century was briefly encouraged during the 1940s by Vargas, but with little

success. The first federal Amazon development agency was the SPVEA (Superintendency of the Planning for the Economic Valorisation of the Amazon), which preceded SUDENE given that it was created in 1953. The objective was promoting a fuller occupancy of the Amazon Basin, upgrading the economy and integrating into the Brazilian economy by promoting agriculture, industry and infrastructure.

SPVEA differed from SUDENE in that the programme focused on small, unconnected regional units while SUDENE has a more sectoral approach. During the following decade, however, the interest shifted to public works, and in 1972 the idea of attracting industries to the region led to tax exemptions for plants that processed local raw materials. As other regional programmes, SPVEA also achieved very little success. In 1966 SPVEA was substituted by SUDAM (Superintendency for the Development of the Amazon), which was similar to SUDENE in the sense of having a broader, co-ordinative role and also offering similar tax incentives, such as benefiting from the 34/18 tax. Both regions guarantee exemptions from various state taxes and reduction of import duties on imported machinery for a period of ten to fifteen years (Henshall and Momsen, 1976: 256; Wogart, in Rosenbaum and Tyler, 1972: 175). The BNDE (National Development Bank) remained the most important agent of the federal government. Further, it received a 3 per cent of federal government tax, two-thirds of which would go to public sector and one-third to back private investment under the supervision of a separate agency- FIDAM (Private Fund for Amazon Development). Despite the large amounts invested (by 1981 630 projects covering 8.4 million hectares and with US\$ 700 million in official subsidies), cattle ranching failed to promote regional growth, generate employment or increase income levels (Hall, 1993).

An ambitious highway construction programme (the Trans-Amazon highway) was intended to encourage settlement both by small farmers as well as by wealthier individuals and corporate interests. The project had a prominent social purpose since the Trans-Amazon highway was intended to promote the geographical integration of the Amazon as a symbol of national unity and to encourage small farmers suffering from the droughts in the northeast to resettle along it. A tax incentive (Finor) was introduced as

well as other financial incentives to encourage businessmen from southern Brazil and from overseas to invest in cattle ranching and other enterprises in order to promote regional development. However, by 1978 only 6 per cent of the original target had been met, less than half was from the northeast. Agriculture performance along the Transamazon was poor and the government failed to provide an adequate social infrastructure and thus ended in a high rate of project abandonment. By 1974 political pressures as well as technical shortcomings, ended in a reversal of policies with regional development being pursued again by ranching, mining and other large-scale activities. Therefore conditions for small farmers deteriorated even further (Hall, 1993).

In 1981, the north-west frontier development programme (*Polonoroeste*) was launched in order to attract small farmers expelled from southern Brazil by land concentration arising from the spread of mechanised wheat and soy bean cultivation. Again, however, although originally designed in order to assist the landless rural poor, *Polonoroeste* fell short of its ambitious objectives. Although settling about 26, 000 families from 1970 to 1975, most of the beneficiaries were cattle ranchers instead of smallholders. During the seventies, violent conflicts between ranchers, small farmers and indigenous groups multiplied (Hall, 1993).

Another development scheme with negative social consequences was the Grande Carajás Programme in eastern Amazon, based on mining and processing activities. In the same way as the cattle-ranching programmes, the Trans-Amazon highway and *Polonoroeste*; Carajas exacerbated rural violence associated with land conflicts, land concentration and ecological destruction as a consequence mainly of the eviction of indigenous groups and peasant farmers from their land. The Tucuruí hydroelectric scheme, for example, the largest in any rainforest and designed to supply subsidised power for the Grande Carajás aluminium industry, displaced 25,000 people. Commercial activities have been strongly subsidised by the governments in an attempt to promote exports or to favour certain groups while the interests of the rapidly growing urban and rural populations have consistently been neglected (Hall, 1993).

In 1967, a free trade zone was created in Manaus - SUFRAMA (Superintendency for the Free Administration of Manaus), in which imports used by local industries paid no duties while exports from Manaus paid no export taxes. By the end of 1968, imports of electronic equipment, radios and television sets were taking place at the value of US\$ 250,000 per month. Between 1967 and 1968, 3,000 new jobs were created, absorbing all labour surpluses. Construction and cement imports increased in that period by ten-fold. The system of incentives in the region of Manaus with the free trade zone, which is based on tax waivers, made possible the building of the industrial pole in the area, specialising in consumption electronics. The opening of the Brazilian economy, however, led to a crisis in this zone, decreasing sales by half between 1990 and 1992 although a relative recovery followed. This zone is costly and there are doubts about its efficiency. These tax exemptions will end by 2013, and this is expected to induce a further crisis in the economy of Manaus (Diniz, 1999).

Two other programmes that are often cited are SUFRONTE, aiming at the development of the south, which also had limited impact; and PROESTE, launched in 1971, aimed at developing the rural environment of Goiás, Mato Grosso and Northwest Minas Gerais, (Henshall and Momsen, 1976).

Following the promulgation of the 1988 Constitution, decentralisation in both political and financial resources played a significant part. Decentralisation, however, had different impact in the regions, mainly given the existence of regional inequalities. Also, not every state has the same amount of power, and there are several centres of power that decide on national policies. Moreover, the subsequent weakening of the federal government might prove counterproductive for the reduction of disparities. Since 1946 Brazil has a fiscal system in which the redistribution of national income is done from the richer to poorer regions. This was extended by the 1988 Constitution. It is calculated that while the Centre-South generates around 80% of GDP and national revenue, it only has 60% of the expenditure. According to Souza the high level of entanglement of this system is the reason why when the economy of richer states slows down, so do the less developed regions (Souza in Gil Kinzo).

Although there is a long tradition of regional development institutions in Brazil, both at the national as well as at the regional level, none of these have had any significant impact when it comes to promoting the development of backward areas. The main hindrance of the policies that have been implemented in Brazil has been the lack of co-ordination and coherence in both the design and implementation of the different plans. Therefore, and even though since 1975 the unilateral granting of fiscal incentives by the states was forbidden by law, and due to the lack of government regional policies, the fiscal war escalated in the nineties. Reform is still pending, but faces strong opposition from those states most involved in the fiscal war, such as Bahia, Ceara, Goias and Parana.

5. Conclusions

This chapter has sought to provide a survey of regional economic disparities in Brazil since colonial times, when the external market played a fundamental role for the regions. The rise and later exhaustion of a particular activity resulted in the emergence of another product in a different region, which, in turn, would generate regional spillovers. The sugar cycle of the sixteenth and seventeenth centuries favoured the northeast; while the gold cycle of the following century favoured the state of Minas Gerais and coffee, the main product of the nineteenth century, benefited Rio de Janeiro and São Paulo. Besides, there were other minor cycles such as the rubber production in the Amazon at the end of the nineteenth century and cocoa in Bahia in the middle of last century.

In the twentieth century, there was a shift towards the internal market and industrialisation accentuated disparities, locating its benefits in the southeast, with São Paulo at the centre. According to classical theory, disparities would decrease over time, mainly due to capital and labour mobility within a country and diminishing returns. However, this pattern is not that obvious at all for the case of Brazil. As in the case of Argentina, migration patterns did not favour convergence since they were mostly directed towards the industrialising areas. It is important to determine whether disparities have decreased over the last few decades, or whether specific mechanisms need to be

introduced in order to favour convergence. Several issues will be looked at in the following chapter. Firstly, whether convergence among the Brazilian regions over the last couple of decades has indeed occurred and, if so, to what extent. Secondly, to determine whether there are any regions that consistently lag behind the rest of the country and whether any government policies seen in section 3.3 have had any significant effect in a particular state. Finally, whether macroeconomic shocks and short-term economic situations played any role in terms of regional income convergence or divergence.

Convergence Analysis in Brazil

1. Introduction

This chapter follows the analysis of Brazil's disparities from colonial times by testing for convergence between the twenty-seven Brazilian states for the period 1970-2000. The objective, as in the case of the chapter on Argentina, is to determine whether the disparities that were shaped in early stages of Brazilian history remain nowadays, as observed in Figure 1.4 in the introduction of this thesis. Besides, I will try to determine whether external factors influence the process of convergence among the Brazilian states.

Section 2 describes the methodology that was used in order to analyse the available data. Section 3 presents a descriptive analysis of disparities, by presenting sigma analysis on socio-economic variables as well as percentages of average national income. In Section 4 of this chapter, a σ -convergence analysis of regional GDP is performed from 1970 to 2000. An analysis similar to that carried out for the Argentine provinces was also done, in which the impact of omitting one state at the time is analysed. Finally, Section 5 includes both the absolute as well as the conditional β -convergence analyses.

2. Data Availability and Methodology

Data regarding the GDP per capita by regions and federal states for the period 1985-2000 at current prices was obtained from the Instituto Brasileiro de Geografia Estadística (IBGE). For the years 1970, 1975 and 1980, the data reported in this chapter refers to IBGE (1987), also in current per capita units. The Consumer Price Index for the period

was obtained from the Fundação Instituto de Pesquisas Economicas (FIPE) and the UN Statistical Yearbooks (1978, 1985, and 1994). The index was presented with several base years. In this chapter, I have decided to use the same base year as for the Argentine (1986) chapter. As can be seen in Appendix V.g. the choice of base year for the analysis of convergence is irrelevant – provided consistency throughout the series – since the main results for the analysis remain unaltered whether the base year is 1986 or 1995 (as shown in the Appendix). Data for Tocantins was not available before 1989 and therefore this state will be left out of the analysis. Although the states of Tocantins and Piauí have the same shares of national GDP for the period 1989 onwards and ratios could have been calculated in order to fill the gaps, I believe that it was too long a period in order to do this properly. Ferreira (1998) considers that although it is desirable to use the longest available series when studying regional convergence, whenever there are doubts about the quality of the data as well as the compatibility of different series, it is preferable to limit the analysis to shorter periods. He therefore analyses the period 1970-1995. Data for 2001 was available after performing these regressions and results also appear in Appendix V.f as a footnote, but not here, since the main results were not altered by the additional year.

For the conditional convergence, data on total school enrolment corresponding to 1970 was obtained from IBGE (1979). However, data on literacy rates for 1970 was used given that for the conditional β -convergence literacy rates are more useful than enrolment, which affects the medium term. Industrial and agricultural shares of GDP for 1970 have also been obtained from IBGE. Data used in this chapter can be seen in Appendix IV.

In this chapter, the geographical division used for Brazil will be referred to regions and federal states as follows:

Grandes Regiões or regions: North (*Norte*), northeast (*Nordeste*), Southeast (*Sudeste*), South (*Sul*) and Centre-West (*Centro-Oeste*). Each region comprises several *unidades de federação* or federal states as follows.

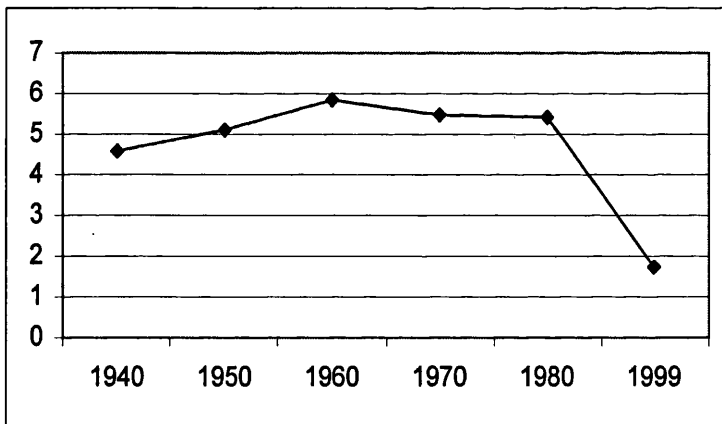
- *Norte*: Rondônia, Acre, Amazonas, Roraima, Pará, Amapá and Tocantins

- *Nordeste*: Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia
- *Sudeste*: Minas Gerais, Espírito Santo, Rio de Janeiro and São Paulo
- *Sul*: Paraná, Santa Catarina and Rio Grande do Sul
- *Centro-Oeste*: Mato Grosso do Sul, Mato Grosso, Goiás and Distrito Federal

3. Socio- Economic Inequalities

In this section, a sigma analysis of some socio-economic variables is performed. The social indicators considered in the analysis were life expectancy from 1940 to 1999 and infant mortality from 1940 to 1999. It can be seen in Figure 9.3 that despite the persistence of significant differences among the regions, there is a continuous increase in life expectancy. The northeast region is consistently below the average while the south ranks highest for all years, followed by the centre-west region.

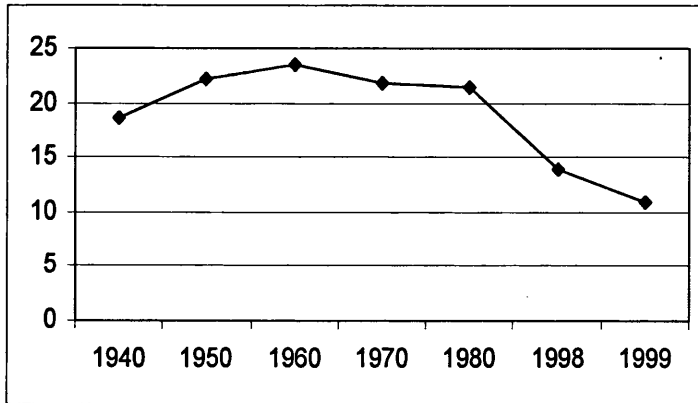
Figure 9.1. Sigma Convergence of Life Expectancy in Brazil, 1940-1999



Source: own calculations

The sigma analysis for this indicator (Figure 9.1) reveals that although for each region there has been an improvement, there have been no major benefits in terms of convergence until the eighties. In fact, disparities within Brazil in terms of life expectancy have increased from 1940 onwards, with a peak in the sixties.

Figure 9.2. Sigma Convergence of Infant Mortality Rates in Brazil, 1940-1999



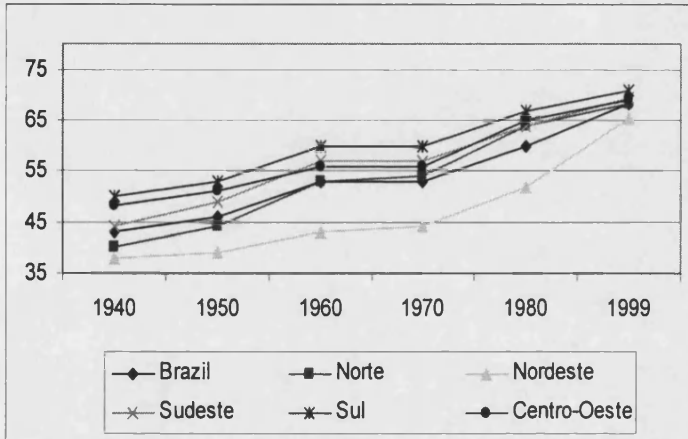
Source: own calculations

For the figures on infant mortality rates (Figure 9.4) there is an improvement for all regions in the period under consideration. The northeast region is also consistently above the average while the south is always below the national average. In fact, all regions are below the average, except for the northeast and the north in certain years. The only period when there is σ -convergence in infant mortality rates is again in the eighties (Figure 9.2), after a significant increase in the sixties. This period of convergence, though, returned the indicator to its previous 1950s level. Thus, the analysis for life expectancy and infant mortality show that although the absolute rates have decreased throughout the whole period (see Figures 9.3 and 9.4 respectively), the sigma indicators have not. In fact, these increased in the fifties and sixties but stayed mostly unchanged (Figures 9.1 and 9.2 respectively).

When performing sigma analysis for urbanisation rates from 1960 to 1995 it can be seen in Figure 9.5 that there was divergence until 1980 and only in the last decade convergence is found. This can be explained because in the forties, the region with the highest growth in urbanisation was the southeast; which had an increase of 21 per cent. In the fifties and sixties, the centre-west had a 40 per cent increase in urbanisation, while in the seventies both the centre-west and the south were the two regions with highest rates. In the period 1980-1995, the northeast increased its urban population more than the centre-west and the south and that explains why the indicator only converged in the last

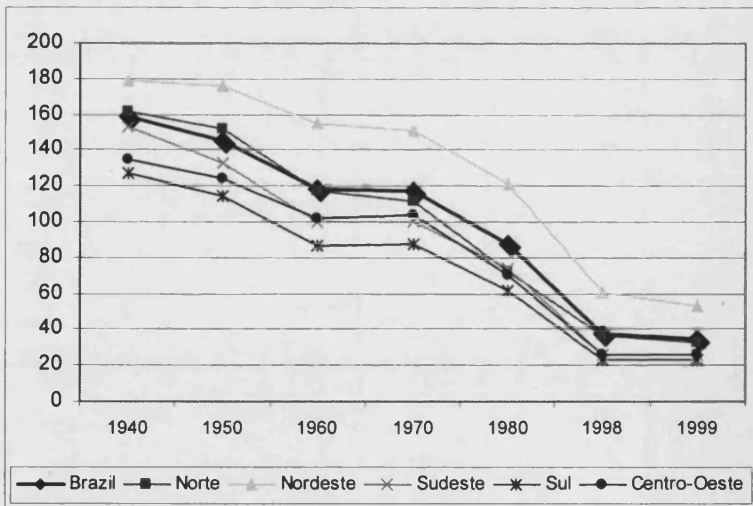
period. Those states with initially higher rates were the ones that had the highest rates until the period 1980-1995.

Figure 9.3. Life Expectancy Rates by Regions, 1940-1999



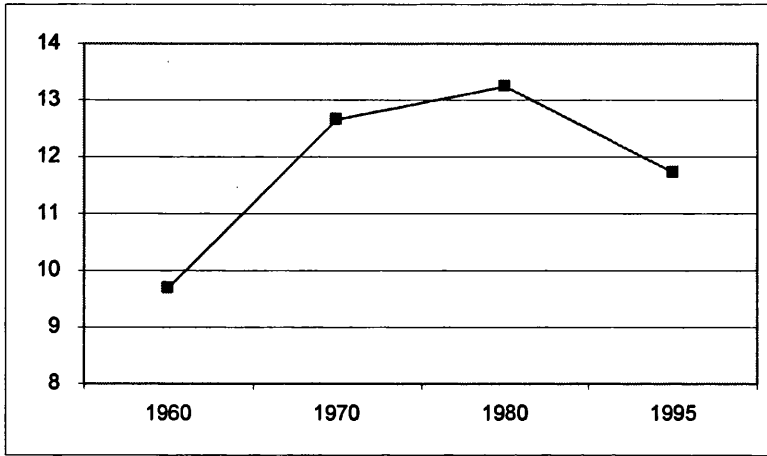
Source: own calculations

Figure 9.4. Infant Mortality Rates by Regions, 1940-1999



Source: own calculations

Figure 9.5. Sigma Convergence of Urbanisation Rates, 1960-1995

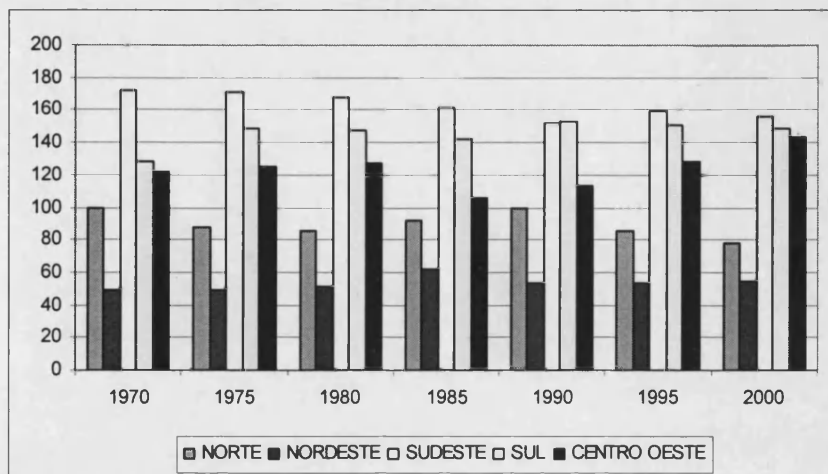


Source: own calculations

Regarding percentages of average national GDP, the extent of the disparities can be seen in Figure 9.6. The northeast, with a large share of national population (30 per cent), accounts only for 13 per cent of the total GDP and therefore has the lowest level of GDP per capita as percentage of national average. Both the southeast and south have a higher than their population distribution of GDP and are above the national average of GDP per capita. (137 and 118 respectively) When looking at Figure 9.6, it can be seen that there have not been any significant changes in the distribution of GDP between the regions since 1970. In fact, since 1985 an increase in the centre west region – and a decrease in the north region – can be seen.

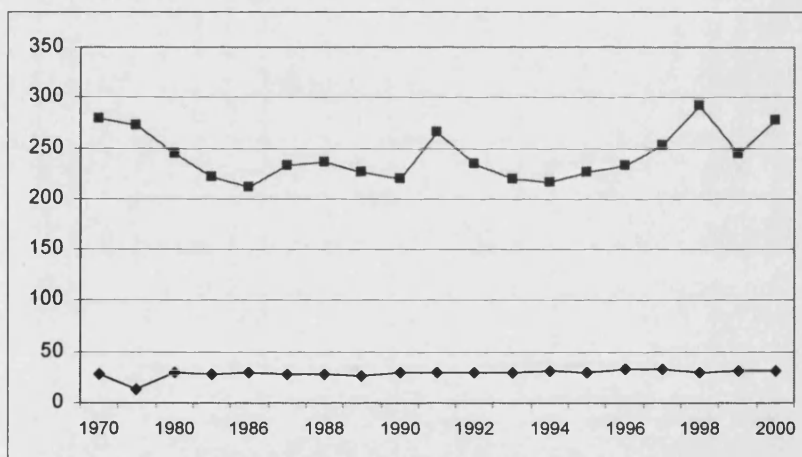
When looking at the maximum and minimum values of percentage national GDP, it can be seen that the minimum has stayed mostly stable throughout the period; that is, those states with minimum percentage national GDP per capita remained around the same level in the period 1970-2000. On the other hand, the maximum levels have slightly decreased until the mid-eighties; then remained stable for the rest of the decade and, after a peak in the early nineties, they decreased to the 1980's levels in the first half of the nineties and increased in the second half until 1998 when they decreased and increased again.

Figure 9.6. Percentages of National GDP by Regions



Source: own calculations

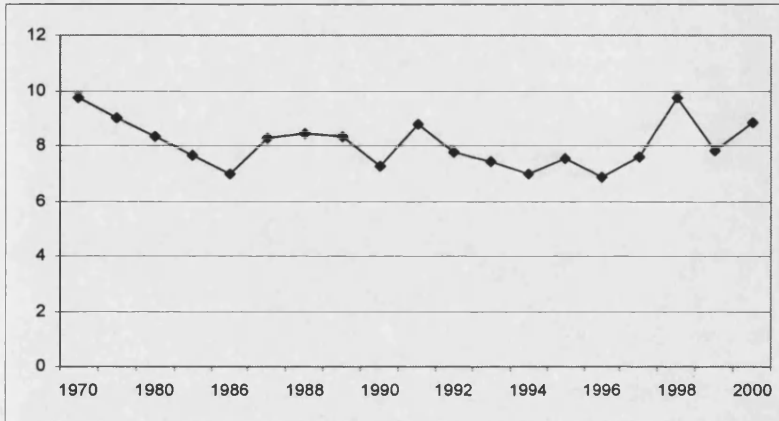
Figure 9.7. Maximum and Minimum state GDP Values in Brazil in percentage of national GDP, 1970-2000



Source: own calculations

Figure 9.8 depicts the ratio of extreme values, in which a clear downward trend can be seen until the mid-eighties and a decrease in 1990 followed by an increase in the following year and finally a decrease of the extreme value indicator until a significant increase in the mid-nineties.

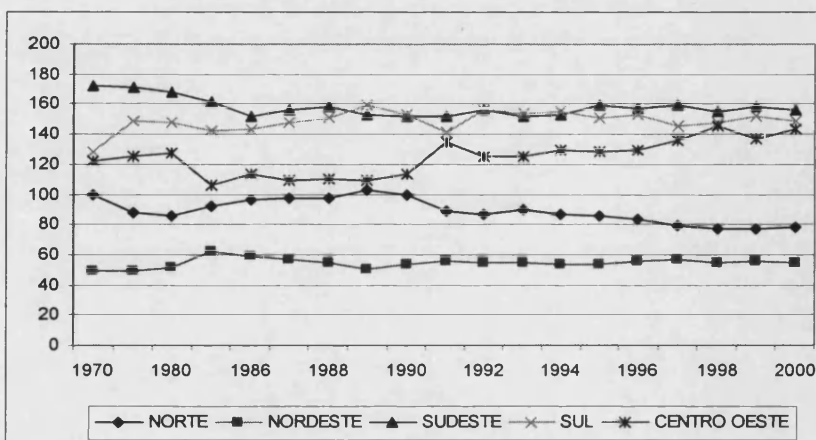
Figure 9.8. Ratio of Extreme Values of state GDP, in percentage of national GDP



Source: own calculations

Figure 9.9 shows the percentage of national income by regions. It can be seen that while the northeast remains mostly stable around 50 per cent of national average; the southeast remains stable but at 150 per cent of average national GDP only showing a slight decrease can be seen until the first half of the eighties. The south region also remains quite stable around 150 percent except for the first decade. In the case of the north and centre-west regions, they start with average or 20 percent above respectively but while the centre south increases to over 140 percent of national average, the north region decreases to 80 percent. This follows the pattern seen above in Figure 9.6.

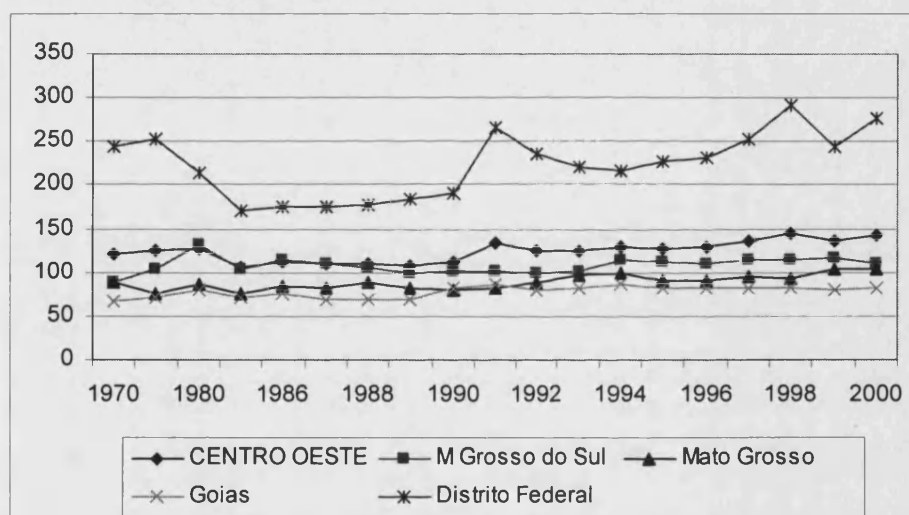
Figure 9.9. Percentage of National GDP per Capita by Regions



Source: own calculations

When looking at Figures 9.10, 9.11 and 9.12 it can be seen that there are some differences regarding the behaviour of certain states in those regions (the south west and northeast are not depicted because they were mostly stable throughout the period). In the case of the centre-west, it can be clearly seen that the increase seen in the nineties in Figure 9.9, reflects the increase in Distrito Federal's percentage of national income at that time. In fact, the line in Figure 9.9 for the centre-west follows quite accurately that for Distrito Federal in Figure 9.10. The rest of the states in the region remained stable in a range of 50 to 150 per cent of national average.

Figure 9.10. Percentage of national GDP in Centre-West

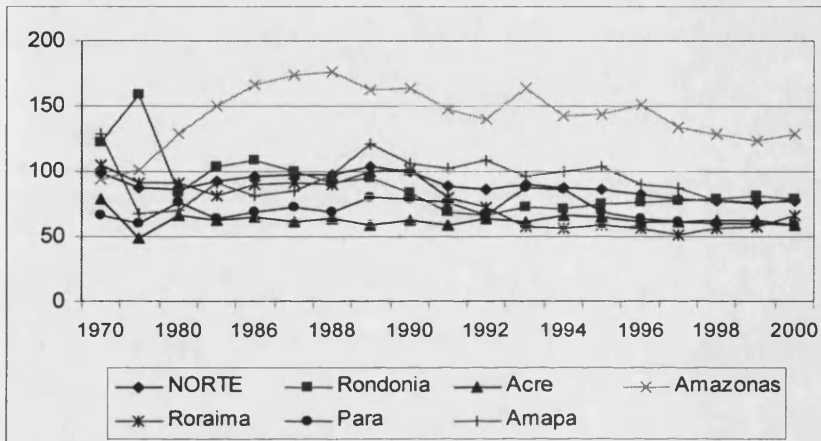


Source: own calculations

In the case of the north, it can be seen that while Acre and Para remained stable just over 50 per cent of average GDP, Amapa presented a sharp decrease in 1970-75 and then gradually increased to to almost reach national average. It then remains relatively stable through the first half of nineties at 80 per cent of average and decreases rapidly afterwards. Despite an initial increase and subsequent sharp decline (which casts some doubts on the data), Rondônia then fluctuates between 50 and just over 100 per cent for the rest of the period. Roraima, on the other hand, remains relatively stable until 1990 at about 70 per cent and then decreases until reaching a minimum of 40 per cent. The only

state in the north region to increase in the period is Amazonas, with a steady increase until the mid-eighties and then remains mostly stable around 50 per cent above national average and although it decreases in the last half of the nineties it still is 30 percent above.

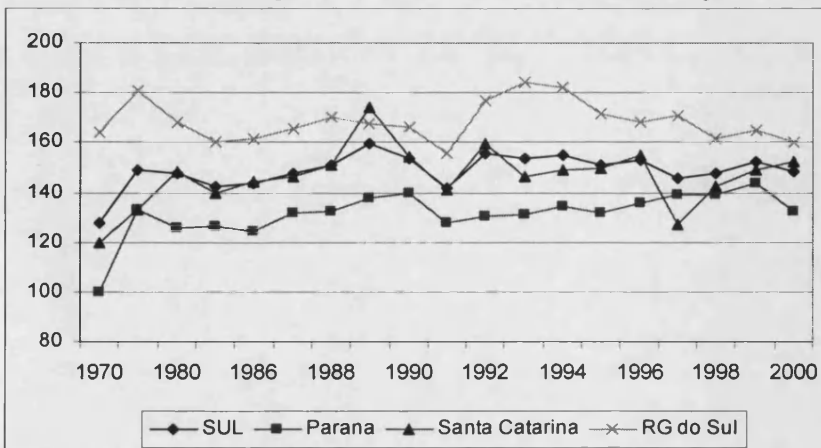
Figure 9.11. Percentage of National GDP in the North region



Source: own calculations

The south region is the most homogeneous since all the states have increased slightly along the period as can be seen in Figures 9.9 and 9.12 with the exception of Santa Catarina which experiences two major jumps – an increase in 1989 and a decrease in 1997.

Figure 9.12. Percentage of National GDP in the South region

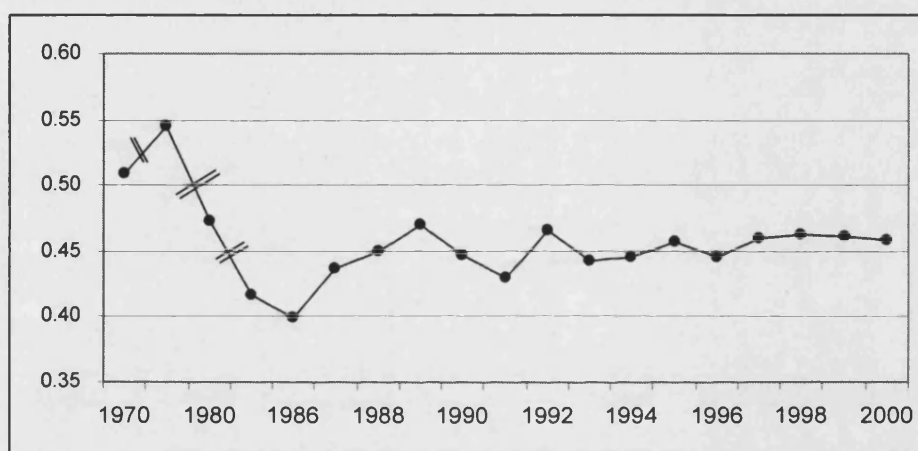


Source: own calculations

4. Sigma Analysis

Figure 9.13 shows the dispersion of the logarithm of the per capita GDP across the five Brazilian regions, as defined in the previous section, for the period 1970-2000. The double lines indicate that the series is not continuous between those years (in the following figures I omit the double lines).

Figure 9.13. Sigma Convergence among the Brazilian Regions



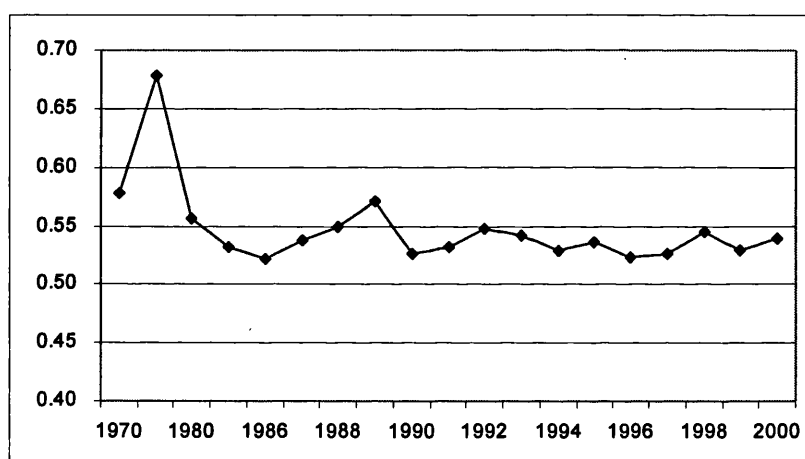
Source: own calculations

It can be seen from the figure that the dispersion ranges from a maximum value of 0.55 in 1975 and a minimum of 0.4 in 1986. The sigma indicator therefore has an overall average rate of change for the period 1970-2000 of 1 per cent. In the period 1970-1975 regions in Brazil benefited from the Brazilian economic miracle; which increased the levels of GDP particularly between 1968-70, and it came to a halt in the mid-seventies. In the northeast, by contrast, severe droughts affected the area in those years and produced stagnation in the first years of the seventies. Also, the economic growth of the sixties and early seventies is often associated to an increase in income concentration. These factors might explain the increase in the indicator for the first half of the seventies.

In the following decade, a sharp reduction in the indicator can be seen, with disparities across the regions decreasing by 24 per cent between 1975 and 1985. The period

comprising the late seventies and early eighties was, by contrast to the previous decade, characterised by the implementation of social policies and wage indexations tending to favour income redistribution. In the last sub-period, as indicated by Figure 9.13, the period 1986-1989, there is an increase in the variability of GDP across regions of more than 17 per cent. This increase was more pronounced between 1986 and 1987, when it reached 9 per cent. This was a period characterised by economic instability and inflation rates were at a maximum. In the first half of the nineties stability was achieved and a decrease in the indicator between 1989 and 1991 can be seen and after the 8 per cent increase in 1992, the indicator remains mostly stable.

Figure 9.14. Sigma Convergence among the Brazilian States



Source: own calculations

When performing a sigma analysis to the states instead of regions some differences can be found (Figure 9.14). First, there is an increase in the overall figures of the indicator, ranging from a maximum value of 0.69 in 1975 to a minimum of 0.51 in 1986, which is expected given the higher variability when including all 27 states. Nevertheless, the years with maximum and minimum values still correspond to those of Figure 9.13. The main difference in the first decade is given by the magnitude of the decrease in the first years. The overall decrease for 1975-1986 is still about 25 per cent but most of that decrease corresponds to the earlier years. In fact, between 1975 and 1980, there is a 20 per cent decrease, while it is only 13 per cent in Figure 9.13. This decrease in the indicator for the

late seventies corresponds, as mentioned, above, to the fact that in the second half of the seventies is a period often associated with decreasing disparities since medium and lower segments of the population obtained real gains while the higher income segments experienced a decline in income.

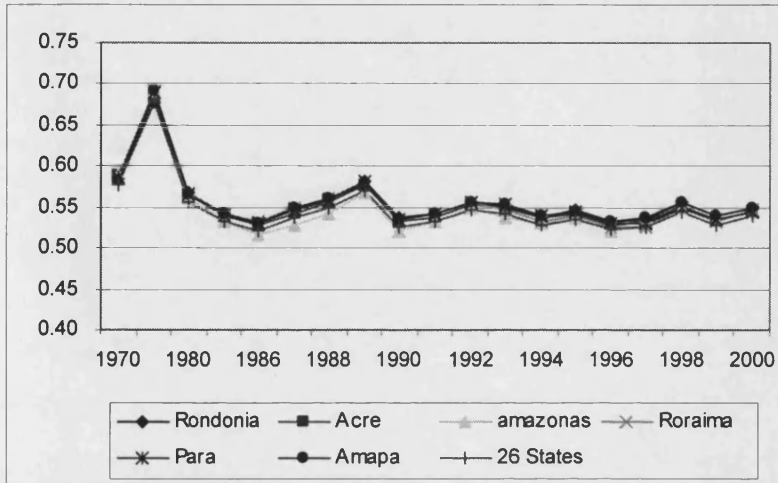
The increase until 1989 also remains, though it is more pronounced, and from then onwards there are no significant changes in the indicator as opposed to Figure 9.13, and the 1989 levels are reached in 1992. As already noted, increasing income concentration, poverty levels and macroeconomic instability characterise this period. After 1986, there were alternating periods of stabilisation and instability while inflation rates were higher than ever in Brazil, particularly in 1988 and 1989, which coincides with a peak in the sigma indicator as well.

During the nineties the indicator remained mostly stable, with slight changes - such as the increase in 1992 and the decrease in 1994 (Figure 9.13). This can also be related to the failure of the Collor Plan in 1992 (which had been implemented in 1990) and the launch of the Plan Real in 1994 that reduced inflation rates to the lowest levels in decades. From 1994 to 1997 the indicator was mostly constant with an increase in 1998.

A further approach has been included within the sigma analysis. This is the same procedure that had been applied to the analysis of the Argentine regions. The regions were divided according to the five groupings detailed in the methodological section. Within each region, each of the states at a time was omitted from the sigma indicator in order to detect any impact. Figures 9.15 to 9.19 show these results.

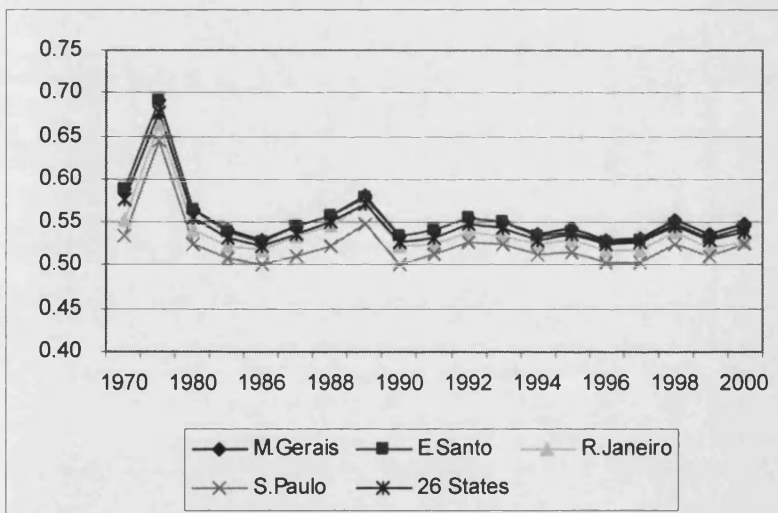
Figure 9.15, corresponds to the north region. The rest of the states follow the same pattern and the only other one that is slightly lower is that corresponding to the curve without the state of Amazonas. For the years 1986 to 1988, 1990 and 1993 the difference is 1 per cent.

Figure 9.15. Sigma Convergence Analysis within the North Region



Source: own calculations

Figure 9.16. Sigma Convergence Analysis within the Southeast Region



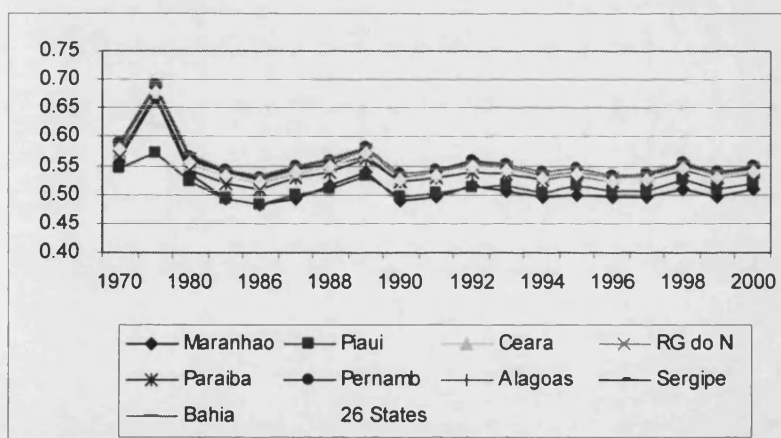
Source: own calculations

Figure 9.16 represents the southeast region. When either Rio de Janeiro or São Paulo are omitted, the indicator decreases. This decrease is present throughout the whole period, and it is larger in the case of São Paulo. It represents a 2 per cent throughout the period except for 1975, 1980, 1987 and 1988 when it is 3 per cent. In the case of Rio de Janeiro, the difference between the curve including all states and that without Rio de Janeiro is 1

per cent for each year except for the period 1986-1990 when there is no difference. The reduction in the sigma indicator when these states are omitted is associated with the decrease in the variability of the indicator once two states with the highest GDP are taken out from the analysis.

In Figure 9.17, the northeast region is considered. The omission of both Maranhão and Piauí make a considerable change in the indicator. This effect is present also throughout the period. The biggest difference, however, is for the state of Piauí, particularly in 1975 when it reaches 11 per cent. For both states, the average difference is 3 per cent with the largest differences between 1985 and 1988 when it reaches 4 per cent. This difference could be associated, as in the case of Rio de Janeiro and São Paulo, with the behaviour of particular states in times of great instability. In this case, when two of the poorest states are omitted the variability decreases.

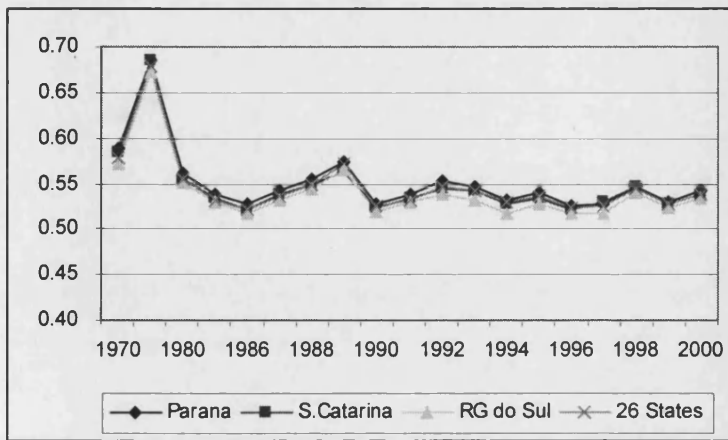
Figure 9.17. Sigma Convergence Analysis within the northeast Region



Source: own calculations

In Figure 9.18, the south region was considered. In this region, there are no noticeable changes when omitting each of the states. The reason for this might be found in that the four states in the south do not present any extreme cases of either 'very poor' or 'very rich' states and therefore their values correspond to the average.

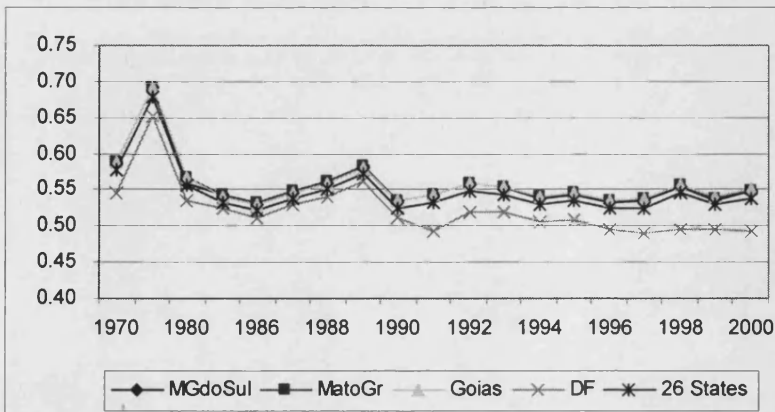
Figure 9.18. Sigma Convergence Analysis within the South Region



Source: own calculations

In the centre-west region, as can be seen in Figure 9.19, the main difference is observed when Distrito Federal is omitted, as expected. The average difference is 2 per cent; this is larger at the beginning of the period and after 1990, but particularly in 1991 when both indicators differ by 4 per cent. This could be related to the fact that in times of growth richer areas are better prepared for reaping the benefits of this growth. The variability including this state increases (or decreases when omitted). It can be seen that in the second half of the nineties the curve without Distrito Federal diverges even more from the others.

Figure 9.19. Sigma Convergence Analysis within the Centre-West Region



Source: own calculations

It is interesting to note that in most of the figures there are some states that when omitted change the value of the sigma indicator. However, that decrease in the indicator is only of magnitude and not of pattern. In the case of Brazil, it is clear that all states behaved in a similar way and that the only differences relate to magnitude. The differences seen in those curves indicate those states further from the average and so, when omitting both the richer and poorer ones, the curve decreases as the 'outliers' are taken out from the indicator. It could be said that all shocks affected the states in the same way. Moreover, there were no regional plans or incentive programmes that had any noticeable effect in any particular state.

This can be compared to what has been seen in the Argentine provinces since the analysis seems to indicate a reality different to that of Argentina. In that country, only one province (Tierra del Fuego) displayed completely different behaviour (Figures 7.13 and 7.18 in pages 193 and 197 respectively); while the rest of the provinces behaved in the same way (except for the Capital Federal, which slightly reduced the indicator – Figure 7.16 on page 195). In the case of Brazil, by contrast, the sigma analysis points at a larger differentiation between 'very' rich and 'very' poor states and therefore when omitting those extreme cases, the indicator decreases.

Ferreira and Diniz (1997) and Schwartzman (1996) both worked on the period 1970-85. Azzoni (1997) criticised both papers not only because that period is too short to draw any valid conclusions but also due to the fact that in that particular period there was strong convergence. He argues that this convergence is not present for other periods and that the σ -convergence analysis shows almost no changes in the period 1985-1995. Azzoni (1997) developed a methodology to merge different series of regional GDP. These data are for 1939, 1947 and 1995 and groups the states into 20 aggregated units.

Azzoni (1997) works with the Theil inequality index and finds there is a trend towards the reduction of this index that can be clearly seen between 1939 and 1995. The minimum value for that series is 0.11 and is given for 1994, while the maximum value of

0.25 corresponds to 1952. Azzoni (1997) agrees that for that period the increases in the Theil index are followed by decreases, but the general trend is that of decline. In Azzoni (2000), inequality, as measured by the Theil index, has high values throughout the period 1939-1995 rising until the mid-fifties and later decreasing until the mid-sixties. From the late-sixties until 1975 he finds a sharp increase and a reversal until 1986. Thereafter, the index is relatively stable. This coincides with the results of the sigma analysis I have performed above as the index decreased from 1975 until 1985 and, following and increase until 1989, maintained a stable trend throughout the nineties (Figure 9.13).

According to Ferreira (1998), the most desirable methodology would be to construct a new series for the whole period, although only institutions such as IBGE have the financial and technical resources to carry out such a task. However, Ferreira does analyse σ -convergence with the long series from Azzoni (1997). He concludes there is σ -convergence since the coefficient decreases from 0.69 in 1939 to 0.48 in 1995. Yet, when applying standard deviation to the natural logarithms of the GDP data, I myself find that the indicator decreases from 0.58 in 1939 to 0.49 in 1995. The indicator corresponding to 1947 has remained unchanged compared to that of 1939. In any case, the 15 per cent decrease in a 56-year-period (1939 to 1995) does not look very promising in terms of regional convergence. The data used here from Azzoni (1997) is presented in Appendix IV.

5. Beta Convergence Analysis

5.1. Absolute Beta Convergence

When performing an absolute β -convergence test to the states in Brazil it can be seen that for the whole period (1970-2000) there is absolute convergence since the coefficient on initial income is negative and t-values are significant though at 10 per cent. It should be recalled that the state of Tocantins has been excluded from the analysis due to lack of data as explained in the previous section. The results can be seen both in Table 9.1 and page 371. As mentioned in previous Chapters, the full econometric readout for Tables 9.1 to 9.7 can be found on Appendix V, page 371 onwards.

Table 9.1. Absolute Beta Convergence in Brazil 1970-2000

2000-1970			
	Coefficient	Std.Error	t-statistic
Constant	-24.35	0.88	-27.82
ln (1970)	-0.17	0.09	-1.96
R-sq	0.14		

Source: own calculations, for more details see page 371

When the analysis is done by decades (Table 9.2 and pages 372 to 374), the results do not show a strong convergence. For the first decade (1970-80), the coefficient on initial income is negative and not significant at either 5 or 10 per cent level of significance plus F statistic is not significant. In the following decade, the coefficient on initial income again has the right sign but is only marginally significant at the 5 per cent level of significance and F statistic is not significant. According to Diniz (1999), the seventies and early eighties saw a period of reversal of polarisation, characterised by the decline in the industrial production of the southeast region between 1970 and 1980. He believes that the crisis of the eighties slowed this deconcentration but the trend towards spreading economic activity to the interior remained.

In the period 1990-2000, F statistic is again not significant and the coefficient displays the right sign but is not significant at either confidence level. Finally, in the sub-period comprising 1990-1996, the coefficient is not significant. Haddad and Hewings (1998) suggest that the policies of the nineties, by increasing international competitiveness are likely to increase rather than decrease imbalances and that they will tend to favour the more developed regions. There is a weaker convergence when comparing the eighties with the seventies, and even weaker between the nineties and the eighties. As already mentioned, Diniz (1999) suggests a relative industrial deconcentration process over the last twenty years that weakened in the eighties and beginning of the nineties given the economic crisis in the country. He then concludes that free trade policies, privatisations, trade agreements such as MERCOSUR and a reduction of government investment in

infrastructure will work against the deconcentration of industry and therefore benefit the most advanced regions.

Table 9.2. Absolute Beta Convergence in Brazil 1970-2000, by sub-periods

1980-1970			
	Coefficient	Std.Error	t-statistic
Constant	2.70	0.73	3.68
ln (1970)	-0.11	0.07	-1.46
R-sq	0.08		
1990-1980			
	Coefficient	Std.Error	t-statistic
Constant	-12.24	0.59	-20.69
ln(1980)	-0.09	0.05	-1.72
R-sq	0.11		
1996-1990			
	Coefficient	Std.Error	t-statistic
Constant	-14.68	0.11	-129.52
ln(1990)	-0.05	0.06	-0.82
R-sq	0.03		
2000-1990			
	Coefficient	Std.Error	t-statistic
Constant	-14.53	0.12	-117.60
ln(1990)	-0.03	0.07	-0.46
R-sq	0.01		

Source: own calculations, for more details see pages 372-374

Given that beta is a necessary though not sufficient condition for sigma to occur, Table 9.3 reports the regression results when the period is subdivided corresponding to the breaks seen in the sigma analysis of the previous section. Two sub-periods will then be considered, the first one from 1975-1985 and the second one from 1986 to 2000. It can be seen that the sub-period 1975-1985 is of absolute convergence since the coefficient on the initial GDP level is negative and the t-value is highly significant. In fact, convergence is stronger than that in Table 9.1 and therefore it is this sub-period that accounts for the

absolute convergence results in that table. For the following sub-period (1986-2000), although the coefficients are still negative, the t-values are not significant. Therefore, the only sub-period in which absolute β -convergence was found is from 1975 to 1985.

Table 9.3. Absolute Beta Convergence in Brazil, sub-periods 1975-85 and 1986-2000

1985-1975			
	Coefficient	Std.Error	t-statistic
ln (1975)	-0.28	0.07	-4.00
constant	4.16	0.71	5.87
R-sq	0.44		
2000-1986			
	Coefficient	Std.Error	t-statistic
ln(1986)	-0.04	0.05	-0.76
constant	-7.93	0.45	-17.45
R-sq	0.02		

Source: own calculations, for more details see pages 375-376

Ferreira (1998) also analysed β -convergence with the longer series presented in Azzoni (1997). I have replicated his analysis and the results can be seen in Table 9.4. It can be seen that there is convergence for the period 1939-1995 and also for the sub-period 1947-1995. In fact, they both show quite similar results. However, when comparing to the sub-period 1938-1947 it can be seen that the coefficient - though negative - is not statistically significant.

Ferreira only compares the two sub-periods 1939-1995 and 1947-1995. but instead of undertaking another regression for the whole period, he compares with the period 1939-1992 and finds that this is not significant, following Azzoni (1996). He attributes these results to the poor performance of the state of Piauí, which according to Ferreira constitutes an outlier in this regression. A dummy variable for the state of Piauí is then included, which is 1 for Piauí and 0 otherwise. In this case the coefficient for initial income is significant, pointing out the existence of convergence when excluding the state of Piauí. This state will be converging to a long-term value lower than the rest of the

states. Azzoni (1996) derives another equation for the period 1947-1992. In this case the hypothesis of convergence is accepted without controlling for the state of Piauí.

Table 9.4. Beta Convergence, Ferreira (1998)

1939-47			
	Coefficient	Std.Error	t-statistic
ln (1939)	-0.06	0.09	-0.76
R-sq	0.03		
1995-1947			
	Coefficient	Std.Error	t-statistic
ln(1947)	-0.25	0.09	-2.71
R-sq	0.29		
1995-1939			
	Coefficient	Std.Error	t-statistic
ln(1939)	-0.30	0.11	-2.65
R-sq	0.28		

It can be seen that the different studies seem to conclude that there has been convergence among the Brazilian states. However, as in the case of Argentina, it is also obvious the importance of the period of time of to allow for the behaviour of certain states that can act as outliers for the tests. Azzoni (2000) points out the importance of the different sub-periods for the consistency of results. When performing a regression for the period 1947-1995 he finds evidence of absolute convergence. However, a regression for 1939-1970, shows no evidence of convergence. According to Azzoni, this indicates that the equalisation of the per capita incomes among states in Brazil is a process that took place mainly after 1970.

This variability in results seems to suggest that there was a continuous and identifiable process of convergence in the late seventies, which was reversed in the eighties. In particular, the eighties were characterised by a series of expansion and recession sub-periods, as has been seen here in both the sigma and β -convergence analyses. According

to Azzoni (2000) there are two periods that constitute outliers, 1955-60 and 1975-80, both associated with strong policy interventions aiming at reducing regional inequalities in the country. This conclusion coincides with the results of both the sigma and the beta analyses in this chapter.

5.2. Conditional Beta Convergence

For the conditional analysis several variables have been considered, as was explained in the methodological section. These included literacy rates for 1970 as well as shares of agriculture and industry as a percentage of GDP for 1970. As can be seen in Appendix IV, the shares of agriculture and industry are not by states but instead grouped into regions and major conglomerates. Once again, full econometric readout can be found in Appendix V.f.

When including education levels at the beginning of the period, it can be seen that the coefficient on initial income is negative and statistically significant. Moreover, the coefficient on literacy rates is positive as expected (i.e. the higher the literacy rates in a particular state, the higher the growth rates) and significant.

When including each region's agriculture and industry participation in GDP, the coefficients on initial income as well as that for agriculture are both significant. In the case of industry, the coefficient is negative and not significant. The R-squared is higher when compared to the unconditional case (Table 9.1). Finally, when all variables are included it can be seen that the only two variables that remain significant are that on initial income and that of agriculture, which is only marginally significant. Both industry and education are not significant at either 5 or 10 per cent level of significance.

Ferreira (1998b) has also worked with conditional convergence and his results indicate that for the period 1970-85, the rate of growth of the GDP per capita in different states varied directly with the rate of investment, secondary school enrolment, and the participation of the workforce. It varied inversely, though, with the level of initial GDP

per capita and the rate of growth of work force in each state. Ferreira highlights the importance of analysing the presence of conditional convergence, but he also points out the lack of detailed regional information in order to be able to test this empirically in Brazil.

Table 9.5. Conditional Beta Convergence, 1970-2000

2000-1970 with education			
	Coefficient	Std.Error	t-statistic
ln(1970)	-0.59	0.18	-3.29
educ	0.02	0.01	2.59
R-sq	0.33		
2000-1970 with agric and industry			
	Coefficient	Std.Error	t-statistic
ln(1970)	-0.26	0.09	-2.76
ind(1970)	-0.00	0.01	-0.41
agr(1970)	0.04	0.02	2.23
R-sq	0.33		
2000-70 with educ, agric and industry			
	Coefficient	Std.Error	t-statistic
ln(1970)	-0.54	0.19	-2.85
ind(1970)	0.00	0.01	-0.06
agr(1970)	0.02	0.02	1.33
ed(1970)	0.01	0.01	1.68
R-sq	0.41		

Source: own calculations, for more details see page 377-379

5.3. Conditional Convergence: Political and Economic Variables

In the case of Brazil I have divided the period into again two different sets of sub-periods. For the macroeconomic variables, the two sub-periods chosen are 1970-1986 and 1987-1994. The former is the period with “low” inflation rates, with an average growth of 95 per cent and a maximum of 200 per cent in 1985 and a minimum of 35 per cent in 1976. The second subperiod, corresponding to high inflation rates, had an average growth of

1,300 per cent, within a range of 220 per cent in 1987 to 2,900 per cent in 1990. The results can be seen in Table 9.6, and it can be seen that a period with lower inflation rates shows convergence while that of higher inflation has a negative but not significant coefficient. When performing a dummy analysis with 1 for high inflation and 0 for low inflation (and adjusting for differences in the time periods) it can be seen that the differences are not statistically significant. Therefore, the hypothesis is rejected.

Table 9.6. Conditional Beta Convergence. Macroeconomic Variables.

1986-1970			
	Coefficient	Std.Error	t-statistic
Constant	-2.84	0.8	-3.54
ln (1961)	-0.19	0.08	-2.33
R-squared	0.18		
1994-1987			
	Coefficient	Std.Error	t-statistic
Constant	-21.18	0.34	-61.74
ln(1975)	-0.07	0.07	1.00
R-squared	0.05		
Dummy var.			
	Coefficient	Std.Error	t-statistic
Constant	-2.84	1.05	-2.71
ln(1970)	-0.19	0.11	-1.78
Dummy	0.04	0.16	0.28
R-squared	1.00		

Source: own calculations, for more details see pages 383-385

In order to test for the impact of political instability on convergence, again the proxy chosen was the military versus democratic periods. The sub-periods then are 1970-1985 (although the military coup in Brazil was in 1964, the data set begins in 1970) and the democratic period 1986-2000. It can be seen in Table 9.7 that there is β -convergence during the military period, with a negative and significant coefficient on initial income. However, for the democratic period, although the coefficient is negative it is not significant. When performing the dummy analysis (using 1 for democracy and 0 otherwise) the results indicate a positive and insignificant coefficient. It must be noted

that the military sub-period coincide with a period of high growth in Brazil, often referred to as the Brazilian economic “miracle” and this might help to explain why the coefficients are not significant.

Table 9.7. Conditional Beta Convergence. Political Variables

1985-1970			
	Coefficient	Std.Error	t-statistic
Constant	3.79	0.84	4.53
ln (1961)	-0.18	0.08	-2.08
R-squared	0.15		
2000-1986			
	Coefficient	Std.Error	t-statistic
Constant	-21.18	0.41	-51.97
ln(1986)	-0.04	0.08	-0.51
R-squared	0.01		
Dummy var.			
	Coefficient	Std.Error	t-statistic
Constant	3.79	0.77	4.92
ln(1970)	-0.18	0.08	-2.26
Dummy	0.14	0.12	1.17
R-squared	1.00		

Source: own calculations, for more details see pages 380-382

Azzoni (2000) concluded that fast growth periods are not only associated with increases in regional inequality but also that the speed of at which inequality varies is associated with the national income variation; i.e. the higher the speed of national growth (decline), the higher the regional divergence (convergence). According to this explanation, in periods of rapid growth richer regions are better prepared to face growing demand than are poorer regions, and, conversely, in periods of decline it will be precisely those richer areas the first ones to be affected. Azzoni performs a set of regressions and concludes that the association between national income growth and regional inequality cannot be rejected.

Diniz (1999) suggests a possible reconcentration of incomes in the centre-south region as a consequence of MERCOSUR. The process of macro spatial industrial deconcentration has stopped and a new regional industrial outline has occurred, combining the polarisation reversal of the metropolitan area of São Paulo with a relative agglomeration in the “polygon” area, which he defines as extending from the central part of Minas Gerais to the northeast of Rio Grande do Sul including the interior of the state of São Paulo. According to Diniz (1999) this indicates that the regions of the northeast and the north that had been the target of regional development policies have not experienced sustainable growth that could then result into significant regional changes.

6. Conclusions

In this chapter, both sigma and β -convergence analysis were applied to the Brazilian states for the period 1970-2000. Three main issues were addressed: First, whether there has been any significant process of convergence among Brazilian states; second, to determine the existence of lagging regions and impact of regional plans; thirdly, what role can be attributed to macroeconomic and political conditions in the process of convergence.

The sigma analysis showed a decrease in the indicator; that is, a decrease in the variability of GDP per capita across Brazilian regions in the first decade. Thereafter, the indicator remained mostly constant until the end of the period under consideration. As has also been seen in the chapter, there is absolute convergence in Brazil for the entire period. However, when dividing the period into ten- and five-year sub-periods, convergence was present in the first decade and, in particular, between the years 1975-80. Therefore, the first conclusion is that there has not been any significant process of convergence among the Brazilian states between 1970 and 2000 except for the period 1975-80. Other authors have reached this same conclusion and considered the sub-period an outlier, as seen in previous sections. The reason for this is that the late seventies was often associated to the expansion of employment through economic growth and relatively

low inflation, together with the implementation of re-distributive social policies and official rules of wage indexation, which favoured redistribution of income.

The late-eighties, on the other hand, was a period characterised by an increase in the concentration of income and an increase in poverty levels. The worldwide recession caused the crisis of the late-eighties. In macroeconomic terms, the eighties were a period of instability and short-run fluctuations. Inflation rates were higher than ever in Brazil. It could also be seen from the sigma analysis that in the years of high inflation and macroeconomic instability, divergence was the rule. In this period, redistributive policies were discarded in favour of macroeconomic programmes to tackle inflation and increase growth.

Finally, in the nineties, stability was reached after the second half with the Plan Real that managed to decrease inflation rates. The sigma analysis also showed stability in the indicator; which was reinforced by the β -convergence analysis. During the nineties, there have not been any improvements regarding convergence and, in fact, neither convergence nor divergence occurred.

It was surprising, though, to see that none of the social variables included was significant and no important conclusions can be drawn from this. However, with respect to social data, some conclusions can be drawn. First, there are significant differences regarding the five regions in Brazil, and these persist to date, particularly in the northeast. Secondly, although infant mortality rates and life expectancy have both improved, there have not been any convergence as measured by the sigma indicator and, in fact, there was divergence during the sixties.

When looking at the impact of both macroeconomic and political variables in the convergence process in Brazil, no conclusive evidence of any link between them was found. This could be explained by the fact the both sub-periods are very similar and that in fact, the military period coincides with that of low inflation rates in Brazil and the Brazilian economic 'miracle'. Better proxies in order to test for this are needed. Also, no

specific states seem to have had a different behaviour than the rest of the states, as happened in the case of Argentina for the province of Tierra del Fuego, which showed a markedly different behaviour from the rest.

It does, therefore, seem that convergence in Brazil has not taken place except for a period in which this was triggered by specific policies (as in the seventies), while divergence has appeared as a result of specific shocks or macroeconomic instability (as in the eighties and early nineties). Moreover, it seems that different authors agree that the policies followed in the nineties, together with MERCOSUR will tend to favour the more developed regions of the country. These results, again, show that when dividing the whole period into different sub-periods, more interesting conclusions can be reached.

Conclusions

The main objective of this thesis has been to study regional economic disparities and the processes that shape regional convergence both within as between countries. In particular, this thesis has focused on Argentina and Brazil in order to draw useful conclusions regarding the impact of regional integration within the MERCOSUR countries. These conclusions, together with those given by the European integration experience, may also be applied to other economically integrated areas, in particular for Latin America.

The issue of convergence is vital not only for individual countries but particularly for integrated areas. The importance of achieving more homogenous national societies is significant not only from a 'humanitarian' perspective but also for solid economic reasons. The more integrated and homogeneous a country is, the larger the internal market and the more linkages in the economy. In areas such as the European Union, where individual countries delegate some of their national policies to a supra-national entity, if inequalities within the union were to persist or enlarge, it may be that belonging to the area is no longer worthwhile. Handing over authority in certain fields implies a cost for each state, and if these costs are larger than the benefits they receive they might logically opt for retrieving their national autonomy. The issue of convergence of regional incomes, both between as within countries is, evidently, crucial.

In fact, at present, regional policy has become one of the most significant topics within European Union's policies and institutional framework. MERCOSUR will, therefore, have to deal with the same issues in the next years before integration deepens, in order to become a successful trade area. As seen in the introduction to this thesis, disparities between member countries of MERCOSUR are markedly significant, more so than any

other disparities within Europe. It follows that if the European Union acknowledged it was slow in dealing with the issue of regional disparities, the countries of MERCOSUR must try to avoid the same mistake.

As mentioned above, despite the significance of this issue, it has often been neglected. Countries around the world increasingly embark on globalisation and the elimination of trade barriers and, in the process, are willing to give up national decisions to a supranational power, disregarding the potential harmful effects for the less advantaged areas. The “automatic” forces of market competition are considered better fit to reallocate resources from poorer to richer areas while the state’s alleged inefficiency is supposedly tampering with development. This is a crucial issue when dealing with integrated areas, since disregards for regional issues, particularly for less developed regions, can arise serious problems that might end working against the objectives of development and equality.

As it was discussed in the theoretical chapter, there does not seem to be consensus among economists as to whether convergence in the neo-classical context is the rule or not. In fact, while neoclassical economists advocate the long run automatic reduction in disparities the regional development economists point out at the need for strong regional policies and highlight the failures of the neoclassical model that will make countries and regions diverge. In this thesis I sought to answer four main questions.

First, I tried to identify how disparities between different areas emerge. Secondly, whether the issue of automatic convergence, as stated by neoclassical economics, holds in practice and in particular for less developed countries and areas. Thirdly, and following the new lines of regional economics research, whether convergence can be affected by external factors, such as macro or political ones, which is another important issue when dealing with less developed countries. Finally, I sought to discuss the significance of regional policies in helping bridge the gap between poorer and richer regions (countries).

This thesis was divided into two parts. Part I referred to the theory and methodology relevant to the study of regional disparities as well as the case study of the European Union. In the introduction to this thesis, I highlighted the importance of the study of convergence for Argentina and Brazil in particular and for MERCOSUR by presenting figures in order to show the wide disparities among the member countries. In these, it could be seen the significant difference in both total GDP and population, where both Argentina and Brazil account for 96 percent of MERCOSUR's total, with Brazil accounting for 79 and 71 percent of population and total GDP respectively. Disparities between these four countries are therefore more than dramatic. When inspecting the disparities within the two largest countries, it was shown that GDP per capita across provinces (Argentina) and states (Brazil) is again more than significant. It follows that the issue of regional differences should not be overlooked.

Chapter 2 presented the theoretical framework and reviewed not only the automatic convergence mechanisms, as stated by the neo-classical model of growth but also failures to the neoclassical model that validate the existence of regional disparities. According to neoclassical economics, disparities would be automatically reduced over time via the equalising effects of the marginal productivity of perfectly mobile factors such as capital and labour. This was also extended to cover integrated areas, not only regions within a country, and therefore according to these models integration would be beneficial. Other studies pointed at several factors that might prevent automatic convergence from taking place, such as cumulative processes, migration, and location economies.

Further, this chapter also briefly reviews the Latin American school of thought and the role of less developed countries in world's development. Historically, countries in Latin America developed linkages to external markets, which shaped their development models. Forced by external conditions, Latin America sought to devise its own development strategy. The problematic faced by Latin American countries after the Second World War gave rise to both structuralism and dependency, which shaped the development strategy of these countries by following an industrialisation strategy based on the substitution of imports.

Chapter 3 described the methodology that was used throughout this thesis, mainly sigma and beta analyses. In addition, chapter 3 presented a review of the main studies of convergence for a wide range of areas if the world but with an emphasis on Latin America. Already in this chapter, one of the main conclusions will appear, the longer the period under study, so convergence is found as reported in studies for the United States, Canada (Sala-i-Martin, 1996) and Sweden (Persson, 1997). However, when dividing into sub-periods, convergence and divergence alternate. Studies included regions in Mexico (Esquivel, 1999), Colombia (Cárdenas and Pontón), Latin American countries (Cáceres and Sandoval, 1999; Dobson and Ramlogan, 2002) and China (Jian et al, 1996; Zhao and Tong, 2000). These findings seem to validate the existence of factors that might temporarily drive the economy to divergence and, therefore, prevent automatic convergence from taking place.

Chapter 4 analysed the case of the European Union over the last fifty years as a case study for other integrated areas. The objective was not only to determine whether an automatic process of convergence had been in place, but also as a framework for a study of less developed countries. In the European Union institutions related to the issue of regional disparities were slow to emerge and it was not until further enlargements added disparities that stronger and more efficient institutions emerged, such as the 1988 Reform of the Structural Funds and the Treaty of Maastricht in 1992.

Convergence in the European Union was certainly not automatic and, as seen in chapter 4, disparities were easier to converge when they were not that wide. However, with the inclusion of other member countries and the increasing disparities in incomes, convergence was harder to achieve. In the case of the European Union, convergence was found for the countries whereas divergence seems to be the rule for the regions. Between countries, convergence was at its strongest during the seventies therefore confirming that at least for the EU, in times of recession (mainly the oil crises of the seventies) convergence occurs. This indicates that the more developed regions within the union were those most affected and therefore helped in closing the gap. Automatic convergence

was not present and as indicated by this thesis, periods of convergence follow periods of non-convergence.

Part II gave a brief review of disparities in MERCOSUR and Argentina and Brazil in particular. Chapter 5 briefly reviewed the case of MERCOSUR and tried to give some preliminary conclusions. Disparities between the four member countries are vast, as mentioned in the introduction to this thesis and Chapter 4, in terms of population, GDP, and other socio-economic indicators. It was seen that the countries of MERCOSUR exhibited convergence for the whole period 1940-1995 but this was only particularly strong for the decade of the seventies. The period 1990-1995 was a period of clear divergence. This can be explained by the lower growth of the two countries with relative highest incomes at the beginning of the period (Argentina and Uruguay) while Brazil and Paraguay exhibited higher growth rates. Conversely, in the first half of the nineties, the opposite was true, with Argentina and Uruguay again exhibiting higher growth, and so divergence was the rule. In this instance, the decade of the seventies favoured convergence, as in the case of the European Union. Therefore, for the MERCOSUR as a whole, external shocks such as the oil crises affected those countries with higher initial incomes most. Also, automatic convergence did not take place, and as in the European Union period of convergence and divergence alternate, signalling to a lack of automatic mechanisms and more to a link with policies and external factors.

Both Chapters 6 and 8 review the history of Argentina and Brazil respectively from colonial times in order to identify the origins of the present “divergence” map as seen in the introduction to this thesis, and the role that national development strategies played for convergence dynamics. Both chapters also included a brief description of certain regional policies in both countries.

In both Argentina and Brazil, the colonial legacy of regional concentration seems to have had a significant impact on disparities. Historical models of development, then, appear to be significant in the origin of disparities, albeit not static but dynamic, with export-led growth and later import substitution industrialisation reinforcing them. Both the Spanish

and Portuguese colonisations were centred in land with agricultural and mining potential. Important mining regional economies flourished in Minas Gerais in Brazil and in Potosí, while food and mule markets were centred in the northwest of Argentina. As these countries strengthened their links with external markets as suppliers of raw materials and foodstuff, significant changes in the internal structure of these countries occurred. In the case of Brazil, this implied the decline of the northeast and the growth of São Paulo and surrounding areas. In Argentina, the decline of the economies of the northwest gave way to the prosperity of the pampa surrounding Buenos Aires.

In the second half of the century, countries sought for an alternative in order to replace the dependence on export-led growth and reduce the vulnerability to external shocks. An inward-looking industrialisation process was followed and, though successful in many respects, for some countries it contributed to reinforcing regional concentration. Both in Argentina and Brazil, the main centres of the agro-export models - São Paulo and Buenos Aires - were also the centres of the industrialisation process. Contrary to neo-classical maxims, the massive migration in both countries in the sixties was directed to the urban centres and therefore reinforced the concentration around the consumption markets.

Chapters 7 and 9 analysed the regional data for Argentina and Brazil in order to test for the presence of convergence among the regions. Disparities have not decreased significantly and again, as in the case of the European Union and MERCOSUR, periods of convergence are followed by periods of non-convergence. Although a definite link between macro and political variables could not be made, the evidence points out at a tentative link. For both Argentina and Brazil the longer periods show convergence, though this is only weak convergence. In the case of Argentina the period 1961 to 1973 was one of convergence and so is 1989-1995. The other sub-periods do not display any convergence. For Brazil, the only period that displays convergence is 1975-1985 while the others do not converge. Regarding the sigma convergence in both countries, the main conclusion is that while for the case of Argentina one province has a different behaviour than the rest, in Brazil all states follow the same pattern and only differ in magnitude.

In order to answer the first of our main issues on how disparities emerge, disparities are significant in those countries with a vast array of resources across regions. This, together with historical patterns of development, as in the case of Argentina and Brazil in particular and other countries throughout Latin America in general, determined a divergence map much more significant than developed countries in general and in particular for the member countries in the European Union. In Latin America, as seen in the thesis, development not only originated certain disparities (with the focus on the export of primary product) but also contributed to reinforce existing ones (when industrialisation took place mostly in the already developed centres). This reinforcement came in the form of industrialisation effort centralised around consumption centres and migration from the interior attracted to those booming regions.

In response to the second main issue addressed in this thesis – whether disparities would be reduced automatically - it was seen that according to classical economic theory, disparities within countries (and economic areas) should decrease automatically over time via factor mobility and decreasing marginal returns. It was seen throughout the thesis that this convergence did not happen, either for countries or for economic areas. The longer the period under consideration, convergence is found. However, when dividing the period into smaller sub-periods, convergence and divergence seem to alternate for all areas under study in this thesis.

Contrary to neo-classical theory, the poorest and richest areas both in Argentina and Brazil have not converged, at least not significantly, as discussed in Chapters 7 and 9. Only for the period 1961-1973 and 1975-1985 respectively there seems to be significant convergence. The same seems to be the case for the countries of MERCOSUR, where only a few sub-periods were of convergence, such as the seventies, while the nineties is of divergence. In the European Union, disparities persist, not only between the countries but also within regions, still after fifty years of integration. In the wake of the new additional member countries from Eastern Europe to the European Union, the institutional

framework is being revised in order to take into account disparities within the new enlarged Union.

The third question that I have sought to address throughout this thesis is the role of macroeconomic conditions and political instability, to find possible links between period of convergence (divergence) and economic and political stability (instability). Even in the case of the European Union there is some evidence of reduction in the speed of convergence in times of economic slowdown, and political turmoil, such as in the case of Greece and Spain until 1975, seems also to have affected the process of convergence. For Argentina and Brazil, both political and macroeconomic variables seem to have a link with σ -convergence. However, when performing formal tests and doing beta-convergence analyses it was seen that only in the case of Argentina did political variables have an impact on convergence, while macroeconomic variables did not offer conclusive evidence. In the case of Brazil, neither political nor macroeconomic variables seem to have had any impact, and there might be a counterbalancing effect given that military periods and macro stability almost coincide. Better proxies and further study will be needed in order to find conclusive evidence.

It then follows that if 'automatic' convergence is hard to achieve (i.e. sub-periods of convergence and divergence alternate) and, given that there are factors that might be responsible for this (possibly macro and political factors among others), policies to correct such imbalances and disparities become more relevant. There is, of course, the issue of whether regional policies should primarily be in charge of central governments, or in the case of integrated areas left in hands of supra-national entities. Although the latter is beyond the scope of this thesis, it must be remembered that in the EU, even once regional polices became a significant pillar within the EU structure, convergence was hard to achieve, particularly within regions. Therefore, in order for convergence to happen, coherent and efficient regional policies with a medium and long-term perspective need to be put in place in order to bridge the gap between poorer and richer areas both within as across countries.

The scope of action for Latin American governments to remove inequalities is palpably limited, given the links between the local groups of power and the models in place. As the dependency theorists explain so, social and political barriers can also lie behind the persistence of disparities in these countries. In the cases of Argentina and Brazil policies to correct imbalances were either ineffective or of limited impact. One has, then, to be cautious when taking the case of MERCOSUR and the possible impact of a deepening integration on disparities. Considering the lack of supra-national institutions in the area, divergence will most likely be the rule. Regional policies should therefore, assuredly be included in MERCOSUR's agenda.

There is therefore a need to redefine the role of the national governments in providing consistent regional policies in order to promote a balanced growth within the individual countries in line with the integration between the countries. The importance of these policies is even more significant when considering less developed countries of Latin America and their historically determined dependence and development patterns. MERCOSUR is not likely to develop as an area where disparities will be automatically reduced. In fact, it is likely to promote further divergence with concentration on the main centres of economic activity, mainly in both Argentina and Brazil. The losers of this arrangement will be the poorer areas in both countries, as well as those from the other countries. If MERCOSUR is to become a successful economic area, balanced development of all regions within its countries is essential and regional policies should be a main concern before embarking on further integration. The neoclassical consideration of the state as inefficient and prejudicial should be changed and an active role of the states within MERCOSUR should be both encouraged and sought.

When extending these conclusions to a possible Free Trade Area of the Americas, the issue of disparities becomes even more relevant, given the wide variety of countries involved in this initiative. The undesirable outcomes of integration processes should be avoided at all costs, given Latin America's already significant and unresolved poverty and regional inequalities issues. Regional policy must, again, be a top political priority if integration is to succeed, both at the national as well as a supranational level.

APPENDIX I

The European Union

I.a. Regional Policy in the EU: A Summary

The policy instruments for regional policy in the EU can be summarised as follows:

- **Structural Funds**
 - European Social Fund (ESF) - Treaty of Rome (1958) - about 30 per cent of Structural Funds
 - European Agricultural Guarantee Guidance Fund (EAGGF) - Treaty of Rome - Guidance almost 17 per cent of Structural Funds
 - European Regional Development Fund (ERDF) - established in 1975 - 50 per cent of Structural Funds
 - Financial Instrument for Fisheries Guidance (FIFG) - created in 1994 - 3 per cent of Structural Funds
- **Cohesion Funds** - established by the Treaty of Maastricht, in force since 1993
- **Other**
 - European Coal and Steel Community - Treaty of Paris (1951)
 - European Investment Bank - Treaty of Rome (1958)
 - New Community Instrument (NCI) - since 1977 granting specific loans to SMEs managed by EIB
 - Integrated Development Operations (IDO) - geographically limited aid
 - Integrated Mediterranean Programmes (IMPs), aid for France, Italy and Greece since 1986. Originated as compensation for 1986 enlargements.

These funds are implemented through two main mechanisms

- Regional development plans, through Community Support Frameworks (CSF) for each region or Single Programming Documents (SPD).
- Community initiatives - focusing on particular areas.

There are two advisory bodies for regional policies:

- Economic and Social Committee - Treaty of Rome
- Committee of the Regions - Treaty of the EU

After the creation of the ERDF in 1975, the initial EC regional policy was based on a financial instrument (ERDF), and complemented by other funds and institutions such as EIB, ESF, ESC, EAGGF- Guidance and ECSC. The fund was distributed according to shares and negotiated

quotas guided by the Council, without major intervention from the Commission. However, aid was limited both in scope and resources (this constituted a 4.8 per cent of the EC budget in 1976). In 1979, a first reform was made, whereby 5 per cent of the fund was made into a non- quota section and therefore the Commission had more control over this. However, 95 per cent of the fund remained in control of Member States and quotas still applied. In 1984, there was a further reform of the fund and Project and Programme assistance replaced the previous system of quotas. The funds were channelled through an indicative share or '*fourchette*' whereby the lower indicative figure would be granted and each Member State should convince of the need for financing more projects. (Glöckler, G. et al, 1998)

The 1988 reform of the Structural Funds is still guiding regional policies nowadays. It introduced a shift in the sense that took into account regional authorities and therefore policies were more regional oriented. From 1975 until 1988 the funds of the ERDF increased from 4.8 per cent to 8.1 per cent of Community budget. In Agenda 2000, more than 30 per cent is planned for the period 2000-2006. (Lopes Porto, 1997; Eurostat)

There are five principles that guide the Structural Funds.

- Concentration, on a set of priorities and objectives. Thus, the regions are classified in NUTS (*Nomenclature des unités territoriales statistiques*) and can be eligible according to the objectives.
- Programming, referring to the elaboration of plans rather than single projects by establishing the Community Support Programme or Single Programming Document.
- Partnership refers to a closer co-operation between the Commission and the national, regional and local authorities.
- Additionality, requiring that Community funds do not overlap with national investments, and that they must complement not substitute each other. Regional policies should not subsidise incomes and simply offset inequalities in standards of living, but instead help to equalise production conditions through investment programmes
- Monitoring, as all regional policy activities are appraised and monitored during the operation and evaluated afterwards. (Glöckler, G. et al, 1998)

Moreover, there were five Objective policies introduced in 1988. During the 1990s some modifications were introduced, but overall it remained unaltered. The main modifications were to include the East German *Länder* as Objective 1 regions after re-unification and to include a new

Objective 6 to account for new entrant countries (Austria, Finland and Sweden) (Glöckler, G. et al, 1998) The EIB intervenes in all six objectives.

- Objective 1: include those regions whose development is lagging behind the rest of the Community. The standard for eligibility was having a GDP per capita of less than 75 per cent of the Community average. All Structural Funds deal with this regions, ERDF in particular, and also the Cohesion Funds.
- Objective 2: regions affected by industrial decline and restructuring. The eligibility was determined according to quantitative labour-market criteria: unemployment rates (three-year average unemployment above the EC average), share of industrial employment in total employment (above the EC average since 1975), and those affected by a decline in industrial or fisheries employment since 1975. ERDF, FIFG and ESF apply to this objective, although the ESF has a significant role.
- Objective 3: to combat long-term unemployment and facilitate the young professional's insertion in the labour market and of those socially excluded. ESF is the only mechanism that is entitled to deal with this.
- Objective 4: concerns the adaptation of workers to industrial shifts and evolution of productive system. ESF is the only one for this objective, which was added in 1993.
- Objective 5a: promoting rural development through helping in the adjustment of agricultural structures and therefore the EAGG-Guidance is involved.
- Objective 5b: to promote rural development and structural adjustment in rural areas. Not only the EAGG-Guidance, but the ERDF and the ESF deal with this objective.
- Objective 6: to promote the development of those areas with very low density of population (below 8inh/sq km). This was added in 1995 focusing on the Arctic regions of Sweden and Finland. All Structural Funds except the Fisheries Financial Instrument apply to this objective.

Objectives are then classified into regional (1, 2, 5b and 6) and horizontal (3, 4 and 5a) (Hall, 1994; Glöckler, G. et al, 1998)

As mentioned before, Agenda 2000 proposed a greater efficiency of the Structural Funds by increasing concentration. This concentration refers to reducing the number of objectives, the geographical area that benefits from Objectives 1 and 2 by 10-15 per cent and financially by

devoting two-thirds of the resources of the funds to objective 1 regions. The former seven objectives will be reduced to three.

- Objective 1: regions whose development lags behind (75 per cent of average GDP per capita) including former Objective 6 regions with the same GDP percentage. About 20 per cent of the population would benefit. All Structural Funds would be involved in this objective.
- Objective 2: for areas undergoing economic and social conversion or structural problems. About 18 per cent of the EU population would be covered by this objective and all funds will be directed to it.
- Objective 3: to support the modernisation and adaptation of education, training and employment. Only those areas not covered by the other objectives will apply and the ESF will be the only instrument to deal with this objective.

Also, the number of initiatives was reduced to four:

- INTERREG, stimulating cross-border, trans-national and inter-regional co-operation
- LEADER, promoting rural development
- EQUAL, combating discrimination and inequality in access to labour markets
- URBAN, economic and social restructuring of towns, cities and suburbs in crisis.

I.b. European GDP data (GDP in millions - for 1960 in domestic currencies; afterwards in ECU). Source: Eurostat

EEC-6 (1960-1995)

	1960	1973	1988	1995
GERMANY	302,550.0	273,190.0	979,300.0	1,846,351.0
Schleswig-Holstein	9,758.0	9,433.0	35,300.0	58,737.0
Hamburg	16,190.0	12,761.0	39,500.0	68,032.0
Bremen	5,088.0	4,333.0	13,000.0	21,343.0
Niederachsen	31,451.0	27,805.0	95,000.0	166,187.0
Nordrhein-Westfalen	92,988.0	76,461.0	252,100.0	412,676.0
Hessen	25,686.0	25,275.0	101,900.0	184,087.0
Rheinland-Pfalz	15,367.0	14,579.0	50,900.0	79,869.0
Baden-Wurtemberg	42,707.0	43,651.0	163,000.0	265,755.0
Bayern	45,462.0	45,104.0	178,200.0	309,216.0
Saarland	5,470.0	4,175.0	14,500.0	24,032.0
Berlin (West)	12,383.0	10,199.0	35,900.0	74,623.0
	1960	1973	1988	1995
FRANCE	226,745.2	185,782.0	746,000.0	1,169,074.0
Reg.Parisienne/ I.de France	60,648.9	51,921.0	209,400.0	342,456.0
Bassin Parisien	38,551.0	31,982.0	122,300.0	187,457.0
Nord	16,350.5	12,709.0	41,500.0	66,957.0
Est	20,546.7	16,571.0	60,200.0	94,188.0
Ouest	24,617.4	19,380.0	81,600.0	128,416.0
Sud-Ouest	20,750.7	15,204.0	66,800.0	103,591.0
Centre-Est	24,459.1	21,224.0	82,700.0	129,379.0
Mediterranee	20,820.9	16,323.0	74,000.0	116,629.0
	1960	1973	1988	1995
NETHERLANDS	37,682.0	45,116.0	185,000.0	304,148.0
Noord	3,729.9	4,864.0	18,600.0	31,214.0
Oost	6,262.3	7,543.0	31,400.0	55,335.0
West	19,268.5	23,558.0	94,600.0	153,291.0
Zuid	8,421.3	8,861.0	38,200.0	6,838.0
	1960	1973	1988	1995
ITALY	19,286.0	122,301.0	517,600.0	831,409.0
Nord-Ovest	3,103.0	18,216.0	65,500.0	101,721.0
Lombardia	4,147.0	26,075.0	103,600.0	167,311.0
Nord Est	2,201.0	14,485.0	65,500.0	114,758.0
Emilia Romagna	1,633.0	10,225.0	45,100.0	73,116.0
Centro	1,924.0	12,705.0	56,100.0	87,921.0
Lazio	1,827.0	11,168.0	51,500.0	83,331.0
Campania	1,255.0	7,861.0	11,700.0	19,776.0
Abruzzi-Molise	370.0	2,396.0	35,600.0	53,855.0
Sud	1,308.0	9,186.0	40,300.0	64,360.0
Sicilia	1,130.0	7,450.0	31,500.0	47,753.0
Sardegna	387.0	2,534.0	11,100.0	17,508.0
	1960	1973	1988	1995
BELGIUM	506,236.0	34,567.0	122,800.0	208,954.0
R.Flamande/ Vlaams Gewest	229,093.0	19,100.0	71,600.0	124,639.0
R.Wallonne/ Waals Gewest	163,152.0	9,661.0	31,400.0	54,612.0
R.Bruxelloise/ Brussels Gewest	113,991.0	5,807.0	19,800.0	29,703.0
	1960	1973	1988	1995
LUXEMBOURG	23,185.0	1,500.0	6,200.0	13,222.0

EEC-9 (1973-1988)

	1973	1988	1995
UNITED KINGDOM	134,382.0	450,600.0	846,411.0
North	6,859.0	22,000.0	38,559.0
Yorkshire and Humberside	10,206.0	33,400.0	65,936.0
East Midlands	7,740.0	26,900.0	556,083.0
East Anglia	3,848.0	13,200.0	30,656.0
South-East	47,803.0	154,000.0	305,851.0
South-West	8,863.0	31,200.0	67,151.0
West Midlands	11,849.0	34,300.0	71,203.0
North-West	15,847.0	47,300.0	82,724.0
Wales	5,744.0	18,700.0	34,861.0
Scotland	12,266.0	38,100.0	74,090.0
Northern Ireland	3,106.0	9,900.0	19,297.0
	1973	1988	1995
IRELAND	4,582.0	26,000.0	49,360.0
	1973	1988	1995
DENMARK	21,622.0	80,400.0	129,378.0

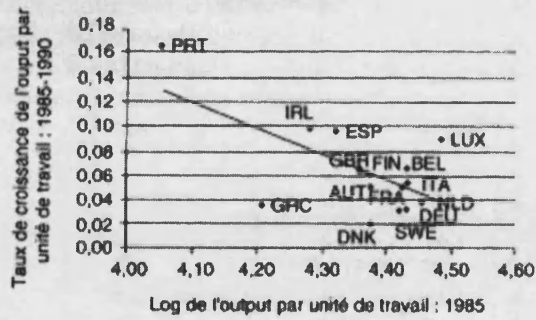
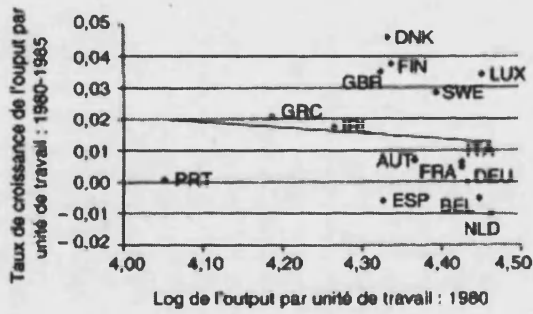
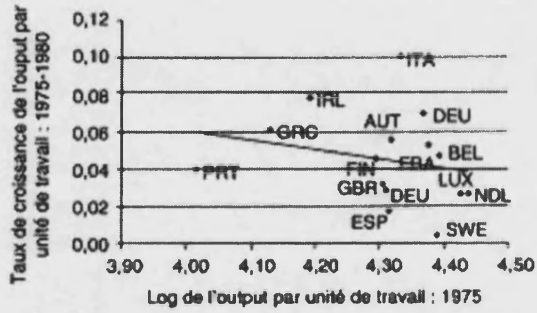
EEC-12 (1988-1995)

	1988	1995
GREECE	39,300.0	87,760.0
Voreia Ellada n/a		27,179.0
Kentriki Ellada n/a		19,011.0
Attiki n/a		32,856.0
Nisia n/a		8,715.0
	1988	1995
SPAIN	292,300.0	430,877.0
Noroeste	28,600.0	39,896.0
Noreste	37,000.0	52,602.0
Madrid	44,300.0	68,499.0
Centro	34,300.0	48,776.0
Este	89,200.0	135,121.0
Sur	47,100.0	69,344.0
Canarias	11,500.0	16,639.0
	1988	1995
PORTUGAL	28,000.0	80,000.0
Continente	28,000.0	77,074.0
Acores ..		1,380.0
Madeira ..		1,546.0

I.c. Evolution of Disparities in the EU

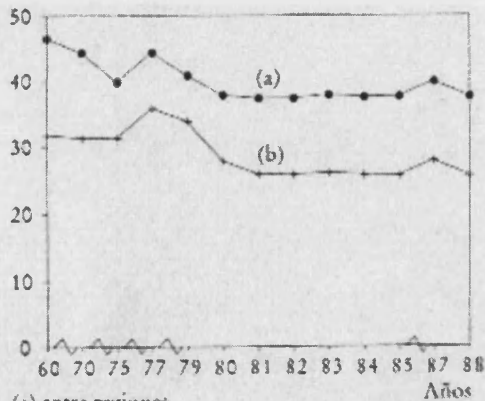
Absolute Convergence among the EU countries

Source: Tavèra (1999)



Evolution of Disparities in the EEC (1960-1988) weighted coefficient of variation, in ECU

- a) among regions
- b) between countries

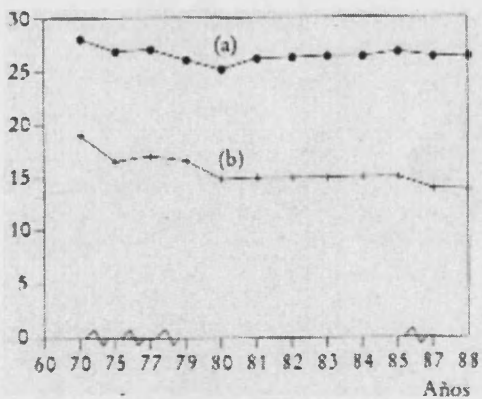


(a) entre regiones.
(b) entre los países miembros.

Source: Cuadrado Roura, 1991

Evolution of Disparities in the EEC (1970-1988) weighted coefficient of variation, in PPP

- a) among regions
- b) between countries

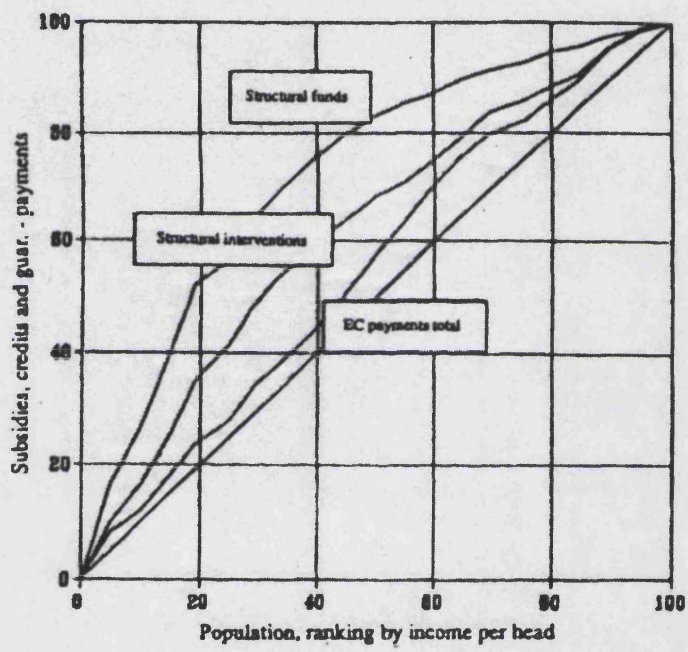


Source: Cuadrado Roura, 1991

I.d. Regional Impact of EU Policies

Figure 1

**Regional concentration of EC payments
(1986-87, EC-12)**



Source: European Commission (1997)

Figure 2

CONCENTRATION OF ERDF INVESTMENT GRANTS (1989-1991)

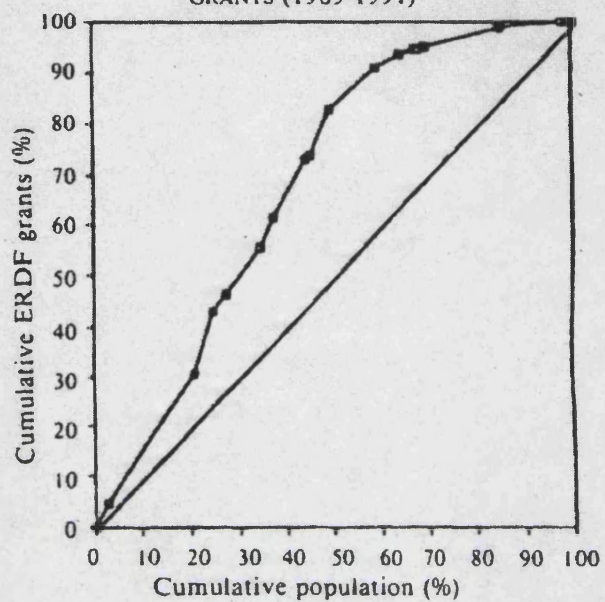
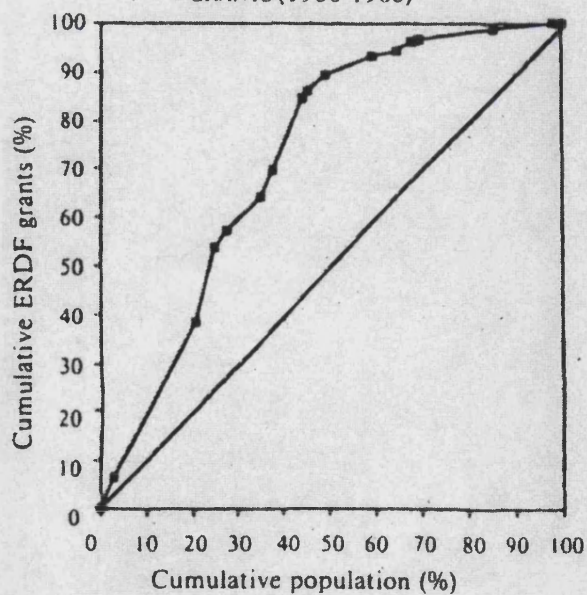


Figure 3

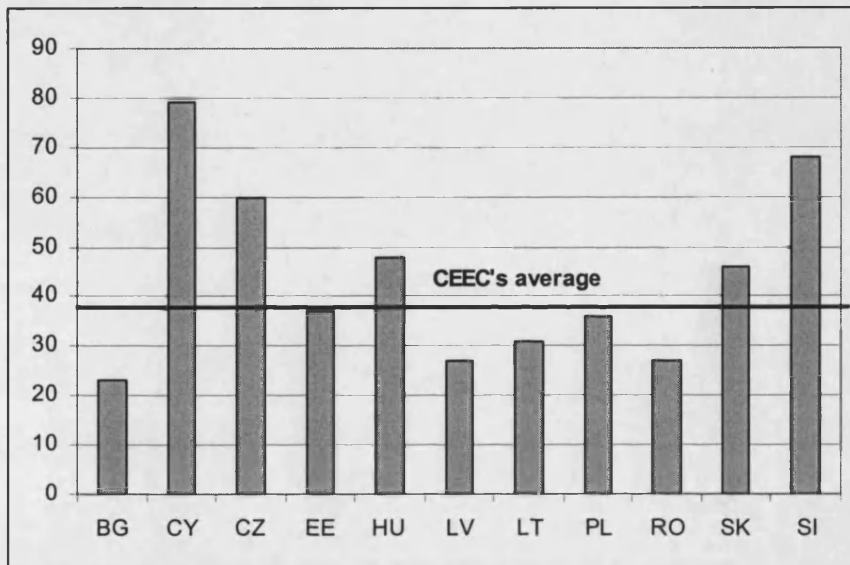
CONCENTRATION OF ERDF INVESTMENT GRANTS (1986-1988)



Source (Figs 2 &3): Villaverde Castro (1993)

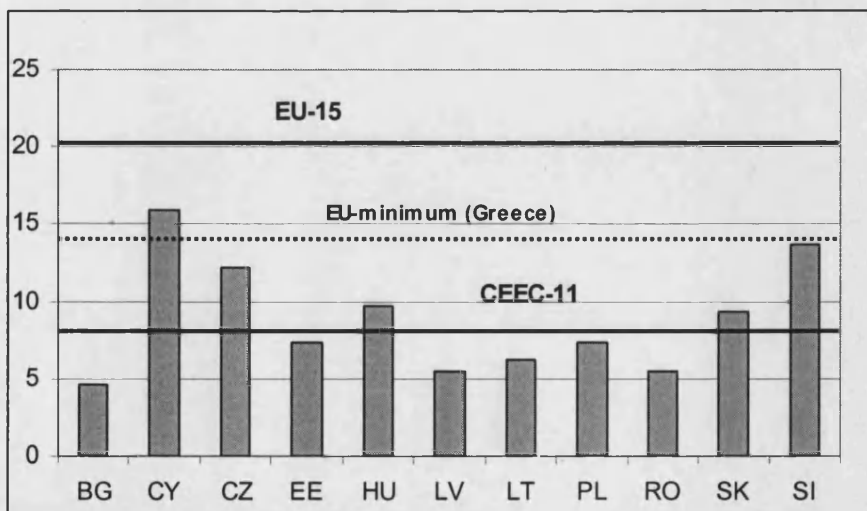
I.e. **The Eastern European Economies**

GDP per Capita, 1998 (EU15= 100)



Source: Eurostat (2000), own calculations

GDP per Capita, 1998 (in thousand PPS)



Source: Eurostat (2000), own calculations

I.f. **Impact of Successive Enlargements in the EU**

Based on 1995 data	Increase in area	Increase in population	Increase in total GDP	Increase in per capita GDP	Average per capita GDP (EUR6=100)
EUR 9/ EUR 6	31%	32%	29%	-3%	97
EUR 12/ EUR 9	48%	22%	15%	-6%	91
EUR 15/ EUR 12	43%	11%	8%	-3%	89
EUR 26/ EUR 15	34%	29%	9%	-16%	75

Source: Agenda 2000 (1997b)

APPENDIX II

MERCOSUR

II.a. Total GDP in the MERCOSUR countries at factor cost using 1970 prices, 1940-2000 (in millions)

	Argentina	Brazil	Uruguay	Paraguay
1940	9035	6515	1273	306
1950	13113	11559	1867	410
1960	17577	23566	2295	521
1970	28686	42885	2676	813
1980	39746	98201	3398	1804
1990	36280	115164	3558	2411
1995	47519	131202	4194	2810
2000	55348	157257	4895	3231

Source: Astorga and FitzGerald (1998), World Bank website

II.b. Population in the MERCOSUR countries in thousands, 1940-2000

	Argentina	Brazil	Uruguay	Paraguay
1940	14,169	41,524	1,974	1,068
1950	17,150	53,444	2,195	1,408
1960	20,616	72,594	2,503	1,749
1970	23,962	95,847	2,705	2,250
1980	28,114	121,286	2,869	2,896
1990	32,546	148,477	3,094	4,277
1995	34,587	161,790	3,186	4,986
2000	37,000	170,000	3,300	5,300

Source: Astorga and FitzGerald (1998), World Bank website

II.c. Illiteracy Rates in the MERCOSUR countries, 1900-1995 (as percentage of population age 15 and over)

	Argentina	Brazil	Uruguay	Paraguay
1900	48.70	65.30	40.60	68.60
1910	39.60	65.10	35.20	61.70
1920	31.80	64.90	25.50	54.90
1930	25.10	60.50	23.90	48.00
1940	18.30	56.10	18.70	40.70
1950	12.40	50.60	14.30	34.20
1960	8.60	39.70	10.50	27.20
1970	7.40	33.80	7.50	21.00
1980	6.10	25.50	5.40	14.00
1990	4.20	20.60	3.70	10.30
1995	3.80	16.70	2.70	7.90

Source: Astorga and FitzGerald (1998)

II.d. Life Expectancy in the MCS countries 1920-1995

	Argentina	Brazil	Uruguay	Paraguay
1920	49.00	32.00	31.00	33.00
1930	53.00	34.00	32.00	38.00
1940	56.00	37.00	38.00	42.00
1950	61.00	43.00	51.00	48.00
1960	65.00	55.00	60.00	55.00
1970	67.00	59.00	65.00	61.00
1980	70.00	63.00	68.00	67.00
1990	72.00	66.00	71.00	69.00
1995	72.00	66.00	72.00	69.00

Source: Astorga and FitzGerald (1998)

II.e. Vehicles per Thousand persons in the MCS countries, 1929-90

	Argentina	Brazil	Uruguay	Paraguay
1929	36	6	30	1.4
1940	30	4	32	2.2
1950	32	7	29	2
1970	92	32	77	12
1990	178	88	129	45

Source: Astorga and FitzGerald (1998)

II.f. Railroads Density (km of tracks per thousand square km)

	Argentina	Brazil	Uruguay	Paraguay
1900	6	1.8	9.3	0.6
1913	12.1	2.9	13.8	0.9
1929	13.5	3.8	14.6	1.2
1950	15.4	4.3	16.1	1.2
1970	14.4	3.7	15.9	1.1
1995	12.9	3.6	16.1	1.1

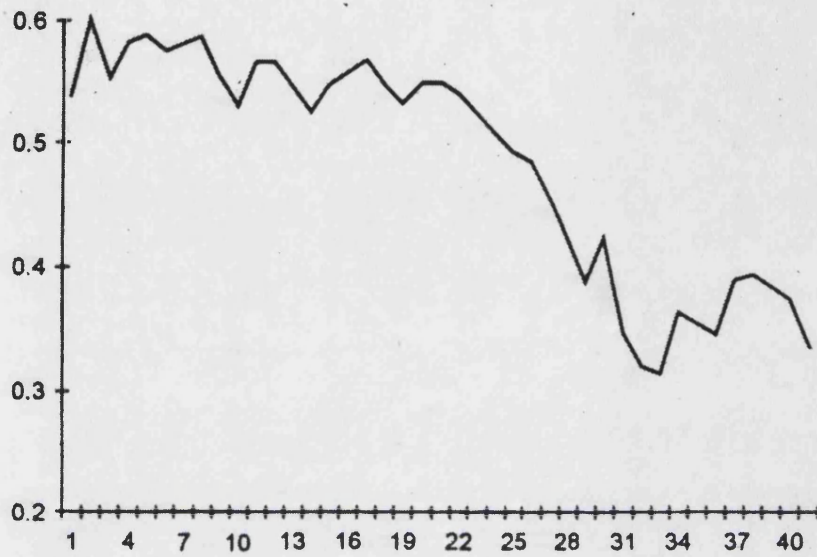
Source: Astorga and FitzGerald (1998)

II.g. Telephones (number of lines per thousand inhabitants)

	Argentina	Brazil	Uruguay	Paraguay
1913	10	2	8	1
1929	23	5	19	2
1940	32	7	28	3
1950	47	10	41	4
1970	73	21	79	11
1990	142	95	187	30

Source: Astorga and FitzGerald (1998)

II.h. Sigma analysis in Mercosur, 1950-1990, Cáceres and Sandoval (1999)



APPENDIX III

Argentina

III.a. Provincial GDP in Argentina at constant domestic 1986 prices, in thousands

	BsAs	Cap.Fed.	Catamarca	Córdoba	Corrientes	Chaco	Chubut	Entre Ríos
1961	2,044.60	1,507.30	18.80	434.00	76.70	90.40	110.29	130.40
1973	3,138.70	2,329.10	26.30	604.90	113.90	92.10	113.00	179.60
1983	3,340.80	2,178.20	41.10	711.10	157.70	97.20	208.20	233.20
1990	2,978.50	2,031.10	56.20	625.00	173.50	115.20	174.50	249.60
1995	3,906.30	2,844.60	63.80	855.40	195.80	122.30	238.50	330.60
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquén	Río Negro
1961	20.90	36.60	47.40	15.30	213.60	41.00	37.50	52.40
1973	41.50	81.00	71.70	21.00	360.50	91.00	71.80	101.60
1983	45.80	100.70	88.60	35.30	384.80	111.10	189.10	169.50
1990	63.70	107.60	91.50	59.00	288.30	121.90	200.70	166.90
1995	75.60	116.90	100.70	86.00	296.30	168.20	338.90	194.40
	Salta	San Juan	San Luis	Sta Cruz	Santa Fé	S.Estero	T.Fuego	Tucumán
1961	77.22	56.10	27.40	78.52	475.10	48.50	7.40	92.39
1973	116.70	81.80	46.00	53.00	778.90	77.30	10.50	231.70
1983	158.90	87.80	72.20	85.20	907.10	91.80	47.70	279.60
1990	160.50	95.50	162.40	80.70	818.10	76.60	65.10	231.30
1995	204.20	131.50	207.20	129.60	1,100.90	105.20	61.20	327.50

Source: Universidad Nacional de la Plata (1999)

III.b. Total Population by provinces, in thousands

	BsAs	Cap.Fed.	Catamarca	Córdoba	Corrientes	Chaco	Chubut	Entre Ríos
1960	7,159	2,967	173	1,821	551	559	149	829
1970	8,995	2,972	177	2,141	589	576	196	843
1980	10,865	2,929	208	2,408	661	701	263	908
1990	12,427	2,989	258	2,732	783	826	347	1,009
1995	13,236	2,988	285	2,894	845	883	392	1,056
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquén	Río Negro
1960	187	252	164	132	855	376	115	195
1970	240	314	177	138	1,004	459	162	270
1980	296	410	208	164	1,196	589	244	383
1990	387	502	255	215	1,391	768	373	494
1995	439	548	278	244	1,489	867	452	550
	Salta	San Juan	San Luis	Sta Cruz	Santa Fé	S.Estero	T.Fuego	Tucumán
1960	429	363	179	56	1,955	491	9	797
1970	520	401	188	89	2,176	520	14	801
1980	663	466	214	115	2,466	595	29	973
1990	845	522	279	155	2,766	665	64	1,125
1995	944	546	316	178	2,915	692	93	1,201

Source: INDEC, several years

III.c. Agriculture and Industry Shares by provinces, 1970 (as % of total provincial GDP)

	BsAs	Cap.Fed.	Catamarca	Córdoba	Corrientes	Chaco	Chubut	Entre Ríos
Agric 1970	14.55	-	16.44	17.30	28.15	28.12	6.18	23.58
Ind 1970	34.81	28.79	5.02	23.73	17.59	12.85	11.46	12.67
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquén	Río Negro
Agric 1970	27.41	23.75	53.04	17.05	12.38	18.36	5.73	16.74
Ind 1970	14.76	25.08	5.27	5.11	24.67	16.10	5.56	9.21
	Salta	San Juan	San Luis	Sta Cruz	Santa Fé	S.Estero	T.Fuego	Tucumán
Agric 1970	19.17	20.67	34.80	14.78	20.24	32.26	10.59	14.40
Ind 1970	17.95	18.09	11.37	1.52	29.69	6.57	5.88	20.62

Source: Universidad de la Plata (1999)

III.d. Illiteracy Rates by Provinces, 1947-1991 (population over 15 years)

	BsAs	Cap.Fed.	Catamarca	Córdoba	Corrientes	Chaco	Chubut	Entre Ríos
1947	10.54	3.28	10.76	9.12	18.37	17.41	9.97	52.01
1960	3.91	2.53	6.68	5.37	12.41	11.96	8.33	8.05
1970	3.56	2.10	5.59	4.87	10.76	11.98	7.22	6.85
1991	1.79	0.56	3.12	2.45	6.45	7.57	3.26	3.62
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquén	Río Negro
1947	14.17	22.64	9.84	10.73	11.79	13.64	15.31	15.56
1960	10.56	14.24	6.81	6.41	7.41	9.41	11.05	10.52
1970	10.16	10.75	5.93	5.56	6.30	9.01	8.86	9.15
1991	5.56	4.77	3.07	2.76	3.42	5.44	3.78	4.00
	Salta	San Juan	San Luis	Sta Cruz	Santa Fé	S.Estero	T.Fuego	Tucumán
1947	18.68	12.16	10.36	3.70	10.95	17.29	2.93	13.25
1960	11.28	7.40	6.81	4.03	5.82	11.19	2.77	7.78
1970	9.44	5.57	5.43	3.87	5.17	9.63	2.19	7.05
1991	4.66	3.10	3.13	1.58	2.78	5.86	0.77	3.55

Source: INDEC, several years

III.e. Infant Mortality Rates by Provinces, 1938-1997 (per 1,000 live births)

	BsAs	Cap.Fed.	Catamarca	Córdoba	Corrientes	Chaco	Chubut	Entre Ríos
1938	83.98	51.75	125.16	120.92	50.23	113.77	146.11	326.40
1957	47.70	46.89	99.38	62.01	97.26	106.85	91.66	103.48
1970	55.40	42.40	73.60	51.40	78.60	100.10	82.60	55.30
1980	28.40	18.50	41.90	24.20	44.60	54.20	34.80	35.80
1991	23.11	15.02	29.90	22.30	29.10	31.30	24.10	20.80
1997	18.80	12.20	18.80	25.60	16.30	22.80	28.20	19.10
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquén	Río Negro
1938	82.67	233.05	109.71	144.06	140.05	120.08	153.91	145.75
1957	60.13	170.86	79.99	93.15	60.95	66.44	132.71	118.51
1970	62.50	132.60	37.30	83.60	65.90	77.70	107.60	95.10
1980	38.10	51.40	30.30	45.80	31.80	51.90	31.70	35.70
1991	25.40	34.60	17.70	24.10	23.40	30.30	17.50	22.20
1997	19.60	29.80	24.00	12.10	19.30	16.70	21.30	13.80
	Salta	San Juan	San Luis	Sta Cruz	Santa Fé	S.Estero	T.Fuego	Tucumán
1938	179.05	151.51	151.20	122.72	95.16	113.42	81.93	203.07
1957	106.35	88.42	139.90	66.96	54.10	86.06	45.43	83.16
1970	114.40	86.00	78.70	50.20	56.40	52.20	55.20	69.90
1980	52.10	30.10	37.20	34.40	34.30	35.10	20.30	42.00
1991	35.70	23.60	23.10	18.20	25.10	22.30	10.90	26.70
1997	15.50	20.50	21.50	19.90	16.00	16.30	11.20	19.60

Source: INDEC, several years

III.f. Urbanisation Rates by Provinces, 1869-1991 (%)

	BsAs	Cap.Fed.	Catamarca	Córdoba	Corrientes	Chaco	Chubut	Entre Ríos
1869	17.50	99.90	31.70	20.40	15.70	n/a	n/a	36.70
1895	35.30	99.90	10.60	19.00	23.60	n/a	n/a	31.50
1914	54.40	100.00	16.10	41.00	31.60	23.10	21.70	37.60
1947	72.00	100.00	31.30	53.00	34.20	30.10	38.30	41.80
1960	84.30	100.00	43.30	69.00	48.60	39.60	52.20	50.00
1970	91.30	100.00	52.90	75.10	57.20	47.00	69.60	60.80
1980	100.00	100.00	57.50	80.80	64.40	60.90	81.40	68.80
1991	100.00	100.00	70.00	85.50	73.90	70.30	87.80	77.70
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquén	Río Negro
1869	n/a	15.40	n/a	15.80	12.40	n/a	n/a	n/a
1895	n/a	13.90	n/a	12.20	24.40	12.80	n/a	n/a
1914	22.30	18.90	17.20	13.00	32.10	18.90	7.50	7.50
1947	19.70	37.80	29.80	31.80	49.20	20.20	22.70	28.10
1960	28.80	48.30	39.60	41.60	60.40	34.70	36.80	44.20
1970	40.30	64.90	49.80	51.50	66.20	37.50	66.00	59.60
1980	55.70	73.60	64.90	61.70	68.80	50.40	76.10	71.80
1991	70.50	82.30	74.70	75.20	77.90	63.40	86.30	79.80
	Salta	San Juan	San Luis	Sta Cruz	Santa Fé	S.Estero	T.Fuego	Tucumán
1869	15.80	13.80	11.40	n/a	38.00	12.10	n/a	16.00
1895	12.20	12.40	18.90	n/a	32.70	5.90	n/a	17.10
1914	13.00	19.70	28.70	n/a	47.30	14.00	16.90	45.60
1947	31.80	46.00	39.10	n/a	59.30	25.80	29.80	49.90
1960	41.60	53.40	51.80	n/a	71.40	36.80	44.20	54.80
1970	51.50	62.40	57.30	n/a	77.70	66.00	75.90	64.70
1980	71.80	72.00	70.00	85.00	82.00	51.90	82.50	70.90
1991	78.90	80.80	81.20	91.40	85.50	60.80	97.20	76.70

Source: INDEC, several years

III.g. Additional Data (1996-2000) and data for 1998

As seen in Chapter 7, the main analysis for Argentine disparities was performed using the data from Universidad de la Plata for the period 1961-1995 (*III.a.* in this Appendix) since data for 1995-2000 was not available. Argentine regional data – as opposed to Brazilian data, which is published by IBGE - has always been lacking coherence and continuity in both collection and compilation. As explained in Section 2 of Chapter 7, due to the neoliberal policies in the nineties, several organisms in charge of statistics were dismantled, affecting the compilation of provincial GDP. Regional GDP had been elaborated by CFI (Consejo Federal de Inversiones) and there was a project to publish new data every five years. The provinces used to receive assistance, which was coordinated by CFI, in order to gather and compile data to produce the series. Manzanal (2000) explains that after 1990, and due to the reforms, CFI no longer coordinates this process and each province is left with that task, with CFI only providing limited assistance. Therefore, the quality of this estimate has decreased since then. Unfortunately it cannot be replaced or proxied by other available data and therefore even with its obvious shortcomings is the series that has to be used. An additional problem is that nowadays data for only a few provinces is available and due to the lack of coordination in gathering/compiling it is almost impossible to compare them.

The data used in this thesis is from Universidad de la Plata, as mentioned before, and has been compared with shorter series provided by CFI for consistency (as explained in the methodological section of Chapter 7). For data sets comprising the period 1995-2000, CFI was contacted without success and several searches carried out on the Internet (www.cfi.com.ar). Their website only provides data for all provinces from 1980 to 1986 and for Salta (1993-1999) and Tierra del Fuego (2002). At the Ministerio de Economía, (www.mecon.gov.ar) there are no records of any regional GDP – not even the previous years- and the same for INDEC (www.indec.gov.ar). Also, at www.netp.adm.ufrgs.br/mercosul/dadoscorrientes.htm data until 1995 was published. On a paper by Escudero *et al* (2002), data for the years 1996-2000 is presented but the source not mentioned. I have contacted OEI and one the authors (Borda, whose address was

found on the internet), but none replied to my requests. Manzanal (2000) provides data for 1996, but this will not be considered, as the addition of only one year will not be of much use for the main analysis.

The data from Escudero *et al* (2002) is presented below and although it will not be considered as part of the main analysis (due to the unknown source), these data have been merged with those of Universidad de la Plata and sigma and beta analysis (the latter only in absolute terms for the whole 1961-2000 period and for the decade 1990-2000) has been performed. The results will only be considered as indicative and appear on the Econometric Appendix V.e on page 373.

Data on current prices for 1998 and 1959 have been obtained from CFI and CFI/Di Tella respectively. Given the nature of convergence analysis, i.e. the regression equation when comparing two given years takes into account those particular years only, I considered inappropriate to include both 1998 and 1959 in the series for UNLP as part of that data set. Calculating 1998 against 1959 would be fine, though mixing data from different sets in order to extract valid conclusions was a bit riskier, particularly given that the data belongs to either extremes of the sample and would potentially induce a significant bias. In Appendix Ve a regression using both years 1998/1959 is performed in order to compare it to the main regression 1995/1961.

Regional GDP data in million of current pesos (1996-2000) as appear on Table 2, Escudero *et al* (2002)

	BsAs	Cap Fed	Catamarca	Cordoba	Corrientes	Chaco	Chubut	Entre Rios
1996	79,527	64,397	1,190	18,501	2,952	3,097	3,306	5,098
1997	84,814	69,193	1,268	19,683	3,184	3,235	3,416	5,405
1998	87,042	71,699	1,308	20,264	3,279	3,203	3,376	5,608
1999	82,290	69,339	1,268	19,006	3,120	3,047	3,284	5,340
2000	81,847	69,405	1,257	18,916	3,109	3,044	3,630	5,336
	Formosa	Jujuy	La Pampa	La Rioja	Mendoza	Misiones	Neuquen	Rio Negro
1996	1,517	1,848	2,158	1,267	9,920	3,251	5,011	3,362
1997	1,624	2,051	2,246	1,330	10,476	3,491	5,081	3,542
1998	1,676	2,081	2,296	1,389	10,846	3,665	4,590	3,688
1999	1,599	2,013	2,159	1,348	10,324	3,494	4,666	3,578
2000	1,615	2,003	2,185	1,351	10,665	3,488	5,602	3,675
	Salta	San Juan	San Luis	Sta Cruz	Santa Fe	S. Estero	T. Fuego	Tucuman
1996	3,544	2,820	2,486	2,791	19,334	1,862	1,495	4,963
1997	3,735	2,997	2,688	2,766	20,415	1,973	1,656	5,329
1998	3,910	3,140	2,741	2,829	20,681	2,069	1,633	5,468
1999	3,695	2,977	2,551	2,815	19,466	2,003	1,547	5,213
2000	3,757	2,950	2,520	3,508	19,429	1,996	1,641	5,202

APPENDIX IV

Brazil

IV.a. State GDP per capita, in domestic current prices (1970-2000)

	Rondonia	Acre	Amazonas	Roraima	Para	Amapa	Maranhao	Piaui	Ceara
1970	1,466	941	1,128	1,260	790	1,536	433	341	514
1975	8,649	2,679	5,507	4,977	3,247	3,669	1,873	675	2,278
1980	59,012	46,402	90,344	64,099	53,999	49,318	24,967	20,670	33,091
1985	7,878,418	4,779,032	11,384,540	6,197,347	4,813,173	6,892,947	2,179,362	2,185,109	3,868,100
1990	145,437	108,277	283,556	174,598	136,212	183,790	52,376	56,036	82,149
1996	2,947	2,360	5,870	2,202	2,504	3,498	1,313	1,458	2,291
2000	4,065	3,037	6,668	3,417	3,041	4,098	1,627	1,872	2,794
	RG.Norte	Paraiba	Pernamb.	Alagoas	Sergipe	Bahia	M. Gerais	E. Santo	R. Janeiro
1970	541	464	863	669	746	770	1,088	1,150	2,683
1975	2,932	2,313	3,905	2,938	3,305	3,664	5,752	4,968	11,724
1980	37,202	27,504	47,593	38,853	41,140	53,724	80,481	83,721	137,031
1985	4,748,568	3,141,336	5,159,879	5,000,398	9,178,305	6,581,346	8,633,361	9,747,312	13,754,450
1990	96,464	84,989	120,111	91,153	125,297	122,709	190,310	207,032	272,410
1996	2,291	1,979	2,887	1,923	2,641	2,625	4,704	5,304	6,460
2000	3,343	2,681	3,673	2,485	3,310	3,680	5,925	6,931	9,571
	Sao Paulo	Parana	S. Catarina	RG do Sul	MG do Sul	M. Grosso	Goias	D. Federal	
1970	3,333	1,196	1,434	1,964	1,055	1,055	801	2,926	
1975	14,876	7,262	7,254	9,840	5,661	4,103	3,883	13,742	
1980	172,004	88,668	104,376	118,406	93,294	60,400	55,740	150,081	
1985	16,735,179	9,600,202	10,608,721	12,178,430	7,912,482	5,781,287	5,383,829	12,943,622	
1990	379,926	240,814	266,348	286,884	175,176	136,673	141,613	328,100	
1996	7,950	5,287	6,025	6,551	4,301	3,541	3,217	9,035	
2000	9,995	6,882	7,902	8,341	5,697	5,342	4,316	14,405	

Source: IBGE (2000)

IV.b. Agriculture and Industry shares in Brazil, by areas, 1970 (as % of GDP)

	North	Northeast	M.Gerais	E.Santo	R.Janeiro	São Paulo
Agriculture	0.59	2.32	8.55	8.55	8.55	8.55
Industry	0.16	0.78	19.78	19.78	19.78	19.78
	South	D.Federal	M.Grosso	MG do Sul	Goias	
Agriculture	11.13	1.85	1.85	1.85	1.85	
Industry	3.70	0.23	0.23	0.23	0.23	

Source: IBGE, several years

IV.c. Infant Mortality Rates by Regions, 1940-1999 (per 1,000 live births)

	Brazil	North	Northeast	Southeast	South	C-West
1940	158.27	161.42	178.71	152.82	127.37	134.81
1950	144.73	151.70	176.34	132.62	114.31	123.56
1960	118.13	117.14	154.94	99.97	86.88	102.17
1970	116.94	111.39	151.18	100.24	87.19	103.90
1980	87.88	72.31	121.36	74.50	61.80	70.32
1999	37.50	36.10	60.40	25.80	22.80	25.80

Source: IBGE, several years

IV.d. Life Expectancy at Birth (years), by Regions

	Brazil	North	Northeast	Southeast	South	C-West
1940	43	40	38	44	50	48
1950	46	44	39	49	53	51
1960	53	53	43	57	60	56
1970	53	54	44	57	60	56
1980	60	64	52	64	67	65
1999	68	68	66	69	71	69

Source: IBGE, several years

IV.e. Urban Population by Regions 1960-1995

	North		Northeast		Southeast		South		Centre-west	
	urban	total	urban	total	urban	total	urban	total	urban	total
1940	405,792	1,462,420	3,381,173	14,434,080	7,231,905	18,345,831	1,590,475	5,735,305	270,837	1,258,679
1950	580,867	1,844,655	4,744,808	17,973,413	10,720,734	22,548,494	2,312,985	7,840,870	423,497	1,736,965
1960	957,717	2,561,782	7,516,500	22,181,880	17,460,897	30,630,728	4,360,691	11,753,075	1,007,228	2,942,992
1970	1,626,600	3,603,860	11,752,977	28,111,927	28,964,601	39,853,498	7,303,427	16,496,493	2,437,379	5,073,259
1980	3,037,150	5,880,268	17,566,842	34,812,356	42,840,081	51,734,125	11,877,739	19,031,162	5,114,597	7,544,795
1995	7,701,799	12,342,627	30,640,801	46,995,094	62,680,175	70,190,565	18,950,271	24,546,983	9,534,013	11,296,224

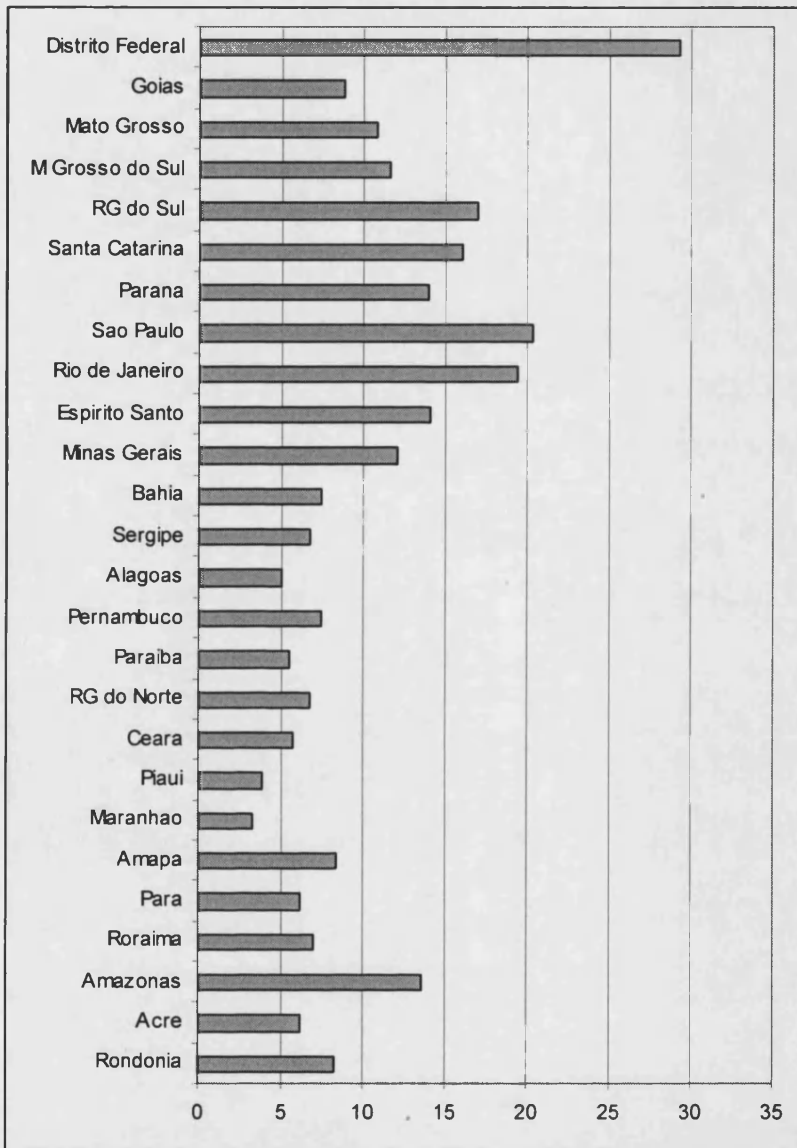
Source: IBGE, own calculations

IV.f. Literacy Rates by States, over 15 years

	Rondônia	Acre	Amazonas	Roraima	Para	Amapa	Tocantins	Maranhão	Piauí	
1970		65	47	63	66	68	66	n/a	41	40
1996		86	70	79	86	79	85	78	67	66
	Ceara	RG Norte	Paraíba	Pernambuco	Alagoas	Sergipe	Bahia	M Gerais	E Santo	
1970	45	46	45	50	39	47	49	66	67	
1996	69	72	69	74	64	75	76	87	86	
	R Janeiro	São Paulo	Paraná	S Catarina	RG do Sul	MG do Sul	M Grosso	Goiás	D Federal	
1970	83	81	69	81	82	64	64	64	83	
1996	94	93	88	93	93	88	88	87	94	

Source: IBGE, several years

IV.g. GDP per capita by states for 2000, in constant 1986 prices (in millions)



IV.h. GDP per capita in constant 1995 US\$

Estados	1939	1947	1995
Rondônia/ Acre/ Amazonas	861.00	847.87	2,716.10
Para / Amapa	562.35	510.70	2,156.72
Maranhão	355.55	222.48	1,152.87
Piauí	276.73	262.41	964.92
Ceara	274.04	278.96	1,539.44
RG do Norte	299.89	386.58	1,999.59
Paraíba	254.95	316.57	1,274.45
Pernambuco	461.37	502.63	1,890.44
Alagoas	271.90	356.04	1,610.97
Sergipe	325.26	360.11	2,441.42
Bahía	326.76	366.45	2,004.47
Minas Gerais	450.96	585.50	3,173.04
Espirito Santo	436.26	487.34	3,226.31
Rio de Janeiro	1,819.86	1,769.12	4,446.16
São Paulo	1,396.96	1,572.71	5,898.48
Paraná	834.09	862.79	4,283.25
Santa Catarina	572.97	797.77	3,886.50
RG do Sul	907.45	992.59	4,297.12
Mato Grosso	917.15	636.02	3,000.09
Goiás	442.62	328.73	2,571.94

Source: Ferreira (1998)

APPENDIX V

Econometric Analysis

V.a. Introductory Note and Econometric Tables

This Appendix contains some statistical and econometric results as well as explanations of the main results reported in Chapters 4, 5, 7 and 9, resulting from using the data in Appendices I, II, III and IV. The methodology for analysing convergence is ordinary least squares regression analysis, which was explained in Chapter 2. The sigma convergence is also explained in the relevant Chapters, though the ones corresponding to the additional years for Argentina (1996-2000) as well as for 1959/1998 are included in this Appendix (III.g). The reason for that, as explained in Chapter 7 and Appendix III is that the latter data sets do not constitute part of the main analysis. Also in this Appendix (section V.g.) results for Brazil using 1995 as base year as well as data in current prices are presented. As discussed, the results remain unaltered whether using current or constant (1995 or 1986) prices. The coefficients, t-tests, R-squared, F statistic all remain unaltered except for the constant term – which is irrelevant for the convergence analysis anyway. This section does not intend to be a thorough econometric explanation but merely a guideline to the results reported in this Appendix. For further details, see Green (1990).

For each regression equation of the form $y = \alpha + \beta X + \mu$ in this Appendix, the results are displayed in seven sub-sections, where applicable.

1. Regression results

The regression results reported here will include the R-squared, the adjusted R-squared, the standard errors, the F statistics and the sum of squared errors. The R-squared, or coefficient of determination is a measure of how well the regression fits the data. The R-squared compares the estimated and the actual y-values. Its value ranges between 0 and 1. If this is 0, then the regression equation is not helpful in predicting a y-value. Conversely, if the value is 1, there is a perfect correlation on the sample. The analysis of the R-squared is complemented by the analysis of the adjusted R-squared. R-squared increases when regressors are added to the equation and therefore it is useful to use the adjusted R-squared, which takes into account the degrees of freedom while still showing the improvement of the fit. The adjusted R-squared might decline as variables are added and

can also be negative. The F-statistic is used in order to test the hypothesis of whether the results – as seen by the R-squared – occurred by chance or otherwise indicate a strong relationship between the independent and dependent variables. There is a relationship among the variables if the F-observed statistic of the regression is greater than the F-critical value. The F-critical is obtained from an F-critical table. The alpha value of 0.05 assuming a one-tailed test and degrees of freedom v_1 and v_2 , where $v_1=k-1$ and $v_2=n-k$. If the F-obtained is larger than the F-critical then the regression will be statistically significant.

2. Coefficient results

For the results of the coefficients of the variables, the coefficients, standard errors, t-statistics and probabilities have been reported for each regression. The t-critical can be found on a table (also at the end of this Appendix) in which a t-critical, single-tail of alpha 0.05 with n degrees of freedom is used. It is usually tested whether a parameter is significantly different from zero. The test statistic used is t. The t-statistic obtained by dividing the resulting coefficient by its standard error is then compared with the t-critical value and if the t-obtained is higher than the t-critical, then the hypothesis of the coefficient being statistically different than zero is rejected. When testing convergence in a model, a significant and negative coefficient on initial income means there is convergence among the regions considered; while a significant but positive coefficient means there is divergence among them (for definitions used in this thesis see page 330). The tables also report the lower and upper margins of the confidence interval for each coefficient at 95% confidence level.

3. Autocorrelation and heteroskedasticity

Another important assumptions of the linear model are those of homoscedasticity, ie. $\text{Var}(e_i) = \delta^2$, a constant, for all i; and nonautocorrelation $\text{cov}(e_i, e_j) = 0$ if i is different than j. Although the data sets used in this analysis are annual, the actual regression analysis is done on a cross section since each variable contains information on each region for a particular year. Therefore, we cannot test for the presence of autocorrelation in the regression. However, heteroskedasticity can be tested for. If the disturbances are

heteroscedastic, the ordinary least squares standard errors will be biased. Several tests can be performed, such as the general White test and the Goldfeld- Quandt test. The latter is a very powerful test for heteroskedasticity and given the small samples I have performed this test on each regression reported in this thesis. A brief summary of the results is presented at the end of this Appendix (section V.h) but for simplicity and presentation I have omitted the intermediate steps.

When testing for Goldfeld-Quandt, the data is ordered by independent variable (X) and split into two equal-sized groups, the first one corresponding to the smallest and the largest values. For more powerful tests, a number of observations will be omitted from the sample. When a sample has 26 observations, for instance, the middle six will normally be omitted; and for 48 observations, around 12 will be left out. Separate regressions are run for both groups and the ratio of their sums of squared residuals is formed. This will be an F-statistic and a critical value from the F-distribution can be used to test the hypothesis of homoskedasticity.

4. Dummy variables

Dummy variables indicate in which sector an observation falls in, and have either a 0 or a 1 to indicate presence or absence of attributes. When a dummy is included in the regression equation, the resulting dummy variable coefficient will measure the difference between the presence of the attribute and its absence. Dummy variables have been used in this thesis for two reasons. The first one to test for differences in the convergence for Tierra del Fuego in the case of Argentina and the other one to test for macro and political stability and convergence.

5. Definition of Convergence and divergence

The following are the definitions that will be used in the following pages of this Appendix as well as throughout the thesis, as indicated in Chapter 3.

- *Convergence*: there is convergence when there is a good fit - the higher the R squared the stronger the convergence – and a significant F statistic and the coefficients on initial income are both negative and significant

- *Divergence*: there is divergence when there is a good fit (high R squared and significant F statistic) but the coefficient on initial income is positive and significant.
- *Weak convergence*: there is weak convergence when the F statistic is significant and the coefficient on initial income is negative but not significant or when the t-values are significant but not the F- statistic.
- *No convergence*: there is no convergence when the F statistic and t values are not significant.

Methodology for Argentina and Brazil

The period of analysis for Brazil comprises 1970 to 2000 (data for 2001 was made available shortly after these regressions were performed and due to the fact that the results are not altered significantly will only be presented as a footnote later in this Appendix). As mentioned in the methodological section in chapter 9, data for Brazil was available from IBGE. In the case of Argentina, data collection was more difficult given the number of different sources and the lack of availability of one long series as in the case of Brazil. As discussed in chapter 7, the period of analysis will then be 1961-1995 for Argentina while the additional data for 1996-2000 as well as the current data for 1959-1998 will appear as additional in the following appendix.

The analysis of sigma convergence has been performed for all provinces (Argentina) and all states (Brazil) as well as by regions. The results are presented in the relevant chapters (7 and 9 respectively). In each region I tried to identify whether any province or state in particular had a different behaviour from the rest. In the case of Argentina, only Tierra del Fuego displayed a different pattern. In the case of Brazil, no state showed a different pattern, only changes in magnitude (see below).

The beta convergence analysis for Argentina and Brazil (as explained in Chapters 7 and 9 respectively) was carried out by first analysing whole periods, then dividing by decades, and lastly by any breaks given by sigma analysis. In the case of Brazil there is only one major break as seen by the sigma analysis, while for the case of Argentina there are

several. Also, in the case of Argentina, as found in the sigma analysis, there is one province (Tierra del Fuego) with a different behaviour and therefore Dummy variable analysis will be used to test for this. In the case of Brazil, however, only differences in magnitude and not in pattern were found. Therefore this dummy analysis was only performed for the case of Argentina. Both political and macroeconomic variables have been tested for both countries using dummy analysis. In the case of Argentina, two military periods will be considered while in the case of Brazil only one. For the macroeconomic variables two subperiods have been tested. The results of the beta convergence analyses are found in both the relevant chapters (in a summarised form) plus in this appendix (a longer version of the results plus the corresponding figures).

The European Union and MERCOSUR

As mentioned in the relevant chapters, the European Union (chapter 4) will be divided into three sub-periods and both sigma and beta analyses were performed for regions as well as countries. The first subperiod data is available in domestic currencies. However, for the second period onwards data availability is more homogeneous and available in ECU. The period of analysis is 1960-1995 because at the time of writing of this thesis that was the last year available. At the moment new data has become available but given that the European Union is considered mainly as a case study the results for a long period will suffice for this analysis. In the case of MERCOSUR, as stated in Chapter 5, the results of the regression analysis can only be indicative given the few observations. Only when a certain trend is highly significant will conclusions be derived. Again, in both cases, sigma analyses are depicted in the relevant chapters, together with summarised information of the regressions corresponding to beta convergence. The extended tables of these regressions, together with figures, are found in this appendix.

V.b. Econometric Results – European Union

Regions (1960- 1973)

1- Regression 1960-1973

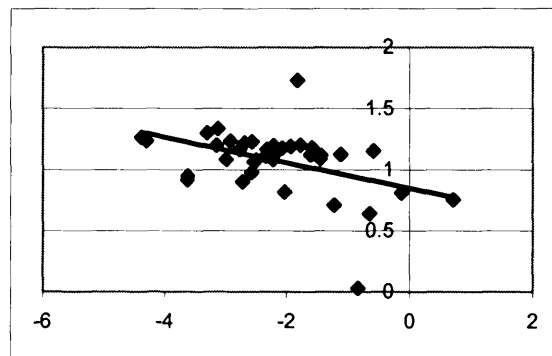
Regression results period

R Square	0.18
Adjusted R Square	0.16
Standard Error	0.24
Observations	38.00
Degrees of freedom	36.00
Regression sum of s	0.46
Sum of sq residuals	2.07
F-statistic	8.05
Significance F	0.01

Coefficient Results

Constant Variable	
Coefficient	0.85
Standard error	0.09
t-statistic	9.54
P-value	0.00
Lower 95%	0.67
Upper 95%	1.03
ln (1960)	
Coefficient	-0.10
Standard error	0.04
t-statistic	-2.84
P-value	0.01
Lower 95%	-0.18
Upper 95%	-0.03

x= ln 1960
y = ln 1973- ln 1960



t critical	2.03	5%
t critical	1.69	10%
F (1,36)	4.12	

The regression for the regions for the period 1960-1973 shows a significant F statistic with a negative and also significant coefficient on initial income. In this period there was convergence among the EEC6 regions

Countries (1960-1973)

2- Regression 1960-1973

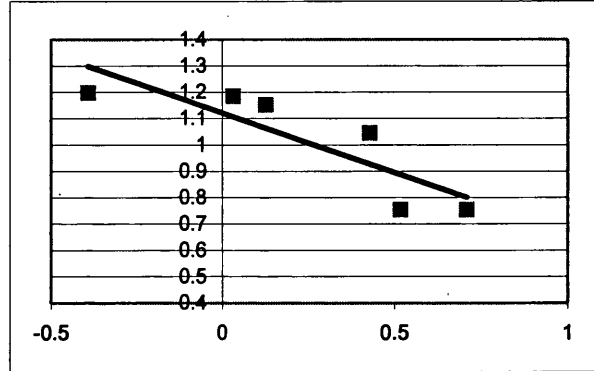
Regression results period

R Square	0.73
Adjusted R Square	0.67
Standard Error	0.12
Observations	6.00
Degrees of freedom	4.00
Regression sum of s	0.16
Sum of sq residuals	0.06
F-statistic	11.08
Significance F	0.03

Coefficient Results

Constant Variable	
Coefficient	1.12
Standard error	0.06
t-statistic	19.10
P-value	0.00
Lower 95%	0.96
Upper 95%	1.28
ln (1960)	
Coefficient	-0.45
Standard error	0.14
t-statistic	-3.33
P-value	0.03
Lower 95%	-0.83
Upper 95%	-0.07

x= ln 1960
y = ln 1973- ln1960



t critical	2.77	5%
t critical	2.132	10%
F(1,4)	7.71	

For the countries, the period 1960-1973 has a significant F statistic and a high R squared. The coefficient on initial income is negative and significant, implying convergence among the EEC6 countries for the period

Regions (1973-1988)

3- Regression 1973-1988

Regression results period

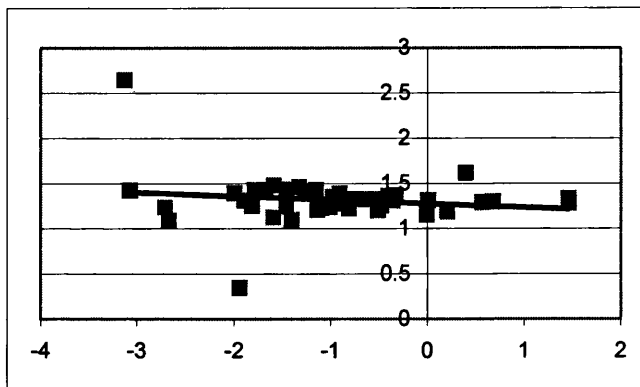
R Square	0.02
Adjusted R Square	0.00
Standard Error	0.29
Observations	40.00
Degrees of freedom	38.00
Regression sum of s	0.08
Sum of sq residuals	3.10
F-statistic	0.95
Significance F	0.34

Coefficient Results

Constant Variable	
Coefficient	1.28
Standard error	0.06
t-statistic	20.78
P-value	0.00
Lower 95%	1.15
Upper 95%	1.40
ln (1973)	
Coefficient	-0.04
Standard error	0.04
t-statistic	-0.97
P-value	0.34
Lower 95%	-0.13
Upper 95%	0.04

x= ln 1973

y= ln 1988- ln 1973



t critical	2.03	5%
t critical	1.69	10%
F(1,38)	4.12	

In this period, the F statistic is not significant, there is a low R squared and the coefficient is negative though not significant and therefore there is no convergence among the regions

Countries (1973-1988)

4- Regression 1973-1988

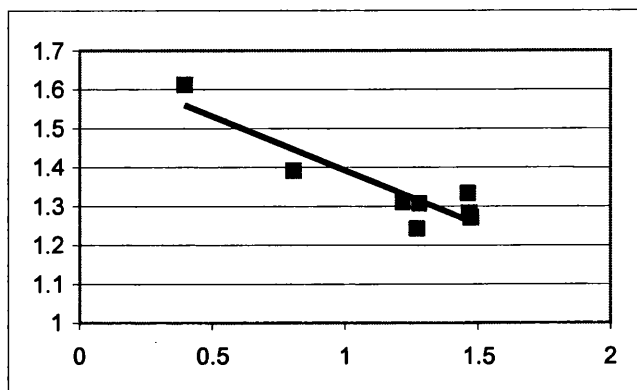
Regression results period

R Square	0.82
Adjusted R Square	0.79
Standard Error	0.05
Observations	8.00
Degrees of freedom	6.00
Regression sum of s	0.08
Sum of sq residuals	0.02
F-statistic	27.79
Significance F	0.00

Coefficient Results

Constant Variable	
Coefficient	1.67
Standard error	0.06
t-statistic	25.79
P-value	0.00
Lower 95%	1.51
Upper 95%	1.83
ln (1973)	
Coefficient	-0.28
Standard error	0.05
t-statistic	-5.27
P-value	0.00
Lower 95%	-0.41
Upper 95%	-0.15

x= ln 1973
y= ln 1988- ln



t critical	2.447	5%
t critical	1.943	10%
F(1,6)	5.99	

The F statistic is highly significant, and the R is also highly significant. The coefficient on initial income is negative and highly significant, therefore the countries were converging during this period.

Regions (1988-1995)

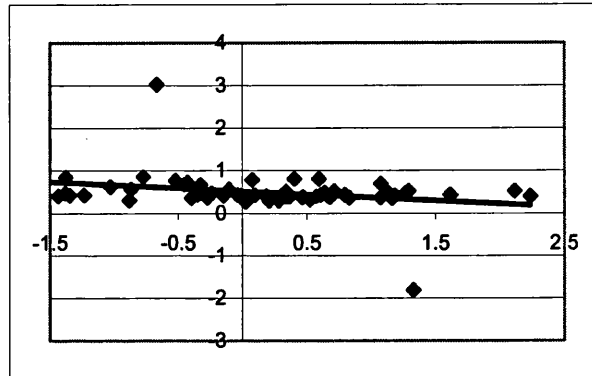
5- Regression 1988-1995

Regression results period

R Square	0.08
Adjusted R Square	0.06
Standard Error	0.46
Observations	59.00
Degrees of freedom	57.00
Regression sum of s	1.01
Sum of sq residuals	12.04
F-statistic	4.77
Significance F	0.03

x= ln 1988

y= ln 1995- ln 1988



Coefficient Results

Constant Variable	
Coefficient	0.52
Standard error	0.06
t-statistic	8.49
P-value	0.00
Lower 95%	0.40
Upper 95%	0.64
ln (1988)	
Coefficient	-0.15
Standard error	0.07
t-statistic	-2.18
P-value	0.03
Lower 95%	-0.28
Upper 95%	-0.01

t critical	2.009	5%
t critical	1.676	10%
F(1,57)	4.05	

The F statistic is marginally significant and the coefficient on initial income is negative and significant at both 5 and 10% so there is convergence in this period. Since the R squared is quite low the convergence is not strong.

Countries (1988-1995)

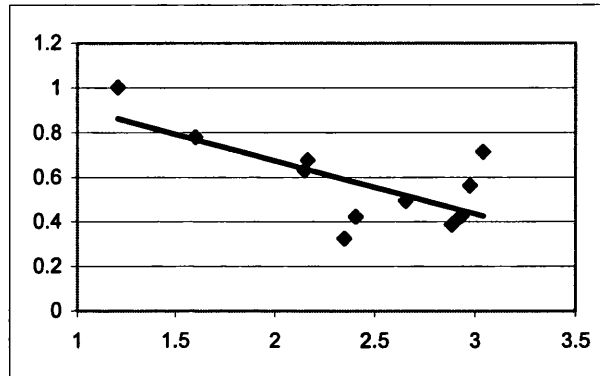
6- Regression 1988-1995

Regression results period

R Square	0.49
Adjusted R Square	0.44
Standard Error	0.15
Observations	12.00
Degrees of freedom	10.00
Regression sum of s	0.21
Sum of sq residuals	0.22
F-statistic	9.53
Significance F	0.01

x= ln 1988

y= ln 1995- ln 1988



Coefficient Results

Constant Variable	
Coefficient	1.15
Standard error	0.19
t-statistic	5.95
P-value	0.00
Lower 95%	0.72
Upper 95%	1.58
ln (1988)	
Coefficient	-0.24
Standard error	0.08
t-statistic	-3.09
P-value	0.01
Lower 95%	-0.41
Upper 95%	-0.07

t critical	2.228	5%
t critical	1.813	10%
F(1,10)	4.96	

The F statistic is highly significant and the R squared shows a good fit. The coefficient is also significant and negative and therefore there is convergence among the countries. This convergence is thus stronger than for the regions.

V.c. Econometric Results – MERCOSUR

1- Regression 1940- 1995

x = ln 1940; y= ln 1995 -ln 1940

Regression results period

R Square	0.63
Adjusted R Square	0.44
Standard Error	0.15
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.08
Sum of sq residuals	0.04
F-statistic	3.40
Significance F	0.21

Coefficient Results

Constant Variable

Coefficient	-1.43
Standard error	1.00
t-statistic	-1.43
P-value	0.29
Lower 95%	-5.74
Upper 95%	2.88
ln (1940)	
Coefficient	-0.54
Standard error	0.29
t-statistic	-1.84
P-value	0.21
Lower 95%	-1.79
Upper 95%	0.72

2- Regression 1940-2000

x = ln 1940; y= ln 2000- ln 1970

Regression results period

R Square	0.61
Adjusted R Square	0.42
Standard Error	0.16
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.08
Sum of sq residuals	0.05
F-statistic	3.13
Significance F	0.22

Coefficient Results

Constant Variable

Coefficient	-1.43
Standard error	1.07
t-statistic	-1.34
P-value	0.31
Lower 95%	-6.03
Upper 95%	3.17
ln (1970)	
Coefficient	-0.55
Standard error	0.31
t-statistic	-1.77
P-value	0.22
Lower 95%	-1.89
Upper 95%	0.79

t critical	4.3	5%
t critical	2.92	10%
F (k-1; n-k)= F(1; 2)		18.5

Regression 1 shows a high coefficient of correlation and a not significant F statistic

The coefficient on initial income is negative and also not significant.

Therefore, there is only weak convergence for the whole period

Regression 2, which is extended to include more update data until 2000, shows similar results

3- Regression 1940- 1950**x = ln 1940; y = ln 1950- ln 1940****Regression results period**

R Square	0.01
Adjusted R Square	-0.49
Standard Error	0.07
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.00
Sum of sq residuals	0.01
F-statistic	0.02
Significance F	0.91

Coefficient Results

Constant Variable	
Coefficient	0.03
Standard error	0.48
t-statistic	0.06
P-value	0.96
Lower 95%	-2.03
Upper 95%	2.08
ln (1940)	
Coefficient	-0.02
Standard error	0.14
t-statistic	-0.12
P-value	0.91
Lower 95%	-0.61
Upper 95%	0.58

4- Regression 1950- 1960**x = ln 1950; y= ln 1960- ln 1950****Regression results period**

R Square	0.32
Adjusted R Square	-0.01
Standard Error	0.08
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.01
Sum of sq residuals	0.01
F-statistic	0.96
Significance F	0.43

Coefficient Results

Constant Variable	
Coefficient	-0.41
Standard error	0.49
t-statistic	-0.84
P-value	0.49
Lower 95%	-2.52
Upper 95%	1.70
ln (1950)	
Coefficient	-0.14
Standard error	0.15
t-statistic	-0.98
P-value	0.43
Lower 95%	-0.77
Upper 95%	0.49

t critical	4.3	5%
t critical	2.92	10%
f (1,2)	18.5	

Regression 3 shows the results when analysing by decades for the first subperiod.

The R squared is extremely low and so is the F statistic.

The coefficient is negative but not significant and therefore the subperiod 1940-1950 is one of no convergence.

When looking at the subperiod 1950-1960, the R squared is higher but the F statistic is still not significant. The coefficient on initial income is again negative but not statistically significant.

Both subperiods correspond to non convergence among the countries now members of MERCOSUR

5- Regression 1960- 1970
x = ln 1960; y= ln 1970 - ln 1960

Regression results period

R Square	0.06
Adjusted R Square	-0.41
Standard Error	0.06
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.00
Sum of sq residuals	0.01
F-statistic	0.13
Significance F	0.75

Coefficient Results

Constant Variable	
Coefficient	-0.07
Standard error	0.46
t-statistic	-0.14
P-value	0.90
Lower 95%	-2.03
Upper 95%	1.90
ln (1960)	
Coefficient	-0.05
Standard error	0.14
t-statistic	-0.36
P-value	0.75
Lower 95%	-0.65
Upper 95%	0.55

6- Regression 1970- 1980
x = ln 1970; y= ln 1980- ln 1970

Regression results period

R Square	0.93
Adjusted R Square	0.90
Standard Error	0.03
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.03
Sum of sq residuals	0.00
F-statistic	28.26
Significance F	0.03

Coefficient Results

Constant Variable	
Coefficient	-1.04
Standard error	0.23
t-statistic	-4.59
P-value	0.04
Lower 95%	-2.02
Upper 95%	-0.07
ln (1970)	
Coefficient	-0.38
Standard error	0.07
t-statistic	-5.32
P-value	0.03
Lower 95%	-0.68
Upper 95%	-0.07

t critical	4.3	5%
t critical	2.92	10%
f (1,2)	18.5	

For the period 1960-1970, the R squared is again very low, with not significant F statistic and negative though not significant coefficient. However, the period 1970-1980 shows a very high coefficient of correlation indicating a very good fit for the period. The F statistic is highly significant. The coefficient is negative and also significant at both 5 and 10%. The subperiod 1960-1970 is one of no convergence while the subperiod 1970-1980 was one of strong convergence.

7- Regression 1980- 1990
x = ln 1980 ; y= ln 1990 - ln 1980

Regression results period	
R Square	0.21
Adjusted R Square	-0.19
Standard Error	0.04
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.00
Sum of sq residuals	0.00
F-statistic	0.53
Significance F	0.54

Coefficient Results

Constant Variable	
Coefficient	-0.40
Standard error	0.49
t-statistic	-0.82
P-value	0.50
Lower 95%	-2.50
Upper 95%	1.70
ln (1980)	
Coefficient	-0.12
Standard error	0.16
t-statistic	-0.73
P-value	0.54
Lower 95%	-0.81
Upper 95%	0.58

t critical	4.3	5%
t critical	2.92	10%
f (1,2)	18.5	

8- Regression 1990-2000
x = ln 1990; y= ln 2000 - ln 1990

Regression results period	
R Square	0.96
Adjusted R Square	0.93
Standard Error	0.01
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.00
Sum of sq residuals	0.00
F-statistic	43.32
Significance F	0.02

Coefficient Results

Constant Variable	
Coefficient	0.93
Standard error	0.13
t-statistic	7.25
P-value	0.02
Lower 95%	0.38
Upper 95%	1.49
ln (1990)	
Coefficient	0.28
Standard error	0.04
t-statistic	6.58
P-value	0.02
Lower 95%	0.10
Upper 95%	0.46

The decade of 1980-1990 shows a much lower coefficient of determination and a non significant F statistic
 The coefficient is negative though not significant and therefore there is no convergence in this decade
 the decade 1990-2000 shows a high correlation, indicating an almost perfect fit
 the f statistic is also highly significant and the coefficient is positive and significant
 this decade was of strong divergence among the MERCOSUR member countries

9- Regression 1990- 1995
x = ln 1990; y= ln 1995 - ln 1990

Regression results period	
R Square	0.84
Adjusted R Square	0.76
Standard Error	0.02
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.00
Sum of sq residuals	0.00
F-statistic	10.54
Significance F	0.08

Coefficient Results

Constant Variable	
Coefficient	0.82
Standard error	0.24
t-statistic	3.42
P-value	0.08
Lower 95%	-0.21
Upper 95%	1.85
ln (1990)	
Coefficient	0.25
Standard error	0.08
t-statistic	3.25
P-value	0.08
Lower 95%	-0.08
Upper 95%	0.59

10- Regression 1995-2000
x = ln 1995; y= ln 2000 - ln 1995

Regression results period	
R Square	0.05
Adjusted R Square	-0.43
Standard Error	0.01
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.00
Sum of sq residuals	0.00
F-statistic	0.10
Significance F	0.78

Coefficient Results

Constant Variable	
Coefficient	0.08
Standard error	0.13
t-statistic	0.67
P-value	0.57
Lower 95%	-0.46
Upper 95%	0.63
ln (1995)	
Coefficient	0.01
Standard error	0.04
t-statistic	0.31
P-value	0.78
Lower 95%	-0.17
Upper 95%	0.19

t critical	4.3	5%
t critical	2.92	10%
f (1,2)	18.5	

The subperiod 1990-1995 shows a strong correlation and a significant F statistic
The coefficient is positive and significant at 10% level, therefore suggesting divergence for the period
on the other hand, the subperiod 1995-2000 shows a very low R squared, a not significant F statistic
and a positive though not statistically significant coefficient, and therefore no convergence for the period
Most of the divergent trend seems to be concentrated in the subperiod 1990-1995

11- Regression 1970- 1995

x= ln 1970; y= ln 1995 - ln 1970

Regression results period

R Square	0.77
Adjusted R Square	0.65
Standard Error	0.05
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.02
Sum of sq residuals	0.01
F-statistic	6.63
Significance F	0.12

Coefficient Results**Constant Variable**

Coefficient	-0.78
Standard error	0.37
t-statistic	-2.13
P-value	0.17
Lower 95%	-2.35
Upper 95%	0.79
ln (1970)	
Coefficient	-0.30
Standard error	0.11
t-statistic	-2.57
P-value	0.12
Lower 95%	-0.79
Upper 95%	0.20

12- Regression 1940- 1970

x = ln 1940; y= ln 1970 - ln 1940

Regression results period

R Square	0.27
Adjusted R Square	-0.10
Standard Error	0.16
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.02
Sum of sq residuals	0.05
F-statistic	0.72
Significance F	0.48

Coefficient Results**Constant Variable**

Coefficient	-0.65
Standard error	1.06
t-statistic	-0.61
P-value	0.60
Lower 95%	-5.23
Upper 95%	3.93
ln (1940)	
Coefficient	-0.26
Standard error	0.31
t-statistic	-0.85
P-value	0.48
Lower 95%	-1.59
Upper 95%	1.07

t critical	4.3
t critical	2.92
f (1,2)	18.5

Following the breaks given by the sigma analysis in chapter 5, the subperiod 1940-1970 has a not significant F statistic and a negative but not significant coefficient on initial income, so there is no convergence. The subperiod 1970-1995, by contrast, shows a significant f statistic with a much higher R squared and a negative though not significant coefficient (weak convergence)

13- Regression 1970- 2000

$x = \ln 1970$; $y = \ln 2000 - \ln 1970$

Regression results period

R Square	0.67
Adjusted R Square	0.51
Standard Error	0.06
Observations	4.00
Degrees of freedom	2.00
Regression sum of s	0.02
Sum of sq residuals	0.01
F-statistic	4.14
Significance F	0.18

Coefficient Results

Constant Variable	
Coefficient	-0.74
Standard error	0.46
t-statistic	-1.59
P-value	0.25
Lower 95%	-2.73
Upper 95%	1.26
ln (1970)	
Coefficient	-0.30
Standard error	0.15
t-statistic	-2.03
P-value	0.18
Lower 95%	-0.92
Upper 95%	0.33

t critical	4.3	5%
t critical	2.92	10%
f (1,2)	18.5	

When extending the period until 2000, the R squared decreases and so does the F statistic. The coefficient is negative and not significant. There is no convergence for this period

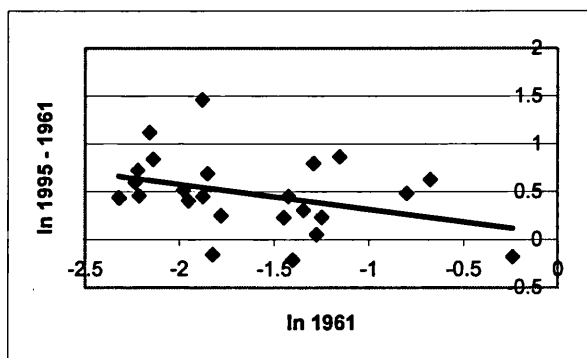
V.d. Econometric Results – Argentina

1- Regression 1961-1995

x= ln 1961; y = ln 1995 - ln 1961

Regression results period

R Square	0.13
Adjusted R Square	0.09
Standard Error	0.13
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.47
Sum of sq residuals	3.13
F-statistic	3.28
Significance F	0.08



Coefficient Results

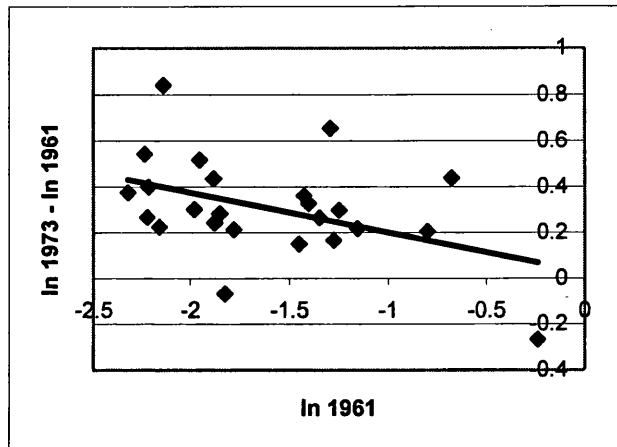
Constant Variable				
Coefficient	0.06			
Standard error	0.24			
t-statistic	0.23			
P-value	0.82			
Lower 95%	-0.45			
Upper 95%	0.56	t-critical	2.07	5%
ln 1961			1.72	10%
Coefficient	-0.26	F (1, 22)	4.3	
Standard error	0.14			
t-statistic	-1.81			
P-value	0.08			
Lower 95%	-0.56			
Upper 95%	0.04			

The F statistic for the whole period is lower than the F critical and therefore not significant. The coefficient on initial income (ln 1961) is negative and, although not significant at the 5% confidence level it is significant at 10%. Therefore, the period displays only weak convergence

2- Regression 1961-1973
Regression results period

x= ln 1961; y= ln 1973 - ln 1961

R Square	0.19
Adjusted R Square	0.15
Standard Error	0.20
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.21
Sum of sq residuals	0.90
F-statistic	5.09
Significance F	0.03



Coefficient Results

Constant Variable				
Coefficient	0.03			
Standard error	0.13			
t-statistic	0.20			
P-value	0.84	t-critical	2.07	5%
Lower 95%	-0.25	t-critical	1.717	-5%
Upper 95%	0.30	F (1, 22)	4.3	
ln 1961				
Coefficient	-0.17			
Standard error	0.08			
t-statistic	-2.26			
P-value	0.03			
Lower 95%	-0.33			
Upper 95%	-0.01			

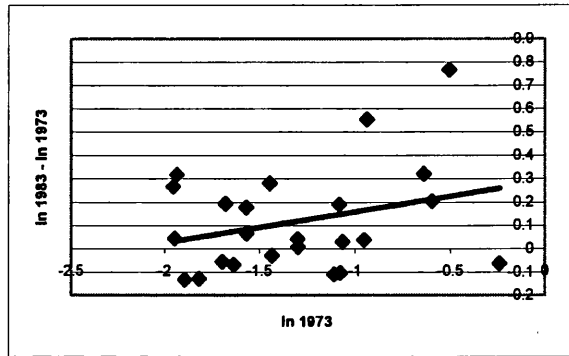
The first subperiod, corresponding to the sigma breaks as seen in chapter 7, shows a higher R squared than regression 1 and a significant F statistic. The coefficient is negative and significant at both levels and therefore in this period there was convergence among the Argentine provinces

3- Regression 1973-83

x= ln 1973; y = ln 1983- ln 1973

Regression results period

R Square	0.09
Adjusted R Square	0.05
Standard Error	0.22
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.10
Sum of sq residuals	1.05
F-statistic	2.10
Significance F	0.16



Coefficient Results

Constant Variable			
Coefficient	0.29		
Standard error	0.13		
t-statistic	2.27		
P-value	0.03		
Lower 95%	0.03		
Upper 95%	0.56	t-critical	2.07 5%
ln 1973		t-critical	1.717 -5%
Coefficient	0.13	F (1, 22)	4.3
Standard error	0.09		
t-statistic	1.45		
P-value	0.16		
Lower 95%	-0.06		
Upper 95%	0.33		

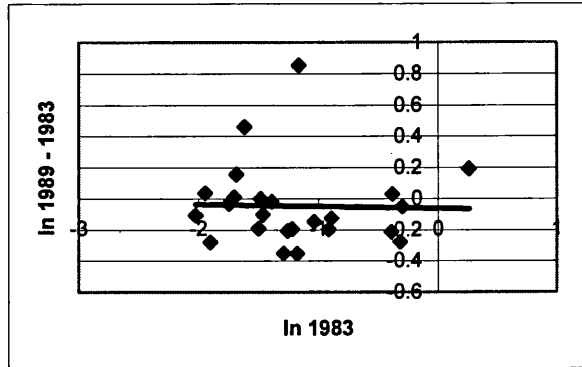
The R squared in this subperiod is low (and lower than regression 1) , and the F statistic is not significant. The coefficient on ln 1973 is positive and not significant. This indicates there was weak divergence among the provinces.

4- Regression 1983- 1989

Regression results period

R Square	0.00
Adjusted R Square	-0.04
Standard Error	0.27
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.00
Sum of sq residuals	1.62
F-statistic	0.02
Significance F	0.89

$x = \ln 1983; y = \ln 1989-1983$



Coefficient Results

Constant Variable	
Coefficient	-0.06
Standard error	0.13
t-statistic	-0.49
P-value	0.63
Lower 95%	-0.32
Upper 95%	0.20
ln 1983	
Coefficient	-0.01
Standard error	0.09
t-statistic	-0.13
P-value	0.89
Lower 95%	-0.21
Upper 95%	0.18

t-critical	2.07	5%
t-critical	1.717	-5%
F (1, 22)	4.3	

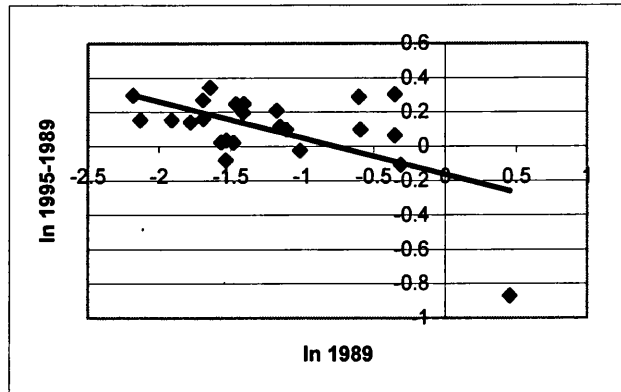
R squared is 0, indicating no correlation between the variables. The F statistic is also not significant. The coefficient of ln 1983 is negative though not significant at either 5 or 10% significance level. The sub-period 1983-1989 displays no convergence

5- Regression 1995- 1989

x= ln 1989; y= ln 1995-1989

Regression results period

R Square	0.33
Adjusted R Square	0.29
Standard Error	0.20
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.43
Sum of sq residuals	0.90
F-statistic	10.61
Significance F	0.00



Coefficient Results

Constant Variable				
Coefficient	-0.16			
Standard error	0.09			
t-statistic	-1.81	t-critical	2.07	5%
P-value	0.08	t-critical	1.717	-5%
Lower 95%	-0.35	F (1, 22)	4.3	
Upper 95%	0.02			
ln 1989				
Coefficient	-0.21			
Standard error	0.07			
t-statistic	-3.26			
P-value	0.00			
Lower 95%	-0.35			
Upper 95%	-0.08			

For the period 1989-1995, the R squared is much higher than in any of the previous subperiods. The F statistic is highly significant and the coefficient on initial income is negative and significant at both levels.

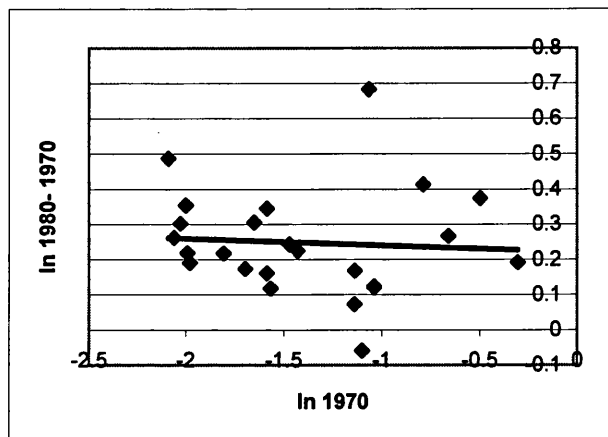
The subperiod 1989-1995 is therefore one of strong convergence

6- Regression 1970-80

x= ln 1970; y= ln 1980-1970

Regression results period

R Square	0.00
Adjusted R Square	-0.04
Standard Error	0.15
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.00
Sum of sq residuals	0.51
F-statistic	0.10
Significance F	0.76



Coefficient Results

Constant Variable				
Coefficient	0.22			
Standard error	0.09			
t-statistic	2.44			
P-value	0.02	t-critical	2.07	5%
Lower 95%	0.03	t-critical	1.71	-5%
Upper 95%	0.41	F (1, 22)	4.3	
ln 1970				
Coefficient	-0.02			
Standard error	0.06			
t-statistic	-0.31			
P-value	0.76			
Lower 95%	-0.15			
Upper 95%	0.11			

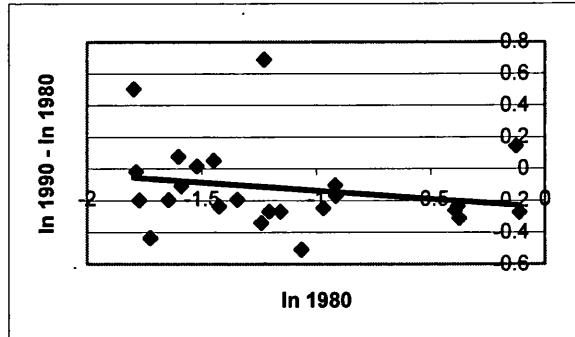
The R squared, following a decade by decade analysis as mentioned in Chapter 7, is 0 for the decade 1970-1980. The F statistic is not significant, while the coefficient is negative and not significant and therefore there is no convergence.

7- Regression 1990-1980

Regression results period

R Square	0.04
Adjusted R Square	0.00
Standard Error	0.27
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.07
Sum of sq residuals	1.63
F-statistic	0.95
Significance F	0.34

x= ln 1980; y= ln 1990-1980



Coefficient Results

Constant Variable				
Coefficient	-0.24			
Standard error	0.13	t-critical	2.07	5%
t-statistic	-1.78	t-critical	1.717	-5%
P-value	0.09	F (1, 22)	4.3	
Lower 95%	-0.52			
Upper 95%	0.04			
ln 1980				
Coefficient	-0.10			
Standard error	0.11			
t-statistic	-0.97			
P-value	0.34			
Lower 95%	-0.32			
Upper 95%	0.12			

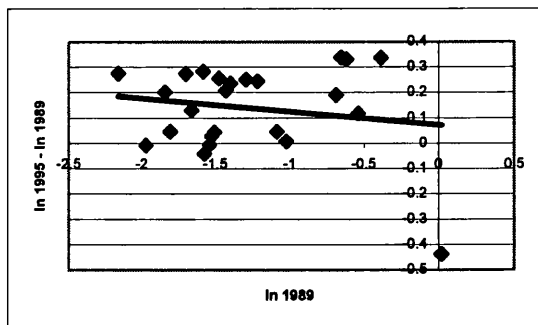
The R square is low and so is the F statistic, which is not significant. The coefficient on initial income is negative and not significant and therefore, this decade is of no convergence

8- Regression 1995- 1990

Regression results period

R Square	0.03
Adjusted R Square	-0.02
Standard Error	0.18
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.02
Sum of sq residuals	0.68
F-statistic	0.62
Significance F	0.44

x= ln 1990; y= ln 1995-1990



Coefficient Results

Constant Variable				
Coefficient	0.07			
Standard error	0.09	t-critical	2.07	5%
t-statistic	0.79	t-critical	1.717	-5%
P-value	0.44	F (1, 22)	4.3	
Lower 95%	-0.12			
Upper 95%	0.26			
ln 1989				
Coefficient	-0.05			
Standard error	0.07			
t-statistic	-0.78			
P-value	0.44			
Lower 95%	-0.19			
Upper 95%	0.09			

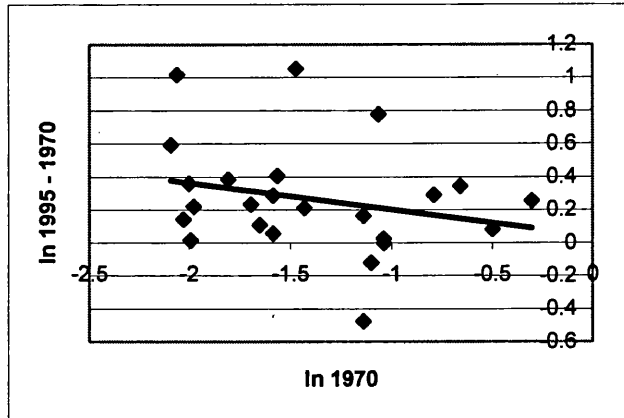
The F statistic is not significant, and the coefficient of correlation is very low. The coefficient on initial income is negative though not significant. The subperiod is of no convergence. When comparing to regression 5 it can be seen that the inclusion (or exclusion) of one year can make a significant difference for convergence.

9- Regression 1995- 1970

x= ln 1970; y= ln 1995-1970

Regression results period

R Square	0.06
Adjusted R Square	0.02
Standard Error	0.33
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.16
Sum of sq residuals	2.46
F-statistic	1.47
Significance F	0.24



Coefficient Results

Constant Variable	
Coefficient	0.04
Standard error	0.20
t-statistic	0.20
P-value	0.84
Lower 95%	-0.37
Upper 95%	0.45
ln 1970	
Coefficient	-0.16
Standard error	0.13
t-statistic	-1.21
P-value	0.24
Lower 95%	-0.44
Upper 95%	0.11

t-critical	2.07	5%
t-critical	1.717	-5%
F (1, 22)	4.3	

A regression for the subperiod 1970-1995 shows that the R squared is low the F statistic is not significant and the coefficient, though negative, is not significant. This subperiod is then of no convergence.

10- Regression 1995- 1961 and education (1947)
x1= ln 1961; x2= education 1947; y ln 1995 - ln 1961

Regression results period

R Square	0.13
Adjusted R Square	0.05
Standard Error	0.38
Observations	24.00
Degrees of freedom	21.00
Regression sum of s	0.48
Sum of sq residuals	3.11
F-statistic	1.64
Significance F	0.22

Coefficient Results

Constant Variable

Coefficient	-0.27
Standard error	0.95
t-statistic	-0.29
P-value	0.78
Lower 95%	-2.25
Upper 95%	1.70

ln 1961

Coefficient	-0.28
Standard error	0.16
t-statistic	-1.76
P-value	0.09
Lower 95%	-0.62
Upper 95%	0.05

Education (1947)

Coefficient	0.00
Standard error	0.01
t-statistic	0.36
P-value	0.72
Lower 95%	-0.02
Upper 95%	0.02

t-critical	1.721
t-critical	2.08
F(2,21)	3.47

11- Regression 1995-1961 with education (1960)
x1= ln 1961; x2= education 1960; y ln 1995 - ln 1961

Regression results period

R Square	0.19
Adjusted R Square	0.11
Standard Error	0.37
Observations	24.00
Degrees of freedom	21.00
Regression sum of s	0.69
Sum of sq residuals	2.91
F-statistic	2.48
Significance F	0.11

Coefficient Results

Constant Variable

Coefficient	-3.72
Standard error	3.00
t-statistic	-1.24
P-value	0.23
Lower 95%	-9.96
Upper 95%	2.53

ln 1961

Coefficient	-0.39
Standard error	0.18
t-statistic	-2.22
P-value	0.04
Lower 95%	-0.76
Upper 95%	-0.03

Education (1960)

Coefficient	0.04
Standard error	0.03
t-statistic	1.26
P-value	0.22
Lower 95%	-0.03
Upper 95%	0.10

10%
5

The regression with education rates from 1947 reveals that the adjusted R squared is lower than that in regression 1. The fit of the regression has therefore not improved by the additional variable. The F statistic is not significant. While the coefficient on ln 1961 is negative and significant only at the 10% level; that for education is not significant, though it is positive

R squared - and adjusted R squared- are higher than for the unconditional case (regression 1). The F statistic is lower and still not significant. The coefficient on initial income is negative and significant at both 5 and 10% (in regr 1 the coefficient is only significant at 10%). The fit of the regression has then improved. When looking at the coefficient on education, this is of the expected (+) sign though not significant. The positive correlation between education and growth indicates that those provinces with higher education levels grow - on average - more than those with lower education.

12- Regression with agriculture and industry
x1= agriculture 1970, x2= industry; y= ln 1995- ln 1961
Regression results period

R Square	0.25
Adjusted R Square	0.14
Standard Error	0.37
Observations	24.00
Degrees of freedom	20.00
Regression sum of s	0.91
Sum of sq residuals	2.68
F-statistic	2.25
Significance F	0.11

Coefficient Results

Constant Variable		
Coefficient	0.34	
Standard error	0.28	
t-statistic	1.18	
P-value	0.25	
Lower 95%	-0.26	
Upper 95%	0.93	
ln 1961		
Coefficient	-0.34	
Standard error	0.15	
t-statistic	-2.20	
P-value	0.04	
Lower 95%	-0.66	
Upper 95%	-0.02	
Agriculture		
Coefficient	-0.01	
Standard error	0.01	
t-statistic	-1.26	
P-value	0.22	
Lower 95%	-0.03	
Upper 95%	0.01	
Industry		
Coefficient	-0.01	
Standard error	0.01	
t-statistic	-1.57	
P-value	0.13	
Lower 95%	-0.03	
Upper 95%	0.00	
t-critical	1.725	10%
t-critical	2.09	5%
F(3,20)	3.10	

The R squared in this regression appears to have increased considerably, though when accounting for the degrees of freedom it can be seen that the increase is not that much and when compared to the R squared of regression 1 it can be seen that the fit of the regression has not improved significantly. The F statistic is still not significant.

The coefficient on initial income is negative and significant while the coefficients for agriculture and industry are negative but not significant.

13- Regression 1995-1961 (educ, ind and agr)
x1= agr, x2= ind, x3= educ; y= ln 1995- ln 1961
Regression results period

R Square	0.32
Adjusted R Square	0.18
Standard Error	0.36
Observations	24.00
Degrees of freedom	19.00
Regression sum of s	1.15
Sum of sq residuals	2.44
F-statistic	2.24
Significance F	0.10

Coefficient Results

Constant Variable		
Coefficient	-3.66	
Standard error	2.92	
t-statistic	-1.25	
P-value	0.23	
Lower 95%	-9.76	
Upper 95%	2.45	
ln 1961		
Coefficient	-0.47	
Standard error	0.18	
t-statistic	-2.63	
P-value	0.02	
Lower 95%	-0.85	
Upper 95%	-0.10	
Agriculture		
Coefficient	-0.01	
Standard error	0.01	
t-statistic	-1.17	
P-value	0.25	
Lower 95%	-0.03	
Upper 95%	0.01	
Industry		
Coefficient	-0.01	
Standard error	0.01	
t-statistic	-1.73	
P-value	0.10	
Lower 95%	-0.03	
Upper 95%	0.00	
Education		
Coefficient	0.04	
Standard error	0.03	
t-statistic	1.38	
P-value	0.19	
Lower 95%	-0.02	
Upper 95%	0.10	
t-critical	2.09	10%
t-critical	1.73	5%
F(4,19)	2.90	

In this regression, the R squared is higher and when looking at the adjusted R square the regression has a better fit than regression 1 and regressions 10, 11 and 12. The F statistic, however, is still not significant. The coefficient on ln 1961 is negative and significant at both levels of confidence. Agriculture and industry both display negative coefficients and while it is not significant for agriculture it is for industry though marginally. The coefficient on education is positive and not significant.

14. Dummy variables, whole period

Dummy: Tierra del Fuego =1; 0 otherwise

Regression results period

R Square	0.17
Adjusted R Square	0.09
Standard Error	0.38
Observations	24.00
Degrees of freedom	21.00
Regression sum of s	0.59
Sum of sq residuals	3.00
F-statistic	2.08
Significance F	0.15

Coefficient Results

Constant Variable	
Coefficient	0.22
Standard error	0.30
t-statistic	0.73
P-value	0.47
Lower 95%	-0.40
Upper 95%	0.83
Dummy T.Fuego	
Coefficient	-0.43
Standard error	0.46
t-statistic	-0.95
P-value	0.35
Lower 95%	-1.38
Upper 95%	0.52
In 1961	
Coefficient	-0.17
Standard error	0.17
t-statistic	-1.02
P-value	0.32
Lower 95%	-0.53
Upper 95%	0.18

t-critical 5%	2.08
t-critical 10%	1.72
F(2,21)	3.47

The analysis of the dummy variables for the whole period shows a not significant F statistic and although the coefficient is negative it is still not significant. The coefficient on the dummy (Tierra del Fuego) is negative and not significant. For the whole period there is no convergence when considering the dummy variable for Tierra del Fuego

15. Dummy variables 1961-1973 Tierra del Fuego

Regression results period

R Square	0.34
Adjusted R Square	0.28
Standard Error	0.19
Observations	24.00
Degrees of freedom	21.00
Regression sum of s	0.37
Sum of sq residuals	0.73
F-statistic	5.36
Significance F	0.01

Coefficient Results

Constant Variable	
Coefficient	0.44
Standard error	0.12
t-statistic	3.67
P-value	0.00
Lower 95%	0.19
Upper 95%	0.69
Dummy T.Fuego	
Coefficient	0.08
Standard error	0.08
t-statistic	0.94
P-value	0.36
Lower 95%	-0.10
Upper 95%	0.25
In 1961	
Coefficient	-0.67
Standard error	0.20
t-statistic	-3.27
P-value	0.00
Lower 95%	-1.09
Upper 95%	-0.24

The subperiod 1961-1973 has a higher R squared than regression 14 (and 2) indicating a better fit. This can also be seen by the highly significant F statistic. Regarding the coefficients, for the In 1961, the coefficient is negative and significant and that for the dummy variable is positive though not significant. This regression therefore indicates a much better fit and stronger convergence and, although the dummy variable is not significant, it shows a positive correlation between Tierra del Fuego and convergence in the period

16. Dummy variables 1983-1973 Tierra del Fuego

Regression results period

R Square	0.50
Adjusted R Square	0.46
Standard Error	0.16
Observations	24.00
Degrees of freedom	21.00
Regression sum of s	0.58
Sum of sq residuals	0.57
F-statistic	10.66
Significance F	0.00

Coefficient Results

Constant Variable	
Coefficient	0.28
Standard error	0.09
t-statistic	3.07
P-value	0.01
Lower 95%	0.09
Upper 95%	0.47
Dummy T.Fuego	
Coefficient	0.45
Standard error	0.20
t-statistic	2.29
P-value	0.03
Lower 95%	0.04
Upper 95%	0.86
In 1973	
Coefficient	0.15
Standard error	0.07
t-statistic	2.25
P-value	0.04
Lower 95%	0.01
Upper 95%	0.29

t-critical 5%	2.08
t-critical 10%	1.72
F(2,21)	3.47

17. Dummy variables 1983-1990 Tierra del Fuego

Regression results period

R Square	0.15
Adjusted R Square	0.07
Standard Error	0.26
Observations	24.00
Degrees of freedom	21.00
Regression sum of s	0.24
Sum of sq residuals	1.38
F-statistic	1.82
Significance F	0.19

Coefficient Results

Constant Variable	
Coefficient	0.16
Standard error	0.14
t-statistic	1.13
P-value	0.27
Lower 95%	-0.13
Upper 95%	0.45
Dummy T.Fuego	
Coefficient	-0.04
Standard error	0.32
t-statistic	-0.13
P-value	0.90
Lower 95%	-0.70
Upper 95%	0.62
In 1983	
Coefficient	0.16
Standard error	0.10
t-statistic	1.65
P-value	0.11
Lower 95%	-0.04
Upper 95%	0.37

For this subperiod, the R squared (and the adjusted) are much higher than in previous regressions. The F statistic is also higher and significant, indicating a much better fit. The coefficient on initial income is positive and significant, pointing out at a divergence in the subperiod. The coefficient on the dummy variable for Tierra del Fuego is positive and also significant. It can be concluded that this subperiod is one of divergence among the Argentine provinces and that this effect can be associated to the behaviour of the province of Tierra del Fuego (as seen in the sigma analysis in Chapter 7, figures 7.10, 7.13 and 7.18)

This subperiod has a similar R and adjusted R squared than regression 14. The F statistic is not significant. The coefficient for initial income is positive and not significant while that for the dummy variable is negative and not significant. This subperiod seems to indicate that there is no convergence. However, the negative sign for the dummy variable indicates a reversal in the relationship

18. Dummy variables 1995-1990 Tierra del Fuego

Regression results period

R Square	0.74		
Adjusted R Square	0.71		
Standard Error	0.13		
Observations	24.00		
Degrees of freedom	21.00		
Regression sum of s	0.98		
Sum of sq residuals	0.35	t-critical 5%	2.08
F-statistic	29.48	t-critical 10%	1.72
Significance F	0.00	F(2,21)	3.47

Coefficient Results

Constant Variable	
Coefficient	0.14
Standard error	0.07
t-statistic	2.19
P-value	0.04
Lower 95%	0.01
Upper 95%	0.28
Dummy T.Fuego	
Coefficient	-1.01
Standard error	0.14
t-statistic	-7.38
P-value	0.00
Lower 95%	-1.30
Upper 95%	-0.73
In 1990	
Coefficient	0.00
Standard error	0.05
t-statistic	0.05
P-value	0.96
Lower 95%	-0.10
Upper 95%	0.11

The R squared is significantly higher, even higher than that of regression 16. The F statistic is also highly significant, indicating this is the best fit so far.

The coefficient on initial income (In 1990) is negligible and not significant while the dummy variable is negative and highly significant, capturing all the effect of the convergence in this subperiod.

It is interesting to compare these results to those of regression 8, for the same period but without allowing for the dummy variable. When including the province of Tierra del Fuego, it can be seen that there was strong convergence in the period where it seemed from Regression 8 there was no convergence

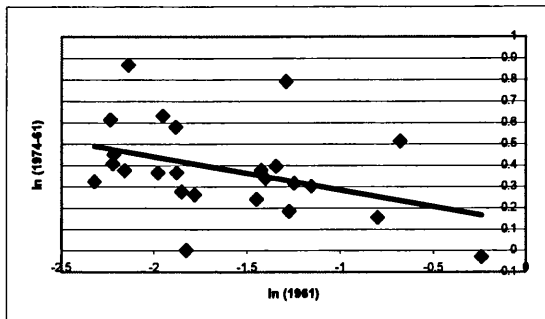
19. Macroeconomic Variables

Regression (19a) - low inflation 1961/1974

x= ln 1961; y = ln 1974- ln 1961

Regression results period

R Square	0.16
Adjusted R Square	0.12
Standard Error	0.20
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.17
Sum of sq residuals	0.88
F-statistic	4.13
Significance F	0.05



Coefficient Results

Constant Variable				
Coefficient	0.13			
Standard error	0.13			
t-statistic	1.00			
P-value	0.33			
Lower 95%	-0.14			
Upper 95%	0.40			
In 1961		t-critical	2.07	5%
Coefficient	-0.16	t-critical	1.72	10%
Standard error	0.08	F (1, 22)	4.30	
t-statistic	-2.03			
P-value	0.05			
Lower 95%	-0.31			
Upper 95%	0.00			

In this subperiod the F statistic is only marginally significant
 The coefficient on ln 1961 is negative and also marginally significant at the 5% level (though significant at 10%)
 therefore the subperiod 1961-1974 is one of weak convergence

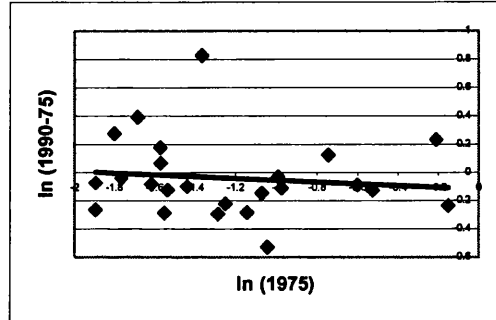
19. Macroeconomic Variables

Regression (19b) - high inflation 1975-1990

x= ln 1975; y = ln 1990- ln 1975

Regression results period

R Square	0.01
Adjusted R Square	-0.03
Standard Error	0.28
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.02
Sum of sq residuals	1.76
F-statistic	0.29
Significance F	0.59



Coefficient Results

Constant Variable				
Coefficient	-0.12			
Standard error	0.16			
t-statistic	-0.76			
P-value	0.46			
Lower 95%	-0.44			
Upper 95%	0.20			
In 1975		t-critical	2.07	5%
Coefficient	-0.06	t-critical	1.72	10%
Standard error	0.12	F (1, 22)	4.30	
t-statistic	-0.54			
P-value	0.59			
Lower 95%	-0.31			
Upper 95%	0.18			

In this period the R squared is very low, indicating no correlation among the variables. The F statistic is not significant. The beta coefficient is negative and not significant so for this period there is no convergence

19c- Using dummy variables

2 regressions (a) low inflation 1961-1974; (b) high inflation 1975-1990

Dummy=0 for the first subperiod and is 1 for the second subperiod

Regression results period

R Square	0.47			
Adjusted R Square	0.43			
Standard Error	0.25			
Observations	48.00			
Degrees of freedom	47			
Regression sum of s	2.31	t-critical	2.02	5%
Sum of sq residuals	2.65	t-critical	1.68	10%
F-statistic	12.79	F (3, 44)	2.84	
Significance F	0.00			

Coefficient Results

Constant Variable	
Coefficient	0.13
Standard error	0.16
t-statistic	0.81
P-value	0.42
Lower 95%	-0.19
Upper 95%	0.45
dummy	
Coefficient	-0.25
Standard error	0.21
t-statistic	-1.19
P-value	0.24
Lower 95%	-0.67
Upper 95%	0.17
In 1974	
Coefficient	-0.16
Standard error	0.09
t-statistic	-1.66
P-value	0.10
Lower 95%	-0.34
Upper 95%	0.03
Dummy X	
Coefficient	0.09
Standard error	0.14
t-statistic	0.67
P-value	0.51
Lower 95%	-0.19
Upper 95%	0.37

F statistic is significant but the coefficients on the dummy and initial income are not significant and only marginally respectively. Coefficient of dummy x, which shows by how much the coefficient x of the second period, exceeds that of the first, and since this is not significant we cannot reject the hypothesis that the extent of the convergence is the same for both subperiods

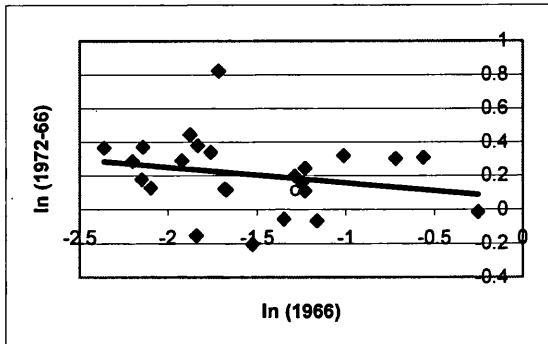
20- Political Variables

Regression (20a) - military government 1966-1972

x= ln 1966; y = ln 1972- ln 1966

Regression results period

R Square	0.05
Adjusted R Square	0.01
Standard Error	0.22
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.06
Sum of sq residuals	1.05
F-statistic	1.22
Significance F	0.28



Coefficient Results

Constant Variable	
Coefficient	0.07
Standard error	0.14
t-statistic	0.48
P-value	0.63
Lower 95%	-0.22
Upper 95%	0.35
ln 1966	
Coefficient	-0.09
Standard error	0.08
t-statistic	-1.11
P-value	0.28
Lower 95%	-0.27
Upper 95%	0.08

t-critical	2.07	5%
t-critical	1.72	10%
F (1, 22)	4.30	

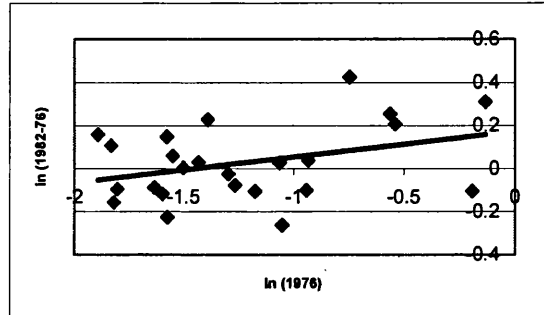
The subperiod 1966- 1972 the R squared is very low and the F statistic is not significant. The coefficient on ln 1966 is negative and not significant at either 5 or 10% and therefore there is no convergence for this period

Regression (20b) - military government 1976-1982

x= ln 1976; y = ln 1982- ln 1976

Regression results period

R Square	0.12
Adjusted R Square	0.08
Standard Error	0.17
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.08
Sum of sq residuals	0.61
F-statistic	3.01
Significance F	0.10



Coefficient Results

Constant Variable				
Coefficient	0.17			
Standard error	0.09			
t-statistic	1.91			
P-value	0.07			
Lower 95%	-0.02			
Upper 95%	0.36			
ln 1976		t-critical	2.07	5%
Coefficient	0.12	t-critical	1.72	10%
Standard error	0.07	F (1, 22)	4.30	
t-statistic	1.74			
P-value	0.10			
Lower 95%	-0.02			
Upper 95%	0.26			

In the case of the second military period, the F statistic is not significant, though the regression has a better fit as indicated by a higher R squared.

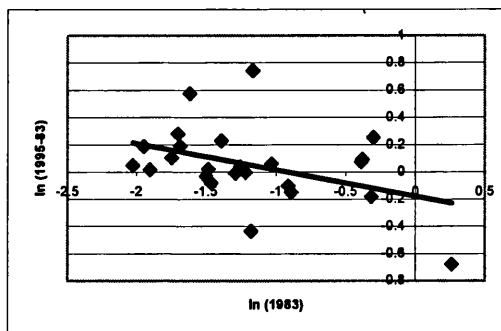
The coefficient on initial income is significant at the 10% level and is positive, indicating divergence- albeit weak- in this period

Regression (20c) - democratic government 1983-1995

x= ln 1983; y = ln 1995- ln 1983

Regression results period

R Square	0.17
Adjusted R Square	0.13
Standard Error	0.26
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.31
Sum of sq residuals	1.53
F-statistic	4.43
Significance F	0.05



Coefficient Results

Constant Variable	
Coefficient	-0.18
Standard error	0.12
t-statistic	-1.46
P-value	0.16
Lower 95%	-0.43
Upper 95%	0.08
ln 1983	
Coefficient	-0.19
Standard error	0.09
t-statistic	-2.10
P-value	0.05
Lower 95%	-0.38
Upper 95%	0.00

t-critical	2.07	5%
t-critical	1.72	10%
F (1, 22)	4.30	

The democratic period is significant and shows a slightly higher R squared. The coefficient on ln 1983 is significant at both 5 and 10% and is negative. Therefore, there was convergence in the period 1983- 1995

20d- (a) military 1976-82; (b) democracy 1983-1995

Dummy=0 for the first subperiod and is 1 for the second subperiod

Regression results period

R Square	0.14
Adjusted R Square	0.08
Standard Error	0.15
Observations	48.00
Degrees of freedom	44.00
Regression sum of s	0.16
Sum of sq residuals	1.00
F-statistic	2.37
Significance F	0.08

Coefficient Results

Constant Variable

Coefficient	0.17
Standard error	0.08
t-statistic	2.12
P-value	0.04
Lower 95%	0.01
Upper 95%	0.34

dummy

Coefficient	-0.26
Standard error	0.11
t-statistic	-2.44
P-value	0.02
Lower 95%	-0.48
Upper 95%	-0.05

In 1976

Coefficient	0.12
Standard error	0.06
t-statistic	1.93
P-value	0.06
Lower 95%	-0.01
Upper 95%	0.24

Dummy X

Coefficient	-0.22
Standard error	0.08
t-statistic	-2.66
P-value	0.01
Lower 95%	-0.38
Upper 95%	-0.05

t-critical	2.021	5%
t-critical	1.68	10%
F (3, 44)	2.84	

The F statistic is not significant. The coefficients are all significant and while that on initial income is positive, the dummy coefficients (belonging to the democratic period) are negative, indicating convergence in that period
Therefore we reject the hypothesis that the extent of converge is the same for both periods

20e- a)military 1966-1972, b)democracy 1983-95

Regression results period

R Square	0.2
Adjusted R Square	0.15
Standard Error	0.24
Observations	48
Degrees of freedom	44
Regression sum of s	0.66
Sum of sq residuals	3.73
F-statistic	0.02
Significance F	

Coefficient Results

Constant Variable

Coefficient	0.07
Standard error	0.15
t-statistic	0.44
P-value	0.66
Lower 95%	-0.24
Upper 95%	0.37

dummy

Coefficient	-0.24
Standard error	0.19
t-statistic	-1.29
P-value	0.20
Lower 95%	-0.62
Upper 95%	0.13

In 1976

Coefficient	-0.09
Standard error	0.09
t-statistic	-0.99
P-value	0.32
Lower 95%	-0.28
Upper 95%	0.09

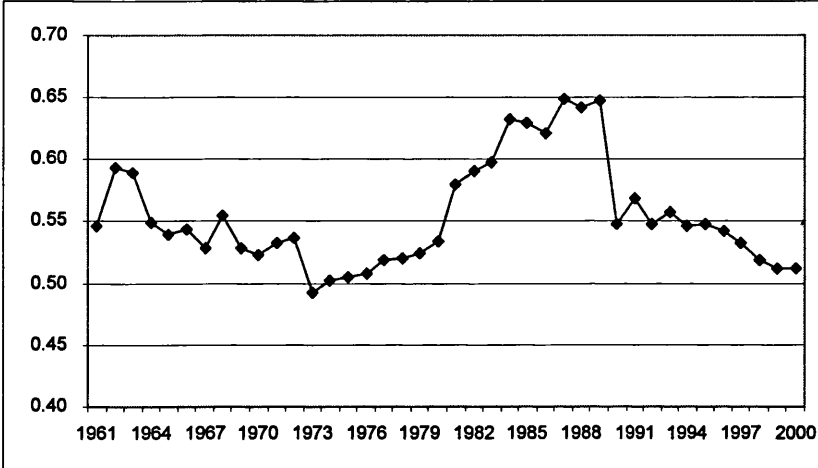
Dummy X

Coefficient	-0.10
Standard error	0.13
t-statistic	-0.80
P-value	0.43
Lower 95%	-0.36
Upper 95%	0.15

The F statistic in this regression is significant though the individual coefficients are not.
The hypothesis is rejected and therefore the convergence for both periods is not the same

V.e. Additional Data Argentina. Main sigma and beta results

Figure V.e.1. Sigma analysis including Escudero et al (2002)

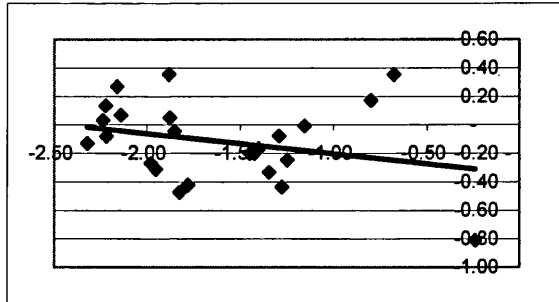


Source: UNLP, Escudero et al (2002) and own calculations

1b- Regression 1961-2000 (merging UNLP and OEI)

Regression results period

R Square	0.08
Adjusted R Square	0.03
Standard Error	0.27
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.14
Sum of sq residuals	1.65
F-statistic	1.83
Significance F	0.19



Coefficient Results

Constant Variable		t-critical	2.07	5%
Coefficient	-0.34		1.72	10%
Standard error	0.18	F (1, 22)	4.3	
t-statistic	-1.93			
P-value	0.07			
Lower 95%	-0.71			
Upper 95%	0.02			
ln (1940)				
Coefficient	-0.14			
Standard error	0.10			
t-statistic	-1.35			
P-value	0.19			
Lower 95%	-0.36			
Upper 95%	0.08			

The R square is small and the F statistic is not significant
 The coefficient on initial income is negative and not significant
 and therefore with the additional data the period has no convergence.

When comparing this regression with regression 1, the R-squared is smaller, the F-statistic is still not significant but even smaller than before and the coefficient on initial income is not significant at either 5 or 10 significance level (while for regression 1 it was significant at 10%).

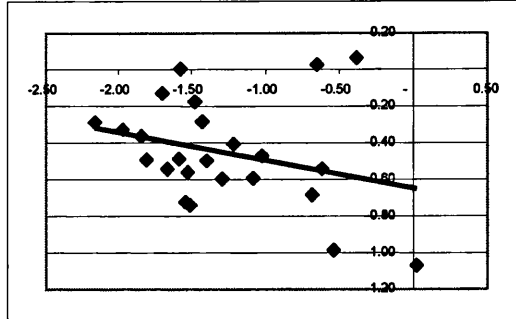
Given the inclusion of the 1996-2000 data made no difference for convergence (in fact the results display less significance) and the source is unknown, these data was left out of main analysis.

8b- Regression 1990-2000 - with the additional data

$x = \ln 1990; y = \ln 2000 - \ln 1990$

Regression results period

R Square	0.08
Adjusted R Square	0.04
Standard Error	0.28
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	0.16
Sum of sq residuals	1.75
F-statistic	2.02
Significance F	0.17



Coefficient Results

Constant Variable				
Coefficient	-0.65			
Standard error	0.15	t-critical	2.07	5%
t-statistic	-4.36	t-critical	1.72	10%
P-value	0.00	F (1, 22)	4.3	
Lower 95%	-0.96			
Upper 95%	-0.34			
ln (1990)				
Coefficient	-0.15			
Standard error	0.11			
t-statistic	-1.42			
P-value	0.17			
Lower 95%	-0.37			
Upper 95%	0.07			

The F observed is smaller than the critical and thus it is not significant. The correlation is very low in this regression while the coefficient on initial income is negative but not significant at either significance level. No convergence, though the significance levels in this regression are higher than those in regression 8.

21- Regression 1959-1998

R Square	0.42
Adjusted R Square	0.39
Standard Error	0.44
Observations	24.00
Degrees of freedom	22.00
Regression sum of s	3.08
Sum of sq residuals	4.31
F-statistic	15.72
Significance F	0.00

Coefficient Results

Constant Variable	
Coefficient	5.56
Standard error	1.51
t-statistic	3.67
P-value	0.00
Lower 95%	2.42
Upper 95%	8.70
ln 1961	
Coefficient	-0.26
Standard error	0.07
t-statistic	-3.96
P-value	0.00
Lower 95%	-0.40
Upper 95%	-0.13

This regression has a much higher R squared than regression 1 and F statistic is highly significant. The coefficient on initial income is negative (and the same as regression 1) but it is significant at either 5 or 10% - as opposed to the former, which was only significant at 10%. This regression shows a strong convergence rather than only a weak one - as in regression 1

This shows how the choice of period might make a significant difference (see page 203)

V.f. Econometric Results – Brazil*

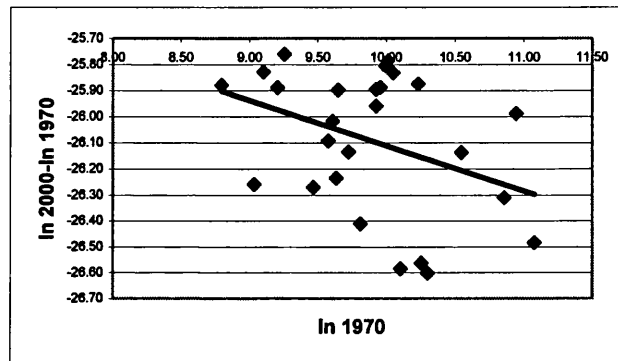
1- Regression 1970-2000

x=ln 1970

y= ln 2000 -ln 1970

Regression results period

R Square	0.14
Adjusted R Square	0.10
Standard Error	0.26
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.25
Sum of sq residuals	1.57
F-statistic	3.83
Significance F	0.06



Coefficient Results

Constant Variable		t critical (10%)	1.71
Coefficient	-24.38	t critical (5%)	2.06
Standard error	0.88	F (1, 24)	4.26
t-statistic	-27.82		
P-value	0.00		
Lower 95%	-26.19		
Upper 95%	-22.57		
ln (1970)			
Coefficient	-0.17		
Standard error	0.09		
t-statistic	-1.96		
P-value	0.06		
Lower 95%	-0.36		
Upper 95%	0.01		

The R square is low and the coefficient on the ln 1970 is negative, although not statistically significant at the 5% level but it is so at 10% level. The F statistic (3.83) is lower than the F critical (4.26) and therefore the regression is not statistically significant. Overall, the coefficients display the right sign, but the regressor's significance is only marginal.

* When running the regressions on this thesis, data available for Brazil was until the year 2000. However, more recent data on Brazil's regions GDP became available in the last stages of preparing this thesis. I have performed regression 1 including these new data and the results were unchanged for the R-squared and standard error of the regression; and slightly changed for the rest of the coefficients (RSS=1.58; F-statistic=4.03; constant coefficient= -24.24, t-statistic = -27.57; coefficient on initial income= -0.18, t-statistic=-2.01) and therefore the main results remain unaltered so data until 2000 will be considered for the rest of the analysis. The F-statistic is higher but still not significant although the coefficient on initial income is now statistically significant at both 5 and 10% levels.

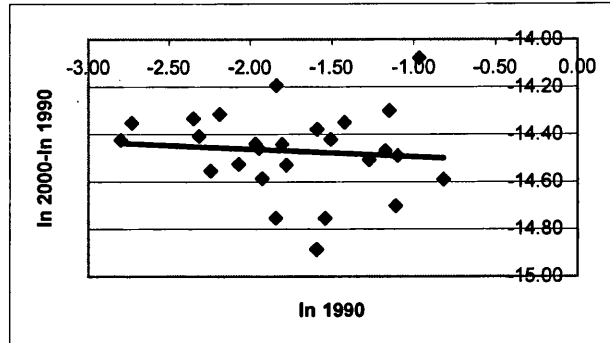
2-Regression 2000-1990

x= ln 1990

y= ln 2000 - ln 1990

Regression results period

R Square	0.01
Adjusted R Square	-0.03
Standard Error	0.18
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.01
Sum of sq residuals	0.77
F-statistic	0.21
Significance F	0.65



Coefficient Results

Constant Variable

Coefficient	-14.53		
Standard error	0.12		
t-statistic	-117.60	t critical (10%)	1.71
P-value	0.00	t critical (5%)	2.064
Lower 95%	-14.78	F(1,24)	4.26
Upper 95%	-14.27		

ln (1990)

Coefficient	-0.03
Standard error	0.07
t-statistic	-0.46
P-value	0.65
Lower 95%	-0.17
Upper 95%	0.11

When looking at the last decade considered, it can be seen that the R squared is very low (lower than regression 1) and so is the F statistic. When looking at the coefficient of ln 1990, it has a negative sign though this is not statistically significant at either 5 or 10% confidence levels. Therefore it can be concluded that in the decade 1990-2000 no convergence is found

3. Regression 1990-1980

$x = \ln 1980$

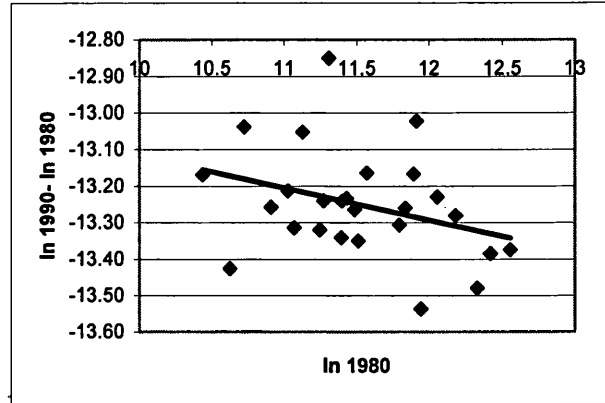
$y = \ln 1990 - \ln 1980$

Regression results period

R Square	0.11
Adjusted R Square	0.07
Standard Error	0.14
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.06
Sum of sq residuals	0.49
F-statistic	2.95
Significance F	0.10

Coefficient Results

Constant Variable	
Coefficient	-12.24
Standard error	0.59
t-statistic	-20.69
P-value	0.00
Lower 95%	-13.46
Upper 95%	-11.01
ln (1980)	
Coefficient	-0.09
Standard error	0.05
t-statistic	-1.72
P-value	0.10
Lower 95%	-0.19
Upper 95%	0.02



t critical (10%)	1.71
t critical (5%)	2.064
F(1,24)	4.26

In this subperiod, the R squared is much higher than the previous one and slightly lower than the regression for the whole period. The F statistic follows suit and therefore it is still not statistically significant. The coefficient for ln 1980 is again of negative sign and not significant at the 5% level but marginally significant at 10%. Therefore the subperiod 1990-1980 displays no conclusive convergent trend

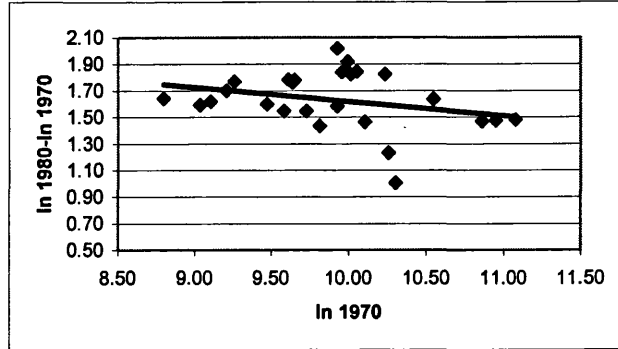
4. Regression 1980-1970

$x = \ln 1970$

$y = \ln 1980 - \ln 1970$

Regression results period

R Square	0.08
Adjusted R Square	0.04
Standard Error	0.21
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.10
Sum of sq residuals	1.09
F-statistic	2.13
Significance F	0.16



Coefficient Results

Constant Variable			
Coefficient	2.70		
Standard error	0.73	t critical (10%)	1.71
t-statistic	3.68	t critical (5%)	2.064
P-value	0.00	F(1,24)	4.26
Lower 95%	1.19		
Upper 95%	4.21		
$\ln(1970)$			
Coefficient	-0.11		
Standard error	0.07		
t-statistic	-1.46		
P-value	0.16		
Lower 95%	-0.26		
Upper 95%	0.04		

The subperiod 1980-1970 has a very low R squared, and again the F statistic is not significant. The coefficient on $\ln 1970$ is again of negative sign and not significant at either 5 or 10% of significance level. Therefore, the period 1980-1970 displays no convergence.

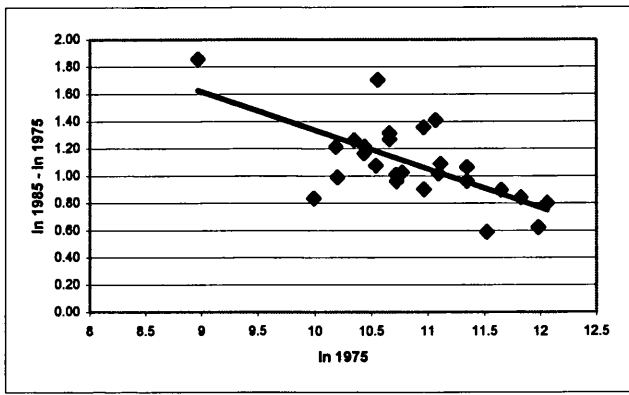
5. Regression 1985-1975

x= ln 1975

y= ln 1985- ln 1975

Regression results period

R Square	0.44
Adjusted R Square	0.42
Standard Error	0.22
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.92
Sum of sq residuals	1.18
F-statistic	18.78
Significance F	0.00



Coefficient Results

Constant Variable

Coefficient	4.16
Standard error	0.71
t-statistic	5.87
P-value	0.00
Lower 95%	2.70
Upper 95%	5.63

t critical (10%)	1.71
t critical (5%)	2.064
F(1,24)	4.26

ln (1975)

Coefficient	-0.28
Standard error	0.07
t-statistic	-4.33
P-value	0.00
Lower 95%	-0.42
Upper 95%	-0.15

This subperiod was chosen to replicate the break given by the sigma analysis. It can be seen that in this case the R square is the highest so far and that the F statistic is highly significant. When looking at the coefficient on ln 1975 this is not only negative but it is also significant at both 5 and 10% confidence levels. It can safely be concluded then that following the breaks given by the sigma analysis (see Figure 9.14 in Chapter 9) the subperiod 1975-1985 is one of strong convergence among the Brazilian states.

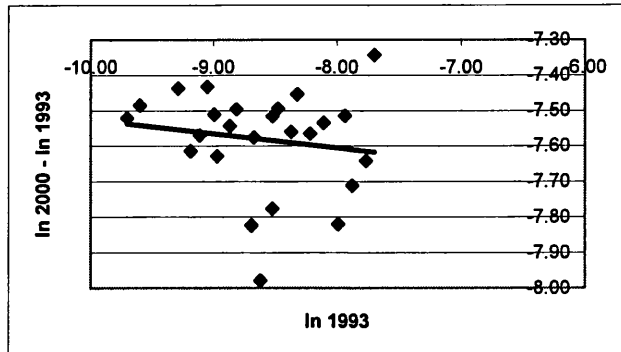
6. Regression 2000-1993

x= ln 1993

y= ln 2000- ln 1993

Regression results period

R Square	0.02
Adjusted R Square	-0.02
Standard Error	0.14
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.01
Sum of sq residuals	0.49
F-statistic	0.58
Significance F	0.45



Coefficient Results

Constant Variable			
Coefficient	-7.93		
Standard error	0.45		
t-statistic	-17.45	t critical (10%)	1.71
P-value	0.00	t critical (5%)	2.064
Lower 95%	-8.86	F(1,24)	4.26
Upper 95%	-6.99		
ln (1993)			
Coefficient	-0.04		
Standard error	0.05		
t-statistic	-0.76		
P-value	0.45		
Lower 95%	-0.15		
Upper 95%	0.07		

This subperiod also complements the analysis following the sigma breaks as described in Chapter 9. This subperiod displays a very low R Squared and a non significant F statistic. The coefficient on the dependent variable is negative but not significant and therefore it can be concluded that the period 1993-2000 is one of non convergence

7. Regression 2000-1970 with education

x1= ln 1970

x2= education

y= ln 2000- ln 1970

Regression results period

R Square	0.33
Adjusted R Square	0.27
Standard Error	0.23
Observations	26.00
Degrees of freedom	23.00
Regression sum of s	0.60
Sum of sq residuals	1.21
F-statistic	5.73
Significance F	0.01

Coefficient Results

Constant Variable

Coefficient	-21.38
Standard error	1.40
t-statistic	-15.27
P-value	0.00
Lower 95%	-24.28
Upper 95%	-18.48

ln (1970)

Coefficient	-0.59
Standard error	0.18
t-statistic	-3.29
P-value	0.00
Lower 95%	-0.96
Upper 95%	-0.22

t critical (10%)	1.71
t critical (5%)	2.06
F(2,23)	3.42

Education

Coefficient	0.02
Standard error	0.01
t statistic	2.59
P-value	0.02
Lower 95%	0.00
Upper 95%	0.03

The conditional convergence analysis for the whole period including the enrollement rates give a higher R squared than the unconditional model, even when corrected by the degrees of freedom (adjusted R squared).

The F statistic is significant. The coefficient on ln 1970 is negative and significant at both 5 and 10% levels of confidence. The coefficient on education displays the right sign (positive) and is also significant, highlighting a relationship between the higher the level of education and the higher the growth for a given state.

Overall the conditional regression reveals that, when allowing for the differences in education levels among states, there was convergence for the period under study.

8. regression with agriculture and industry shares

x1= ln 1970

x2 = share of agriculture as % of GDP

x3 = share of industry as % of GDP

y = ln 2000- ln 1970

Regression results period

R Square	0.33
Adjusted R Square	0.24
Standard Error	0.24
Observations	26.00
Degrees of freedom	22.00
Regression sum of s	0.59
Sum of sq residuals	1.22
F-statistic	3.57
Significance F	0.03

Coefficient Results

Constant Variable

Coefficient	-23.66
Standard error	0.91
t-statistic	-26.05
P-value	0.00
Lower 95%	-25.55
Upper 95%	-21.78

ln (1970)

Coefficient	-0.26
Standard error	0.09
t-statistic	-2.76
P-value	0.01
Lower 95%	-0.45
Upper 95%	-0.06

Agriculture

Coefficient	0.04
Standard error	0.02
t-statistic	2.23
P-value	0.04
Lower 95%	0.00
Upper 95%	0.07

t critical (10%)	1.71
t critical (5%)	2.07
F(3, 22)	3.05

Industry

Coefficient	0.00
Standard error	0.01
t-statistic	-0.41
P-value	0.69
Lower 95%	-0.02
Upper 95%	0.02

The R squared in this regression is the same as the conditional case with only education though obviously the adjusted R is lower because of the loss of degrees of freedom). The F statistic is also significant, though not as significant as when including only education Regarding the coefficients, ln 1970 has a negative and significant coefficient; while agriculture displays a positive and also significant coefficient while industry a positive and not significant The coefficient in agriculture implies that there is a positive correlation between those states that have higher agricultural share of GDP and their rate of growth. The regression displays convergence

9. Regression 2000-1970 with agriculture, industry and education

x1= ln 1970

x2 = education

x3 = share of agriculture as % of GDP

x4 = share of industry as % of GDP

y = ln 2000- ln 1970

Regression results period

R Square	0.41
Adjusted R Square	0.29
Standard Error	0.23
Observations	26.00
Degrees of freedom	21.00
Regression sum of s	0.74
Sum of sq residuals	1.08
F-statistic	3.61
Significance F	0.02

Coefficient Results

Constant Variable

Coefficient	-21.67
Standard error	1.47
t-statistic	-14.73
P-value	0.00
Lower 95%	-24.73
Upper 95%	-18.61

ln (1970)

Coefficient	-0.54
Standard error	0.19
t-statistic	-2.85
P-value	0.01
Lower 95%	-0.93
Upper 95%	-0.15

Education

Coefficient	0.01
Standard error	0.01
t-statistic	1.68
P-value	0.11
Lower 95%	0.00
Upper 95%	0.03

Agriculture

Coefficient	0.02	t critical (10%)	1.72
Standard error	0.02	t critical (5%)	2.08
t-statistic	1.33	F(3,21)	3.07
P-value	0.20		
Lower 95%	-0.01		
Upper 95%	0.06		

Industry

Coefficient	0.00
Standard error	0.01
t-statistic	-0.06
P-value	0.95
Lower 95%	-0.02
Upper 95%	0.02

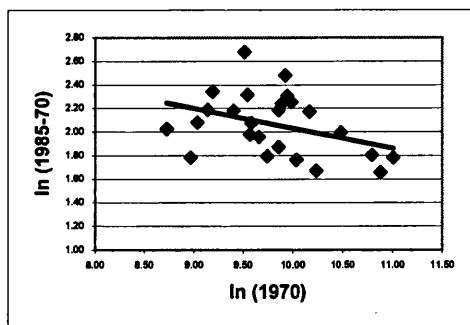
In this regression, the R squared increased, though when looking at the adjusted r squared this increase has not been dramatic. The F statistic is significant and the coefficient on ln 1970 is negative and significant implying convergence. The coefficient for education is positive and not significant at either confidence level Both agriculture and industry have positive but not significant coefficients.

Regression (10a) - military government 1970-1985

x= ln 1970; y = ln 1985- ln 1970

Regression results period

R Square	0.15
Adjusted R Square	0.12
Standard Error	0.24
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.26
Sum of sq residuals	1.43
F-statistic	4.32
Significance F	0.05



Coefficient Results

Constant Variable	
Coefficient	3.79
Standard error	0.84
t-statistic	4.53
P-value	0.00
Lower 95%	2.07
Upper 95%	5.52
ln (1970)	
Coefficient	-0.18
Standard error	0.08
t-statistic	-2.08
P-value	0.05
Lower 95%	-0.35
Upper 95%	0.00

F(1, 24)=	4.26
t crit (5%)=	2.06
t crit (10%)=	1.71

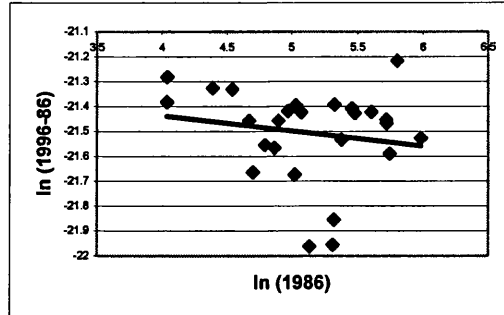
The R square in this regression is fairly similar to that of regression 1 (for the whole period, unrestricted). The F statistic, however, is significant in this regression. It seems as if all the convergence of the whole 1970-2000 period was captured in this subperiod. the coefficient on initial income is negative and significant at both levels therefore, the period is one of convergence

Regression (10b) - democratic government 1986-2000

x= ln 1986; y = ln 2000- ln 1986

Regression results period

R Square	0.01
Adjusted R Square	-0.03
Standard Error	0.20
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.01
Sum of sq residuals	1.00
F-statistic	0.26
Significance F	0.62



Coefficient Results

Constant Variable			
Coefficient	-21.18		
Standard error	0.41	F(1, 24)=	4.26
t-statistic	-51.97	t crit (5%)=	2.06
P-value	0.00	t crit (10%)=	1.71
Lower 95%	-22.02		
Upper 95%	-20.34		
ln (1986)			
Coefficient	-0.04		
Standard error	0.08		
t-statistic	-0.51		
P-value	0.62		
Lower 95%	-0.20		
Upper 95%	0.12		

The R squared for this subperiod is very low, in fact it displays results similar to regression 2 for the period 1990-2000. The F statistic in this case is also not significant, seeming that this regression captures the effect of the last decade.

Regarding the coefficient on initial income the coefficient is negative and not significant at any confidence level.

The subperiod is then one of no-convergence

10c- Using dummy variables

2 regressions (a) military 1970-85; (b) democracy 1986-2000

Dummy=0 for the first subperiod and is 1 for the second subperiod

R Square	1.00		
Adjusted R Square	1.00		
Standard Error	0.22		
Observations	52.00		
Degrees of freedom	48.00		
Regression sum of s	7145.04	F(3, 45)	2.81
Sum of sq residuals	2.43	t-critical 5%	2.01
F-statistic	47072.73	t-critical 10%	1.68
Significance F	0.00		

Coefficient Results

Constant Variable

Coefficient	3.79
Standard error	0.77
t-statistic	4.92
P-value	0.00
Lower 95%	2.24
Upper 95%	5.35

Dummy

Coefficient	-24.98
Standard error	0.89
t-statistic	-27.96
P-value	0.00
Lower 95%	-26.77
Upper 95%	-23.18

In 1970

Coefficient	-0.18
Standard error	0.08
t-statistic	-2.26
P-value	0.03
Lower 95%	-0.33
Upper 95%	-0.02

DX

Coefficient	0.14
Standard error	0.12
t-statistic	1.17
P-value	0.25
Lower 95%	-0.10
Upper 95%	0.37

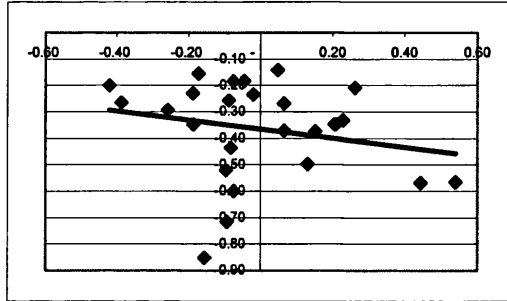
This regression is significant. However, the unusually high F statistic is explained by the massive difference in constant term. The coefficient on initial income is negative and significant, but the coefficient on dummy x is positive and not significant therefore we cannot reject the hypothesis that the extent of convergence is the same for both periods.

11. Macroeconomic variables. Regression (11b) - low inflation (1970-86)

$x = \ln 1970; y = \ln 1986 - \ln 1970$

Regression results period

R Square	0.18
Adjusted R Square	0.15
Standard Error	0.23
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.30
Sum of sq residuals	1.31
F-statistic	5.44
Significance F	0.03



Coefficient Results

Constant Variable	
Coefficient	-2.84
Standard error	0.80
t-statistic	-3.54
P-value	0.00
Lower 95%	-4.49
Upper 95%	-1.18
ln (1970)	
Coefficient	-0.19
Standard error	0.08
t-statistic	-2.33
P-value	0.03
Lower 95%	-0.36
Upper 95%	-0.02

F(1, 24)=	4.26
t crit (5%)=	2.06
t crit (10%)=	1.71

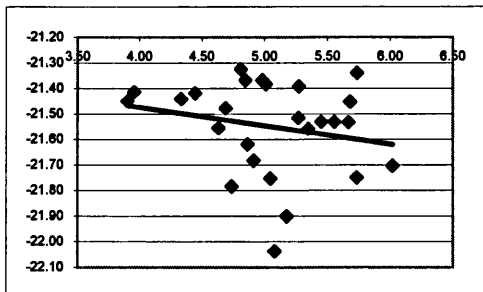
The F statistic in this regression is significant the coefficient on initial income is negative and highly significant and therefore in this subperiod there is convergence.

11. Macroeconomic variables. Regression (11b) - high inflation (1987-94)

$x = \ln 1987$; $y = \ln 1994 - \ln 1987$

Regression results period

R Square	0.05
Adjusted R Square	0.01
Standard Error	0.18
Observations	26.00
Degrees of freedom	24.00
Regression sum of s	0.04
Sum of sq residuals	0.79
F-statistic	1.14
Significance F	0.30



Coefficient Results

Constant Variable			
Coefficient	-21.18	F(1, 24)=	4.26
Standard error	0.34	t crit (5%)=	2.06
t-statistic	-61.74	t crit (10%)=	1.71
P-value	0.00		
Lower 95%	-21.89		
Upper 95%	-20.48		
ln 1987			
Coefficient	-0.07		
Standard error	0.07		
t-statistic	-1.07		
P-value	0.30		
Lower 95%	-0.21		
Upper 95%	0.07		

This subperiod displays a much lower R squared than the previous equation. The F statistic is not significant and the coefficient, though negative, is not significant. This subperiod is therefore one of no convergence among the states.

11.c- Macroeconomic Variables, Dummy analysis, 1970-1986 and 1987-1994

Regression results period

R Square	1.00
Adjusted R Square	1.00
Standard Error	0.31
Observations	52.00
Degrees of freedom	48.00
Regression sum of s	19164.83
Sum of sq residuals	4.48
F-statistic	68458.47
Significance F	0.00

Coefficient Results

Constant Variable			
Coefficient	-2.84	F(3, 45)	2.81
Standard error	1.05	t-critical 5%	2.01
t-statistic	-2.71	t-critical 10%	1.68
P-value	0.01		
Lower 95%	-4.94		
Upper 95%	-0.73		
dummy			
Coefficient	-39.52		
Standard error	1.20		
t-statistic	-32.93		
P-value	0.00		
Lower 95%	-41.93		
Upper 95%	-37.11		
ln			
Coefficient	-0.19		
Standard error	0.11		
t-statistic	-1.78		
P-value	0.08		
Lower 95%	-0.40		
Upper 95%	0.02		
dx			
Coefficient	0.04		
Standard error	0.16		
t-statistic	0.28		
P-value	0.78		
Lower 95%	-0.27		
Upper 95%	0.36		

Both r squared and F are hugely significant. However, it is the coefficient on the dummy x the one we are mostly interested in. This is positive and not significant, so again, as in the case of political variables we cannot reject the hypothesis that the extent of convergence is the same for both periods.

V.g. Brazil - Using 1995 as base year (instead of 1986)

As can be seen in this and the following page, the main results (R squared, F statistic, standard error, and coefficient of initial year) remain unaltered using 1995 as base year instead of 1986. The only change is that of the constant term, but that is irrelevant for our analysis of convergence.

Vg.1- Regression 1970-2000

x=ln 1970

y= ln 2000 -ln 1970

Regression results period

R Square	0.14
Adjusted R Square	0.10
Standard Error	0.26
Observations	26.00
Degrees of freedom	24
regression sum of s	0.25
sum of sq residuals	1.57
f statistic	3.83
significance f	0.06

Coefficient Results

Constant	
coefficient	-20.57
standard error	2.62
t statistic	-8.01
P-value	0.00
Lower 95%	-26.37
Upper 95%	-15.56
ln (1970)	
coefficient	-0.17
standard error	0.09
t statistic	-1.96
P-value	0.06
Lower 95%	-0.36
Upper 95%	0.01

Vg.2- Regression 1990-2000

x=ln 1990

y= ln 2000 -ln 1990

Regression results period

R Square	0.01
Adjusted R Square	-0.03
Standard Error	0.18
Observations	26.00
Degrees of freedom	24.00
regression sum of s	0.01
sum of sq residuals	0.77
f statistic	0.21
significance f	0.65

Coefficient Results

Constant	
coefficient	-13.91
standard error	1.23
t statistic	-11.33
P-value	0.00
Lower 95%	-16.44
Upper 95%	-11.38
ln (1970)	
coefficient	-0.03
standard error	0.07
t statistic	-0.46
P-value	0.65
Lower 95%	-0.17
Upper 95%	0.11

Vg.3- Regression 1990-1980

x=ln 1980
y= ln 1990 -ln 1980

Regression results period	
R Square	0.11
Adjusted R Square	0.07
Standard Error	0.14
Observations	26.00
Degrees of freedom	24
regression sum of s	0.06
sum of sq residuals	0.49
f statistic	2.95
significance f	0.10

Coefficient Results

Constant	
coefficient	-10.50
standard error	1.60
t statistic	-6.56
P-value	0.00
Lower 95%	-13.80
Upper 95%	-7.20
ln (1980)	
coefficient	-0.09
standard error	0.05
t statistic	-1.72
P-value	0.10
Lower 95%	-0.19
Upper 95%	0.02

Vg.4- Regression 1980-1970

x=ln 1970
y= ln 1980 -ln 1970

Regression results period	
R Square	0.08
Adjusted R Square	0.40
Standard Error	0.21
Observations	26.00
Degrees of freedom	24.00
regression sum of s	0.01
sum of sq residuals	1.09
f statistic	2.13
significance f	0.16

Coefficient Results

Constant	
coefficient	4.82
standard error	2.19
t statistic	2.20
P-value	0.04
Lower 95%	0.31
Upper 95%	9.34
ln (1970)	
coefficient	-0.11
standard error	0.07
t statistic	-1.46
P-value	0.16
Lower 95%	-0.26
Upper 95%	0.04

V.h. Heteroskedasticity

As already mentioned in the methodological notes, all regressions have been tested for heteroskedasticity by Goldfeld – Quandt test and the summary of the findings are the following.

Brazil.

The data for Brazil has been ordered and divided into two separate regressions, each with 10 observations (the 6 observations in the middle were omitted). A ratio was then calculated between the sum of square residuals of each in order to test the hypothesis of homoscedasticity, which is tested with an F critical (in this case equals 3.44 at the 95% level and 6.03 at 99%). All the regressions for Brazil presented an F observed smaller than the F critical at 99% level and therefore homoscedasticity was not rejected. There were a few regressions for which homoscedasticity was rejected at the 95% level, and these were the regressions for 1990-2000; 1970-1980 and 1993-2000.

Argentina.

Data for Argentina was divided into 2 regressions with 8 observations each (omitting the middle 8 observations) and in all regressions except that for 1961-1995 with education levels of 1960, the hypothesis of homoscedasticity could not be rejected at 99% level. At 95% level, however, the regressions for 1989-1995; 1970-1980; 1961-1995 with education levels of 1947 (and that with industry, agriculture and education); as well as the two equations with the data from Escudero et al (2002) for 1961-2000 and 1990-2000.

European Union.

For the European Union regions for the period 1960-1973 there are 37 observations and therefore were divided into two regressions with 13 observations each (11 were left out). This regression rejected the hypothesis of homoscedasticity at 95% level, though it could not be rejected at 99%.

For the same period, the countries were divided into three groups of two observations each and the middle one was omitted. This regression did not reject the hypothesis of homoscedasticity. For the period 1973-1988, two regressions of 18 observations each were done out of a total 48 observations.

For the countries, two regressions of three observations each were calculated. Both regressions could not reject the hypothesis of homoscedasticity. Finally, for the period 1988-1995, the 59 observations belonging to the regions were divided into two separate regressions of 10 observations each, omitting the middle 19 observations. For the 12 countries, two separate regressions of 4 observations were constructed. In both the hypothesis of homoscedasticity was not rejected, at either 95 or 99% level.

The following table shows the results for the Goldfeld-Quandt test performed for all regressions. The table displays the year, number of regression as in Appendix V, the F-observed (the ratio of the two RSS from the two independent regressions), the F critical and, where applicable, the F critical at 99%.

Regr.	Brazil	F obs	F crit	F crit 99%
1)	1970-2000	1.93	3.44	
2)	1990-2000	5.55	3.44	6.03
3)	1980-1990	0.69	3.44	
4)	1970-1980	3.62	3.44	
5)	1975-1985	0.33	3.44	
6)	1986-2000	4.38	3.44	6.03
7)	1970-2000, ed.	1.71	3.79	
8)	1970-2000, agr, ind	2.13	4.28	
9)	1970-2000, agr, ind, ed	4.26	5.05	
10)	1970-1985	0.77	3.44	
11)	1986-2000	2.36	3.44	
12)	1970-1986	0.63	3.44	
13)	1987-1994	0.76	3.44	
Vg.1)	1970-2000	3.23	3.44	
Vg.2)	1990-2000	5.55	3.44	6.03
Vg.3)	1980-1990	0.69	3.44	
Vg.4)	1970-1980	0.31	3.44	
Regr.	Argentina	F obs	F crit	F crit 99%
1)	1961-1995	1.92	4.28	
2)	1961-1973	1.06	4.28	
3)	1973-1983	3.23	4.28	
4)	1983-1989	0.31	4.28	
5)	1989-1995	6.88	4.28	8.47
6)	1970-1980	8.03	4.28	8.47
7)	1980-1990	0.29	4.28	
8)	1990-1995	3.35	4.28	
9)	1970-1995	0.9	4.28	
10)	1961-1995, ed 47	6.8	5.05	11
11)	1961-1995 ed 60	11.84	5.05	11
12)	1961-1995, agr, ind	4.7	6.39	
13)	1961-1995, agr, ind, educ	4.45	6.54	
19a)	1961-1974	1.38	4.28	
19b)	1975-1990	1.19	4.28	
20a)	1966-1972	0.73	4.28	
20b)	1976-1982	2.49	4.28	
20c)	1983-1995	1.78	4.28	
Ve.1b)	1961-2000	4.6	4.28	
Ve.9b)	1990-2000	4.51	4.28	8.47
Regr.	European Union	F obs	F crit	F crit 99%
1)	1960-1973	4.73	2.98	4.85
2)	1960-1973	84.5	161	
3)	1973-1988	0.03	2.35	
4)	1973-1988	0.04	161	
5)	1988-1995	0.81	2.27	
6)	1988-1995	0.23	19	

APPENDIX VI

Chronology of Events

VI.a. Chronological List of Regional Trade Arrangements notified to GATT

TITLE	MEMBERS	YEAR
France-Italy Interim Customs Union	France, Italy	1947
South African-Southern Rhodesian Customs Union	South Africa, Southern Rhodesia	1948
Nicaragua and El Salvador Free Trade Area	El Salvador, Nicaragua	1951
European Coal and Steel Community	Belgium, France, Italy, Luxembourg, Netherlands, West Germany	1951
European Economic Community	Belgium, France, Italy, Luxembourg, Netherlands, West Germany Denmark, Ireland and the United Kingdom joined 1973 Greece joined in 1981 Portugal and Spain joined 1986 Austria, Sweden, Finland in 1995	1958
Central American Free Trade Area	Costa Rica, El Salvador, Guatemala, Honduras Nicaragua	1958
European Free Trade Association	Austria, Denmark, Norway, Portugal, Sweden, Switzerland, United Kingdom Denmark and UK left 1973 Iceland joined in 1970 Finland became full member in 1970 Portugal left in 1986	1960
Latin American Free Trade Association	Argentina, Brazil, Chile, Mexico, Paraguay, Peru, Uruguay Colombia, Ecuador joined in 1961	1960
Central American Common Market	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua	1960
Arab Common Market	United Arab Republic	1964
Central African Economic Customs Union	Central African Republic, Chad Congo, Gabon	1964
Canada-US Automotive Agreement	Canada, United States	1965
Australia-New Zealand Free Trade Agreement	Australia, New Zealand	1965
United Kingdom- Ireland Free Trade Agreement	Ireland, United Kingdom	1965

TITLE	MEMBERS	YEAR
Caribbean Free Trade Agreement	Barbados, Guyana, Trinidad and Tobago	1968
Andean Pact	Bolivia, Chile, Colombia, Ecuador, Peru Venezuela joined in 1973 Chile left in 1976	1969
Caribbean Community and Common Market	Barbados, Guyana, Trinidad and Tobago Other countries joined in 1974	1973
ASEAN Preferential Trading Agreements	Indonesia, Malaysia, Philippines, Singapore, Thailand Brunei joined in 1988	1977
Latin American Integration Association	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela	1979
Australia-New Zealand Closer Economic Relations Trade Agreement	Australia, New Zealand	1983
Free Trade Agreement between Israel and the United States	Israel, United States	1985
Single European Act	Belgium, France, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom, West Germany	1986
Programme of Economic Integration and Cooperation	Argentina, Brazil	1986
Canada-United States Free Trade Area	Canada, United States	1988
Enterprise for the Americas Initiative	all American countries	1990
Treaty of Asuncion- MERCOSUR	Argentina, Brazil, Paraguay Uruguay Bolivia and Chile became associate members in 1996	1991
EFTA- EEC agreement	EFTA, EEC	1991
Treaty of the European Union	EEC countries	1992
North American Free Trade Area	Canada, United States, Mexico	1994

Source: Campos Filho (1999)

VI.b Main Developments in the European Union

- 1945 Second World War ends
- 1946 “European Reconstruction” or Marshall Plan of reconstruction aid for Europe
- 1949 Creation of the German Democratic Republic
- 1950 The Schuman declaration, calling for the creation of a European Coal and Steel Community (ECSC)
- 1951 The Treaty of Paris forming the ECSC
- 1957 The Treaties of Rome were signed, one creating the European Economic Community (EEC) and the other the European Atomic Energy Community (Euratom)
- 1960 Organisation of European Economic Cooperation (OEEC) becomes the Organisation for Economic Co-operation and Development (OECD)
The Stockholm Convention was signed, creating the European Free Trade Area (EFTA)
- 1961 Britain, Ireland and Denmark apply for membership. President de Gaulle refuses
- 1964 The Merger Treaty joined the ECSC, Euratom and the EEC
- 1967 Second British attempt to join
- 1971 Collapse of the Bretton-Woods system
- 1973 First oil crisis
First enlargement (UK, Ireland and Denmark)
The people of Norway vote against entry to the EEC
- 1979 Launch of European Monetary System, Britain does not join
First elections of the European Parliament
- 1981 Greece joins the EEC
- 1985 Spain and Portugal join by signing the Treaty of Accession
- 1986 The Single European Act (SEA) was signed
- 1989 German reunification
- 1991 Treaties of the European Union are signed at Maastricht (Dec.)
- 1995 Austria, Sweden and Finland join the Union
- 1997 The Amsterdam Treaty
- 1998 European Monetary Union countries are decided
- 2002 The Euro is launched

VI.c Chronology of Events in Argentina from Colonial Times

- 1536 The city of Buenos Aires is founded
- 1545 Silver mines are discovered in Potosí
- 1622 The *Aduana Seca* was established in Córdoba
- 1696 The *Aduana Seca* was moved from Córdoba to Tucumán
- 1767 The Jesuits were expelled from Spanish territories
- 1776 The viceroyalty of the Río de la Plata is created
- 1777 *Aduana Seca* was abolished
- 1778 Free Trade was proclaimed in the port of Buenos Aires
- 1808 French invasion of Spain
- 1810 Formation of the first independent government, of a provisional nature (Primera Junta)
- 1811 A Triunvirate government replaces the Junta
- 1813 *Ley de vientres*, slavery is abolished
- 1816 Independence is declared in Tucumán
- 1820 Battle of Cepeda, Buenos Aires is defeated and the Constitution of 1819 is eliminated
- 1825 Argentina and Brazil go to war for the *Provincia Cisplatina* (nowadays Uruguay)
- 1826 Unitary Constitution
- 1828 The independence of the *Provincia Cisplatina* is declared
- 1833 Rosas dictatorship begins
- 1852 Rosas is defeated in the Battle of Caseros
- 1853 National Constitution promulgated
- 1854 The construction of the first railway began
- 1862 Mitre is elected president
- 1865 Triple Alliance is established between Brazil, Argentina and Uruguay against Paraguay
- 1869 First national census
- 1870 The war against Paraguay ends
- 1880 Roca becomes president, following a successful campaign to extend the south frontier, *Campaña del Desierto*
- 1916 Hipolito Yrigoyen becomes the first elected president of Argentina by universal and compulsory suffrage
- 1930 Military coup, Uriburu takes power
- 1932 The war of Chaco begins between Bolivia and Paraguay

- 1933 Roca-Runciman Treaty
- 1940 Ramón Castillo becomes president following the death of Ortiz
- 1943 Military Coup
- 1946 Perón becomes president
- 1951 Perón is elected president again
- 1952 Evita Perón dies
- 1955 *Revolucion Libertadora*, Military coup takes over, Perón goes into exile
- 1958 Arturo Frondizi becomes president
- 1962 The military overthrow Frondizi and put José María Guido in charge of the presidency
- 1963 Arturo Illia is elected president
- 1966 General Onganía takes over the presidency, *Revolución Argentina*
- 1969 *El Cordobazo*, workers and students' demonstration
- 1970 Onganía deposed and replaced by Levingston and then Lanusse
- 1972 Perón returns to Argentina after 17 years of exile
- 1973 The formula Perón-Perón is elected
- 1974 Following the death of Perón, his wife assumes the presidency
Military coup led by Videla, initiating the "process of national reorganization", an unprecedented violent period
- 1979 Conflict over the Beagle Channel with Chile
- 1981 Viola takes power and later that year was removed and replaced by Galtieri
- 1982 Falklands War against the United Kingdom
- 1983 End of military government and Alfonsín is elected president
- 1985 The government launches the Plan Austral to curb inflation
- 1990 Hyperinflation, Alfonsín leaves the government before its time and is replaced by the newly elected president Menem
- 1992 Inflation is curbed following the Plan Convertibilidad, designed by minister Cavallo
- 1995 Menem is elected for a second term
- 1996 Finance Minister Domingo Cavallo is dismissed. General strike in September
- 1999 De la Rúa wins the presidency
- 2000 Strikes and fuel tax protests
- 2001 Crisis deepens, changes and resignations in the cabinet. President De la Rúa resigns in December and Duhalde appointed as caretaker president
- 2003 Nestor Kirchner sworn in as president

VI.d Chronology of Events in Brazil from Colonial Times

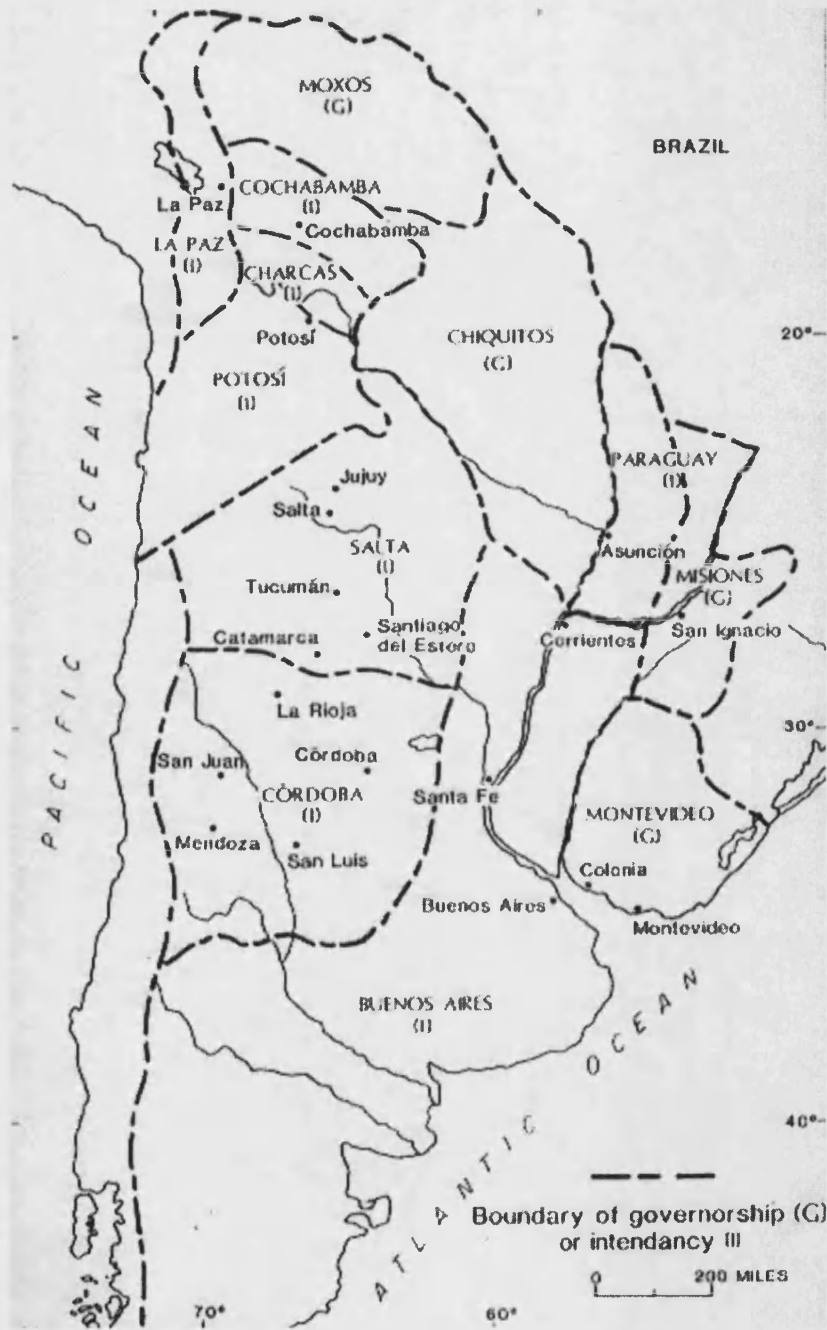
- 1500 Cabral's expedition arrives in Brazil
- 1525 Sebastian Caboto disembarks in Brazil
- 1530 The system of hereditary captaincies is implemented by Dom João III
- 1538 The first African slaves arrive in Brazil
- 1549 Tome de Sousa becomes the first governor general of Brazil
Salvador is founded
- 1559 The 'carta regia' facilitates the imports of slaves for sugar plantation owners
- 1624 Dutch invasions of Bahía
- 1625 The Dutch leave Bahía
- 1630 Invasion of Pernambuco by the Dutch
- 1654 The Dutch are finally defeated
- 1750 Treaty of Madrid, recognising Portuguese rights over the territories west from the meridian of Tordesillas
- 1759 The Jesuits are expelled from Brazil
Hereditary captaincies are abolished and the territory belongs to the Crown
- 1763 Rio de Janeiro becomes the capital of the viceroyalty
- 1808 Napoleon invades Portugal
The Portuguese court arrives in Brazil
Free trade in all ports of Brazil is established
- 1818 The prince regent becomes king with the title of Dom João VI, following the death of Queen Dona Maria I in 1816
- 1821 Dom João VI returns to Portugal
- 1822 The prince regent Dom Pedro refuses to leave Brazil (*dia do fico*) and proclaims the independence of Brazil
- 1824 First Constitution
The United States recognises the independence of Brazil
- 1825 Argentina and Brazil go to war for the *Provincia Cisplatina* (present Uruguay)
Portugal recognises the independence of Brazil
- 1826 Dom Pedro becomes king of Portugal and abdicates in favour of his daughter Dona Maria da Gloria
- 1828 The independence of the *Provincia Cisplatina* is declared
- 1831 Dom Pedro I abdicates
Provisional Triunvirate Regency is established followed by a permanent Triunvirate

- 1838 The Marques de Olinda is elected as regent of the Empire
- 1840 Dom Pedro II becomes the second emperor of Brazil
- 1854 Electricity and gas are installed in Rio de Janeiro
- 1865 Triple Alliance is established between Brazil, Argentina and Uruguay against Paraguay
- 1870 The war against Paraguay ends
- 1871 *Lei do Ventre Livre* is issued, whereby children of slaves are born free
- 1877 Drought in the northeast
- 1888 End of slavery in Brazil (*Lei Aurea*)
- 1889 The Republic of Brazil is proclaimed
- 1891 First Constitution of the Republic is proclaimed
- 1908 First wave of Japanese immigrants arrives in Brazil
- 1930 Getulio Vargas comes to power
- 1934 New Constitution is proclaimed
The Congress appoints Vargas as elected president of the Republic
- 1937 Following a coup, Vargas closes the Congress, issues a new Constitution and bans political parties
- 1940 A minimum wage is established
- 1942 Brazil joins the Second World War, following a German attack on Brazilian ships
- 1945 Vargas resigns under increasing military pressure
National elections, Dutra is elected president
- 1946 *Assamblea Nacional Constituinte* issues the new Constitution
- 1951 Vargas assumes the Presidency again, following his electoral victory
- 1953 Petrobras is created
- 1954 Vargas imposes more restrictions on foreign capital and suggests the creation of Electrobras
Militars issue a manifesto in which they demand that the president resigns
Vargas commits suicide and Café Filho assumes the presidency
- 1955 Kubitschek is elected president
- 1956 The economic plan *Cinquenta anos en cinco* (fifty years in five) is launched
- 1957 Construction of Brasilia begins
- 1959 The project for Sudene is approved
- 1960 Brasilia is inaugurated
- 1964 Military coup, Castelo Branco assumes the presidency
- 1965 Monetary reform, the *cruzeiro novo* is launched

- 1967 Costa e Silva becomes the new president
- 1970 Opposition to government becomes more evident with guerrilla movements in the cities
- 1972 The Transamazonica Highway is inaugurated
- 1973 President Medici signs an agreement with the Paraguayan dictator Stroessner to commence the building of the hidroelectrical power plant in Itaipú
- 1979 Amnesty laws are passed and hundreds of exiles return to Brazil
- 1980 Economic crisis worsens, followed by strikes and demonstrations
- 1982 Itaipú is inaugurated
External Debt Crisis, Brazil admits that cannot meet the debt services
- 1985 Electoral Congress appoints Tancredo Neves as president, who dies before assuming the presidency
Sarney assumes the presidency
- 1986 *Plano Cruzado* to curb inflation and stabilise the economy is launched
Elections for an Assembleia Constituinte
- 1987 Extremely high inflation rates, the crisis worsens
- 1988 New Constitution
- 1989 Collor de Melo becomes the first president elected by direct vote since 1960
- 1990 New economic plan, new currency and freeze of bank deposits for 18 months
Treaty of free trade with Argentina is signed
- 1991 Inflation increases again and crisis worsens
- 1992 Under corruption allegations, Collor is replaced by Itamar Franco
- 1993 A new currency, the *crusero real* is launched in an attempt to curb inflation
- 1994 Cardoso elected president
- 1997 Constitutional changes to allow for a presidential re-election
- 1998 Cardoso is re-elected
- 2001 The president abolishes 2 development agencies for the amazon and the north east under allegations of stealing funds
- 2002 Currency hits all-time low. Lula da Silva is elected president.

MAPS

Map of Colonial Argentina



Source: Rock (1986)

Map of Modern Argentina



Source: www.lanic.utexas.edu/maps/

Map of Colonial Brazil



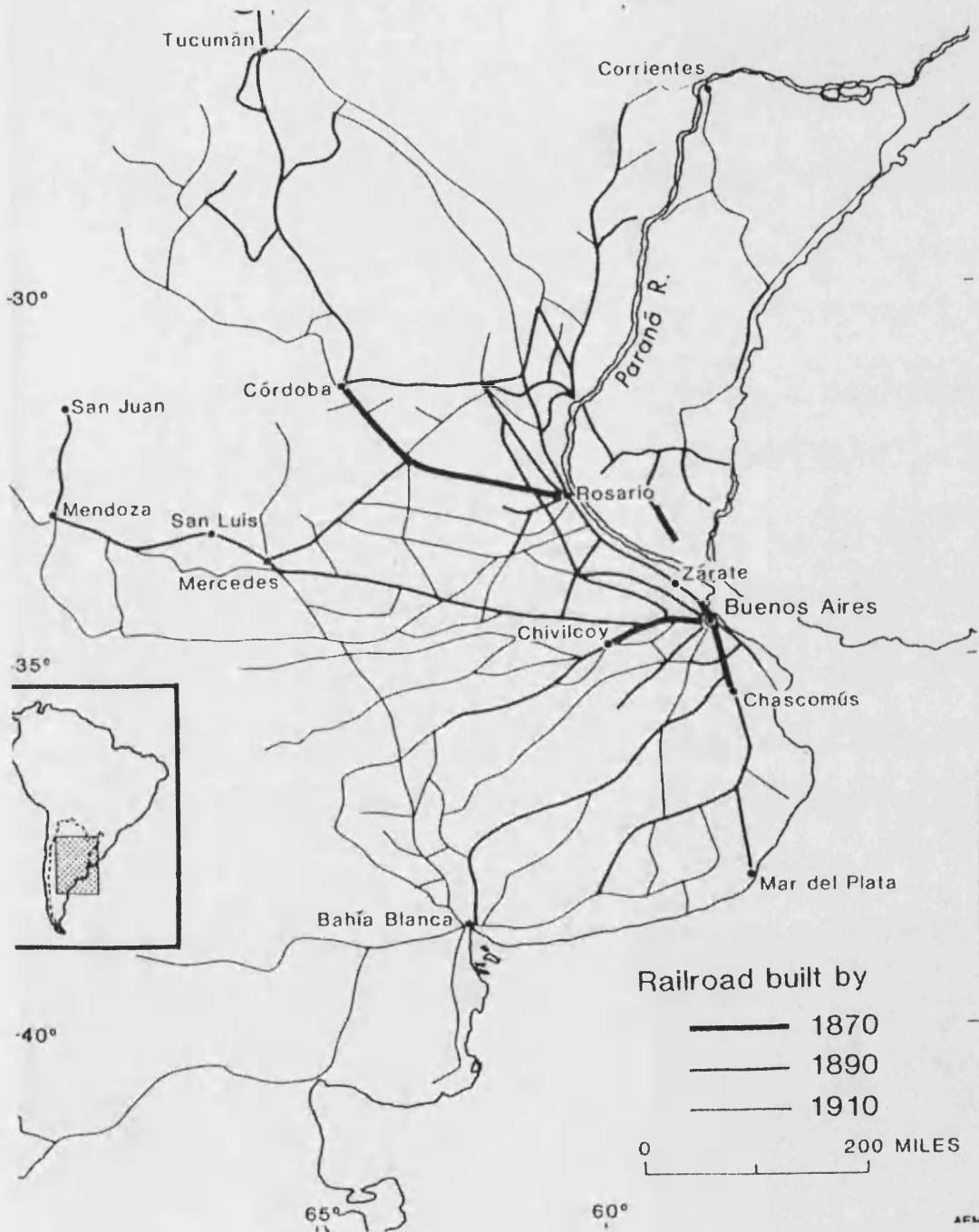
Source: Fausto (1998)

Map of Modern Brazil



Source: www.lanic.utexas.edu/maps/

Map of Railways Argentina



Source: Rock (1986)

Map of Railways Brazil (by 1930)



Source: Topik (1987)

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