

Macro-Economic Stabilisation and
Structural Reform:
A Political Economy Approach to Emerging
Economies

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Abstract

The subject of this thesis is to explore the interaction between the political setting, and stabilisation and reform outcomes in emerging economies. It is motivated by the observation that during the last decades numerous governments in emerging economies have made major efforts to achieve macro-economic stability and advances in economic reforms; necessary changes in economic policy, however, frequently created strong political opposition from those particular interests that stood to lose from them, and thus often failed to be implemented.

This thesis contributes to the study of the most important questions in this context, namely why and how countries slide down the path to macro-economic chaos, and under which conditions attempts to reverse the economic free-fall will be successfully pursued. Moreover, which are the reforms needed to improve the situation fundamentally, and how they can be successfully implemented given the political constraints. More specifically it studies the structural reasons leading to high inflation, and the requirements to achieve sustainable price stability. It then turns to major areas of economic reform, namely privatisation and improved governance. It studies how the political setting influences privatisation outcomes, and shows that press freedom is an important tool in fighting corruption, and thus in improving governance. It finally takes a concrete example, namely Russian regions, to study the impact of differences in the political setting and reform efforts, as well as other structural variables, on the economic outcomes.

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Introduction

During the last decades numerous governments in emerging economies have undertaken efforts to achieve macro-economic stability and advance economic reforms. The reason for the former was often that the macro-economic situation had deteriorated to a point where the country was on the brink of economic collapse, for example expressed by bursts of extreme inflation. The rationale for economic reform was that for macro-economic stability to be sustainable, the structural features of the economy had to be substantially altered. Not unexpectedly, however, changes in economic policy often created strong political opposition. Those particular interests that stood to lose from the policies necessary to stabilise the macro-economic situation, or from the changes structural reforms would bring, tried to block change.

The general subject of this thesis is to explore the interaction of the political setting with stabilisation and reform outcomes in emerging economies. Important questions in this context are why and how countries slide down the path to macro-economic chaos, and under which conditions attempts to reverse economic free-fall may be successfully pursued. Moreover, which are the reforms needed to improve the situation fundamentally, and how can they successfully be implemented given political constraints? More precisely, we investigate the structural reasons leading to high inflation, and the requirements necessary to achieve sustainable price stability. We then turn to two major areas of economic reform, namely privatisation and improved governance. We investigate how the political setting influences privatisation outcomes, and show that press freedom is an important tool in fighting corruption,

and thus in improving governance. We then use the concrete example of Russian regions to investigate the impact of differences in the political setting and reform efforts, as well as other structural variables, on economic outcomes.

In the following survey we give a brief overview of the main contributions related to problems of inflation crises and stabilisation policies, as well as to issues of structural reform. The parts of the survey addressing political economy issues of reform will concentrate on general reform issues, and on those areas of reform to which this thesis contributes, namely privatisation and improving governance.

Chapter 1

Survey: The Political Economy of Macro-Economic Crises and Structural Reform

1 Explaining inflation crises and political obstacles to macro-stabilisation

1.1 Understanding policies that lead to macro-economic in- stability and high inflation

It is not particularly controversial to state that a large number of countries in Latin America and Eastern Europe at certain moments pursued economic policies that led to large decreases in social welfare¹. However, traditional economic models were unable to explain this aberrant choice without assuming a large degree of irrationality on behalf of politicians. This obviously unsatisfactory situation gave

¹In order to keep in focus we do not go into detailed country studies here, but refer the reader to the very extensive literature on the subject. Dornbusch/Edwards 1994 provide a good starting point.

rise to formal political economy explanations. This literature often explains bad economic decision-making by invoking prisoner dilemma type situations. Typically a plurality of groups or institutions draws resources from a common pool. Moreover, while each party fully profits from the resources it obtains, it bears only a fraction of the costs that are connected with their generation, as these costs are socialised. Thus, in spite of the fact that overstretching the resource potential of the common pool generally creates a negative externality, and thus everybody would be better off under general restraint, each group will end up overdrawing resources as long as possible.

These prisoner dilemma type situations can, for example, occur in pure monetary games², where excessive money printing by multiple monetary authorities leads to excessive inflation. A situation of multiple monetary authorities arises typically in badly designed monetary unions. The monetary union following the break up of the Austro-Hungarian empire is the example par excellence of such a situation³.

However even when a currency union is designed in which a single central bank holds the authority of money creation, situations of excessive money growth with the resulting increases in inflation can occur. This is the case when members of a currency union can run excessive deficits or obtain overly generous loans from national branches of the central bank or other public banks (that are often *de facto* under the control of national politicians) that eventually will have to be covered by money creation. A good example is the case of the monetary union following the break up of the Soviet Empire⁴. While the authority to print bank notes stayed with the Russian Central Bank, other national central banks extended generous loans to ailing state enterprises that were rarely expected actually to be repaid⁵, creating large amounts of quasi-money, and refinancing themselves afterwards from the Russian

² Aizenmann 1992, 1998

³ See Dornbusch 1992

⁴ See Cheikbossian 2001

⁵ To be fair, it should be mentioned that the Russian Central Bank actively took part in this game by handing out huge amounts of soft loans to Russian state enterprises.

Central bank. Needless-to-say, that inflation skyrocketed and the currency union broke up fast.

Finally even monetary mismanagement within a single country can be explained along these lines. If a country is federally structured, or more generally if political power is sufficiently decentralised, local branches of the central bank or other regional public banks are often *de facto* under the influence of local politicians. They may thus be used to finance excessive public spending or unprofitable projects that politicians are interested in for electoral reasons, trusting that the central bank would bail them out should the need arise.

Slightly more general, although basically of the same flavour, are situations where non-cooperative behaviour in the presence of a common pool problem leads to budget deficits that are eventually monetised. In such a situation different interest groups, for example lobbies, “spending” ministries, or regions compete for transfers from a weak central government that result in budget deficits which ultimately have to be financed by money emission⁶.

In such a framework even positive economic shocks can - via an increase in distortive fiscal redistribution - lead to lower growth⁷.

While non-cooperative behaviour provides a good explanation of why crises occur, it is by itself unable to deliver cycles where periods of high inflation alternate with stabilisations that deliver temporary low inflation, as often observed in Southern cone countries such as Argentina or Brazil⁸. One possibility is to explain such cycles by explicitly considering changes in monetisation levels⁹. In a situation, where different interest groups extract transfers from a weak government financed by money emission, economic agents try to shield from inflation tax by avoiding local currency. Thus the inflation tax base decreases, and supposing that demands

⁶Velasco 1997, 1998a,b. See Rodden et al. 2003 and Fernandez-Arias et al. (forthcoming) for empirical evidence on bailouts of sub-national entities by central government.

⁷Tornell/Lane 1999

⁸See Kiguel/Liviathan 1994 for a description of these phenomena.

⁹Mondino et al 1996

for transfers stay constant in subsequent periods, the government progressively has to raise the inflation tax rate, that is, inflation. At the same time the tax base constantly diminishes as higher inflation leads to even more financial adaptation, that is a preference for other means of payment or saving to the detriment of the local currency. Thus rising inflation and demonetisation go hand in hand, until inflation rates reach a point where the negative externality from inflation is so strong that cooperative behaviour becomes a dominant strategy. Only then can stabilisation be achieved. However, once inflation has fallen, monetisation levels will increase again. Hence non-cooperative behaviour becomes the dominant strategy again, and a new inflation-financial adaptation spiral is set in motion.

An alternative explanation¹⁰ for cyclical changes in inflation rates sees “mega-inflation” periods as having the same function as price wars in models of oligopolistic competition under imperfect monitoring. Those periods of generalised suffering have for effect to restrain the greed of the groups that compete for oligopoly rents, i.e. seigniorage. In this interpretation the occurrence of “mega-inflation” outbursts are a sort of disciplining device to enforce periods of more moderate inflation.

However, while non-cooperative behaviour of different social actors provides a good explanation of suboptimal policy outcomes, it leads to a new puzzle. Policy outcomes in comparable countries from the same region facing similar macro-economic environments have often differed substantially. Given that common pool problems potentially exist in all countries, we need to explain why some countries avoided bad economic management, whereas uncooperative behaviour resulted in economic chaos in others.

The pattern of how the competition for political power takes place, as well as the rules of everyday policymaking and the structure of the administration seem to play important roles¹¹. So far it has been shown, both theoretically and empirically,

¹⁰Zarazaga 1996

¹¹See Alesina/Perotti 1995a for a survey on the determinants of budget deficits, and von Hagen 2006 on the political economy of fiscal institutions.

that countries that are politically more unstable and polarised, or where society is more fractionalised suffer from higher deficits and inflation rates¹². Election systems may play a role, in the sense that systems with a tendency to produce weaker governments, e. g. more representative systems, could be a reason for higher deficits¹³. More generally, lack of political competition seems also to be connected to worse fiscal outcomes¹⁴, possibly because countries with more intense political competition are more likely to adopt institutions that address the common pool problem¹⁵.

Moreover it seems that "divided governments"¹⁶ have more difficulty achieving the necessary adjustments when facing adverse economic shocks¹⁷. Finally countries where budgeting procedures are more "centralised"¹⁸ and give finance ministers "strategic dominance over spending ministers" and "limit the amendment power of parliament" usually show stronger fiscal discipline¹⁹.

1.2 Understanding delays in addressing inflation crises and other unsustainable macro-imbalances

So far we have focused on the structural reasons that lead to inflation crises and other unsustainable macro-policies. A different, though obviously related, question is why once the severity of the situation has been recognised by everybody and there is general agreement on the need for policy changes, stabilisation may still be delayed. One answer is simply a dynamic interpretation of the aforementioned

¹²See e.g. Alesina/Tabellini 1990, Tabellini/Alesina 1990 and Cukierman et al 1992 for theoretical explications, and Edwards/Tabellini 1991a,b, Roubini 1991, Cukierman et al 1992, Edwards 1993, Alesina/Perotti 1995b, Alesina et al. 1999a, and Annett 2000 for empirical support.

¹³Grilli, Masciandro and Tabellini 1991

¹⁴See Skilling 2001 and Wibbels 2003 for empirical evidence.

¹⁵See Hallerberg 2004.

¹⁶For example, coalition governments.

¹⁷Poterba 1994, Alt/Lowry 1994, Roubini/Sachs 1989

¹⁸A budget process is regarded as "centralised" if it contains incentives for policymakers to internalise the common pool externality of decisions (see von Hagen 2005).

¹⁹See von Hagen 1992, von Hagen/Harden 1994, and Hallerberg/von Hagen 1998 for empirical evidence for European, Gleich 2003 and Ylaoutinen 2004 for Eastern European, and Alesina et al 1999b for Latin American countries.

common pool problem²⁰. Interest groups repeatedly play non-cooperatively, which effectively delays stabilisation and leads to a continuous aggravation of the crisis. The deepening crises, however, negatively affects the interest groups' payoffs from a non-cooperative strategy. Thus stabilisation is delayed until the continuation value of the noncooperative strategy drops below the one for cooperation.

It has equally been argued that governments may optimally choose a delay in reform, as they need to improve their reputation to ensure the reform's success. Such a reform delay can be an optimal strategy in a situation of multiple equilibria, where the attained equilibrium depends on the perception of the governments' reform credentials²¹.

Arguably the most influential view sees stabilisation delay resulting from an unresolved conflict of how to share the costs between different social groups²². In a situation where the cost of not stabilising inflicted on the different social actors is unknown to outsiders, a "war of attrition" takes place. Stabilisation is delayed to reveal how much longer another group is willing to bear the pain of not stabilising. This goes on until the group that suffers most from the delay of stabilisation finally capitulates and accepts to bear a more than proportional cost of the stabilisation. In this kind of framework it can equally be shown that crises help in achieving stabilisation²³. This results from the fact that a larger crisis signifies a higher cost of waiting for the combatants, and leads thus to a quicker solution of the war of attrition²⁴. Better public information about the cost of delay usually also tends to speed up stabilisation²⁵.

²⁰Velasco 1998a,b

²¹Chang 2001

²²Alesina / Drazen 1991

²³Drazen/Grilli 1993. See Rodrik 1996 for a critical assessment of the claim that crises speed up reform.

²⁴This result concerning the usefulness of crises in speeding up stabilisation stays valid if one introduces the possibility of bargaining on stabilisation costs between the groups involved in a war of attrition (Hsieh 2000).

²⁵Martinelli / Escorza 2004 provide theoretical, and Seddon Wallack 2004 empirical backing for this claim.

A more basic view sees stabilisation delays as resulting from the human tendency to postpone unpleasant things as long as possible. More precisely, stabilisation delays arise naturally when agents discount the future sufficiently, so that the cost of stabilising immediately outweighs the potential discounted future benefits²⁶. Finally, stabilisation delay can equally be explained by a combination of the above-mentioned tendency to postpone unpleasant things, with the desire of some agents to prepare for a coming stabilisation in order to minimise their losses²⁷. In this spirit, a “populist coalition” between rich and poor agents can have an interest to pursue unsustainable policies and postpone stabilisation: Under the assumption of capital being mobile in the long run, but not in the short run, the rich gain from the delay as it allows them to shift part of their assets abroad. Thus when taxes have to be levied to finance stabilisation, they will be less affected, being able to evade taxation to a large degree. The poor, assumed not to pay taxes and to gain from redistribution as long as economic activity is high, are also in favour of postponing adjustment. The losers in such a scenario are the middle-class, as they will have to bear a more than proportional part of the cost of the adjustment once it is undertaken.

1.3 Understanding the distributive effects of crises and stabilisations

In addition to the finding that delays in stabilisation can be explained by distributive conflict, it is interesting to study the impact of both inflation crises and macro-stabilisations on income distribution. Apart from the three class setting mentioned above, where a delay in stabilisation is detrimental to the interests of the middle-class, it can be shown that in a two class setting with rich and poor, both inflation and stabilisation often have a negative distributive impact on the poorer parts of

²⁶See Laban/Sturzenegger 1994.

²⁷Perotti, R., 1992

society²⁸. More precisely this results from the fact that richer agents have an advantage in using “financial adaptation” (which encompasses all forms of capital flight and currency substitution), and thus suffer less from inflation tax than the poor. Moreover, as the negative distributive impact on the poor increases with higher inflation levels, their bargaining power decreases with rising inflation. Thus, supposing that successful stabilisation necessitates agreement among the different social groups on how to share the costs, the lower strata of society will not only suffer most from high inflation, but will finally also have to bear the largest part of the stabilisation effort²⁹.

In the second chapter of this thesis we use a three class setting to show that the distributive impact of inflation depends on circumstances. When monetisation levels are high, inflation typically redistributes away from the rich towards the lower classes of society. With decreasing monetisation levels, and depending on income distribution, there can either be situations where inflation mainly affects the poor³⁰, or “populist coalitions” that “squeeze” the middle-classes³¹. Moreover, we show that demonetisation is potentially helpful for stabilisation, and in the long-term likely to lead to lower inflation rates, as with lower potential inflation tax income the intensity of distributive struggle diminishes. Thus financial integration and learning, by largely reducing the cost of substituting away from a weak currency, and hence allowing for very low monetisation levels, help in achieving and sustaining low inflation equilibria. Low monetisation comes however at a cost, namely an increased risk of hyperinflation if budget deficits, caused, for example, by strong adverse economic shocks, are monetised.

²⁸Sturzenegger 1997, Sturzenegger/Laban 1994

²⁹Laban/Sturzenegger 1994.

³⁰As in Sturzenegger 1997 and Sturzenegger/Laban 1994.

³¹As in Perotti, R. 1992.

2 Implementing structural reform

2.1 How to overcome political obstacles to reform

In the previous section we have considered the reasons that lead to unsustainable macroeconomic situations, such as inflation crises, and the problems that may occur in stabilising. In this section we will look more specifically at reform. We will consider structural obstacles to reform in general, and how to overcome them. Moreover we will address the question of which groups are most likely to be in charge of successful reforms. We will then concentrate on specific areas that have been high on the list of priorities of reformers in developing countries over the last decades. We will discuss two important structural reform areas in more detail³², to which the third and fourth chapter of this thesis contribute. These are privatisation, which has arguably played the most prominent role in structural reform programs during the last 15 years, and improving governance by decreasing corruption, which might be among the most important issues of this decade.

One of the most puzzling questions is why, even if there is a majority of the population that would benefit from reform, it may not take place. It can be shown that it is *ex-ante* uncertainty over the winners from reform that leads to a “status quo bias”³³. So how can the status quo bias in particular, and resistance to reform in general, be overcome? One school of thought stresses the need for speedy, comprehensive reform³⁴. While arguments vary, the common “political economy” theme of this literature is generally feasibility: periods where meaningful reform can be implemented are scarce and short, and thus reformist governments should get as much done as possible and as quickly as they can. Advocates of more gradualist approaches to reform broadly argue that progressive strategies are less costly in social

³²For a general overview of the political economy of structural reform in OECD countries see Hoj et al. 2006.

³³Fernandez/Rodrik1991

³⁴See Sturzenegger/Tommasi 1998 for a discussion.

terms, and that gradualism thus increases sustainability³⁵. Moreover, feasibility and sustainability can be increased by gradualist “unbundling”³⁶ of reforms that divide the opponents of reform, thus giving the government the possibility to deal with one group at a time³⁷. The experience of successful, even if slow, gradual economic reform in Russia between 2000-03 may be a good demonstration of the potential effectiveness of this “divide and rule” approach. It has however been argued³⁸ that such a strategy works only when reform simply requires majority support, but fails when it requires the support from many large particular interests, that have an effective power to veto reform plans, as has often been the political reality in Latin American countries. In such a setting only “bundling” of reform is politically feasible. Only a comprehensive “bundled” reform package can induce “veto-players”, who would prevent any partial reform affecting them negatively, into supporting the general reform plan, at least as long as potential losses from some reform measures are overcompensated by gains from others.

Another obstacle to reform has obviously been the credibility both of reform plans and policy-makers. For many reforms success depends critically on their credibility, as there are multiple equilibria that depend on agents’ self-fulfilling expectations. For example, even a credible disinflation plan that would be successful if people believed in it, is almost sure to fail as soon as it is perceived as incredible by the population, thus ex-post confirming the negative expectations. However, in situations where the credibility of reform is low because economic agents doubt the true commitment of a government to reform, a reformist government can signal its commitment by “overshooting” on reform, that is going faster or further than would

³⁵See e.g. Dewatripont/Roland 1991&1995, Mehlum 2001 and Dehejia 2003. Popov 2007 argues that the debate about the speed of the liberalisation (shock therapy versus gradualism) was to a large extent misfocused as the crucial importance of strong institutions for good performance was overlooked.

³⁶That is going ahead with different parts of reform at different points in time.

³⁷Wei 1997a

³⁸Martinelli/Tommasi 1997

normally be optimal³⁹.

Another mechanism that can help in overcoming political obstacles to reform is when large policy switches are proposed by characters that *a priori* are unlikely to propose such reforms. Examples for this are the market-oriented stabilisation and reforms enacted under Menem in Argentina and Fujimori in Peru, who both came to power on explicitly populist election platforms. The logic behind this feature of declared populists that successfully implement strong market-oriented reforms is that when voters are not fully informed, the identity and political orientation of the one proposing the reform contains important information. The idea is that if someone proposes reforms that are far from his own preferences, this proves to the population the urgent need for these changes. Once the electorate understands the crucial importance of the reforms on the agenda, there will be much less opposition. As a consequence, characters that *a priori* are unlikely to undertake painful reforms have under certain circumstances a much higher chance of successfully implementing them⁴⁰. Moreover, arguments along this line can rationalise why politicians block reforms while in opposition that they intend to implement once in office⁴¹.

Finally it is interesting and puzzling to observe that in many crises situations the elites in power initiated “reforms from within” that actually worsened their situation compared to the status quo ante⁴². An explanation for this phenomenon can be obtained when one sees crises as the outcome of a common pool problem where competing elites have “over-extracted” rents from society. In such crisis situations, however, reform does not occur because some of the ruling elites expect to be better off after reform. Rather, once it has become clear that the status quo is no longer tenable, reforms are used as a defense mechanism against other powerful groups, since without reform some of the elites may end up in an even worse situation.

³⁹ Rodrik 1989

⁴⁰ Cukierman/Tommasi 1998

⁴¹ Lopez-Murphy/ Sturzenegger 1996

⁴² Tornell 1998

An example for such a “reform from within”, where supporters of reform willingly accepted to be worse off, is trade liberalisation in some Latin American countries. It has been argued that these reforms were supported by the inefficient manufacturing sector, in spite of the fact that it was going to lose under foreign competition, as reforms were considered the only way to tame the power of the trade unions, and thus to avoid far worse outcomes⁴³.

2.2 Privatisation - Why and how should it be done ?

One of the most important reforms that has been undertaken mainly in the eighties and the beginning of the nineties is privatisation. While at the beginning of the eighties the case for private versus public ownership was not that clear cut⁴⁴, the economic consensus has shifted towards favouring private ownership in a majority of situations⁴⁵. This shift has been a result of the empirical evidence⁴⁶ showing improved economic performance under more widespread private ownership, both on the micro- and macro-levels.

Once a consensus for the desirability of privatisation was achieved, major normative questions that were passionately discussed concerned the achievability, design and sustainability of privatisation. The results of these debates obviously depended on the objectives the government was pursuing with privatisation. Commonly stated objectives were to raise revenue, and/or to foster enterprise restructuring in order to increase economic efficiency.

⁴³See Tornell 1998.

⁴⁴Meggison/Netter 2000 include a short survey on the large literature justifying the supremacy of public ownership.

⁴⁵See Hart et al 1997 for an excellent discussion on the boundaries of private and public ownership.

⁴⁶For an excellent starting point on the empirical literature and the recent history of privatisation see again Meggison/Netter 2000. The empirical evidence is, however, not unanimously in favour of private ownership (see e.g. Sabirianova et al. 2005 or Djankov and Murell 2002). It seems, however, relatively uncontroversial that under efficient private ownership outcomes are better than under state ownership

When a government is mainly interested in privatisation revenues, several reasons have been advanced in favour of a partial privatisation. Market oriented governments, it has been argued should use it as a commitment and signalling device. Partial privatisation, provided that control is effectively transferred to the private sector, allows governments to credibly commit to keeping their hands off the privatised companies, as political intervention would reduce the future sales value of the equity stake retained⁴⁷. Given that this leads to a diminished risk for potential buyers, the government can obtain a better price.

Another question that has been addressed is how to maximise privatisation revenue from enterprises that are experiencing economic difficulties. Two different arguments have been advanced for partial privatisation under such circumstances. In choosing partial privatisation, governments might be able to strategically exploit a political constraint forbidding privatisation at negative prices. By choosing the stake that is offered for privatisation in such a way that in an unconstrained bargaining game with a potential buyer it would fetch a negative price (that is the government would have to pay a subsidy to sell), the government uses political constraint to strengthen its bargaining power, and thus to achieve a sale at a higher price⁴⁸. Moreover keeping minority stakes in the privatisation of inefficient companies is similar to keeping a minority stake in the sale of companies during bankruptcy procedures, which has been shown to allow the creditors (=the seller) to capture a larger share of the rents of the buyer⁴⁹.

While from a pure efficiency point of view enterprises should generally be sold to the highest bidder, privatisation design, especially in the context of transition, has been complicated by the fact that there often were no politically acceptable and financially viable buyers for state enterprises. As there was a perceived need to advance privatisation to foster restructuring, attention focused on the degree to

⁴⁷Perotti 1995

⁴⁸Bennet et al. 2001

⁴⁹Cornelli/Felli 2000

which state assets should be given away in so called “mass privatisations”, and how this should best be done.

Apart from feasibility, the advantages of mass privatisation were perceived to be the creation of both a private sector of a critical mass that would guarantee its economic viability, as well as a constituency for reform that would ensure the sustainability of privatisation. It was however immediately stressed that there would be a trade-off, as increased political support might come at the cost of less restructuring, resulting from the fact that core owners are less inclined to invest when their equity stake is smaller and potential gains have to be shared with others that obtained shares during mass privatisation⁵⁰. It has been argued that, in spite of this effect, investment and restructuring may actually increase with more mass privatisation, provided widespread share ownership diminishes expropriation risk sufficiently⁵¹.

When designing mass privatisation, a key question has been whether to give away state assets to insiders in the firm or spread them widely over the population. While both are obviously second best solutions, supporters of widespread privatisation have argued that insider privatisation would increase the riskiness for the asset owners (as their labour income and asset wealth would be tied to the same company). Thus agents would ask for more insurance, which would imply more redistribution, and thus ultimately more expropriation⁵². On the other hand, supposing that managers cannot be replaced (at least in the short-term), as was often the case at the beginning of transition, it has been argued that giving effective control to managers and making them residual claimants on profits would be an efficient strategy to induce restructuring. Only when incumbent managers could not afford to acquire a sufficient amount of shares and it was politically impossible to hand them over the assets for free, should share ownership be spread as widely as possible, thus giving

⁵⁰Roland/Verdier 1994

⁵¹Schmidt 2000

⁵²Schmidt 2000

de facto control over cash flows to management⁵³. In any case, as some economists have argued in the Russian case, giving assets to insiders may in some situations be the only possible way of buying the necessary political support for privatisation⁵⁴.

Which way to privatise best is ultimately an empirical question which, in addition, may vary depending on circumstances. While it seems uncontroversial that selling assets at realistic prices has fostered the best results, the current empirical evidence on “second best” privatisations is more ambiguous. It has become clear that one of the aims of mass privatisations, be it by vouchers or insider privatisation to workers, namely to spread wealth widely over the population, has failed in most transition countries where this approach was chosen. Reasons vary, but ultimately come down to the fact that in situations where property rights in general and minority shareholder rights in particular are poorly defined and defended, small shareholders will be expropriated by larger shareholders or management in one way or another. Setting up institutions that are supposed to defend minority shareholder rights in such a poor institutional and legal environment (for example banks or investment funds) has proven to be of little use, as those institutions, often poorly regulated, mainly pursued their own interests at the population’s expense.

As regards efficiency of mass privatisation methods in transition economies, they have generally allowed the birth of a private sector, even if not always of the “western European” style that had been expected. Moreover, privatised enterprises have in general outperformed their state counterparts, regardless of the means of privatisation⁵⁵. With regard to the different second best privatisation methods, the empirical

⁵³Bös/Harms 1997

⁵⁴Boycko, Shleifer and Vishny 1995

⁵⁵See e.g. Brown/Earle 2000 and Brown et al. 2006. This finding is not unanimous, however. The aforementioned studies, while finding significant positive effects of privatisation for enterprise performance for most transition countries under investigation, find only very weak evidence for Russia (and only with very long time lags). Sabirianova et al. 2005 e.g. show that in Russia and the Czech Republic in the 1990s privatisation to domestic owners did not markedly improve efficiency. Djankov and Murell 2002 also find that in transition countries commercialised state ownership was superior to some forms of private ownership, though generally remained inferior to relatively concentrated private ownership by outsiders.

evidence is scarce and ambiguous. While insider privatisation is sometimes blamed for having brought slightly worse results in efficiency gains, giving away enterprises at huge discounts to political proteges, as happened in Russia and Ukraine, may have brought economic efficiency gains at the cost of political inefficiency.

2.3 Privatisation - How has it been done ?

In recent years, in addition to the normative aspect of how best to privatise, interest has increasingly focused on positive issues, namely how and why governments actually privatise. Empirical work using data from a large number of countries has shown that assets are generally underpriced during privatisations (and especially more underpriced than similar initial public offerings)⁵⁶. Moreover right-wing governments tend to sell state assets at much larger discounts than their left-wing counterparts⁵⁷, and try to spread share ownership more widely among domestic voters⁵⁸. This has been interpreted as proof that privatisations, apart from officially stated goals such as increasing efficiency, raising revenue or increasing stock market liquidity⁵⁹, are mainly undertaken for strategic political reasons to shift the political preferences of the population. More precisely “Machiavellian” right-wing governments would underprice privatised assets to increase the wealth position of the middle-classes, thus changing their political preferences and inducing them to support more right-wing policies⁶⁰.

Another example of how governments can use strategic considerations in privatisation programs concerns the choice between share-issue privatisation as opposed to direct asset sales in auctions. It has been shown that some governments have dominantly used share issue privatisations at the beginning of their privatisation

⁵⁶Underpricing can be general, or targeted to a specific group (e.g. retail investors). See Keloharju et al. 2004 on this issue.

⁵⁷Jones et al 1999

⁵⁸Bortolotti/Pinotti 2003

⁵⁹On the effect of privatisation on stock market liquidity see e.g. Bortolotti et al. 2007.

⁶⁰Biais/Perotti 2001

programs, which could be explained by their desire to create a broad ownership structure that would render future re-nationalisation more difficult⁶¹.

In the third chapter of this thesis we establish a minimal, but relatively general framework of how to think about privatisation from a political economy perspective. This model allows for strategic privatisation initiatives, but at the same time considers other political economy and standard economic motives for privatisation. It has the advantage of being able to explain not only the stylised facts that a “Machiavellian” privatisation approach can convincingly answer, but also the stylised facts where this approach remains unconvincing. Furthermore our model makes it possible to address broader questions related to privatisation, as for example the connection between privatisation and the efficiency of a country’s tax system. We show that inefficient taxation decreases the likelihood of privatisation to be politically feasible, and argue that inefficient taxation systems are partly responsible for the lack of enthusiasm of the poor for privatisation that has been observed in many less developed countries.

2.4 Understanding and fighting Corruption

In spite of the considerable progress made on macro-stabilisation and privatisation in a large number of countries, economic performance has not always been as strong as would have been expected. Driven by this fact the focus has recently shifted to the importance of good institutions for sustainable growth and development. Fighting corruption has thus become a number one priority in a large number of countries and for the international donor community.

While until the beginning of the nineties there was no consensus in economic literature about the overall effect of corruption (being “grease” or “sand” in the wheels of the economy), it has recently been established empirically that corrup-

⁶¹Perotti/Guney 1993

tion has almost exclusively negative effects⁶². In cross-country studies focusing on the link between corruption, investment and growth, corruption has generally been found to entail significant costs⁶³. Without aiming to give a complete list of its potential negative consequences⁶⁴, corruption has also been shown to decrease foreign direct investment and to bias foreign capital inflows towards short-term money, which increases the likelihood of a country suffering from financial crises⁶⁵. Corruption reduces government spending on, as well as return to education⁶⁶, while the performance of government projects has been proven to be by far superior in countries with more developed civil liberties (that are highly correlated with lower corruption levels)⁶⁷. Corruption was also found to increase the death toll of natural disasters⁶⁸. It has been shown that the size of the underground sector is larger in countries with higher levels of corruption and red tape, thus restricting the possibility of governments to obtain resources⁶⁹. On the national level, a study of the economic performance of Italian regions found corruption to have led to a decrease in growth, both directly, and by decreasing the productivity of public investment expenditures⁷⁰. Corruption has also been shown to decrease traffic safety in India⁷¹.

Given the overwhelming empirical evidence on its negative consequences, fighting corruption has become an important task. In principle this fight can be done in two ways, directly and indirectly. The direct way is for governments to tackle corruption in their countries “from above”, by trying to clean up bureaucracies. Pressure from international donors, for example making aid payments dependent on “good governance”, can provide additional incentives for reluctant governments to join the

⁶²For an overview of the relevant literature see Aidt 2003 as well as Jain 2001.

⁶³See Mauro 1995/1998, and Paldam 2002.

⁶⁴For a survey on the economic costs of corruption see Dreher/Herzfeld 2005.

⁶⁵Wei 2000/1997b

⁶⁶Mauro 1998 and Le Van/Maurel 2007

⁶⁷Isham, Kaufman, Pritchett 1997

⁶⁸Escaleras et al. 2006

⁶⁹Friedman et al 2000

⁷⁰Del Monte/Papagni 2001

⁷¹Bertrand et al. 2006

crusade. However, both because governments are not always sincerely interested in fighting corruption (they are potentially its largest beneficiaries), and because corruption is an entrenched problem, it has been proposed to aim for structural changes instead.

It has been shown that countries with higher rents, both from natural resources and lack of competition, suffer from higher corruption levels⁷². Corruption is higher in countries with a “bad” bureaucratic structure, especially non-meritocratic hiring⁷³, and low civil sector wages⁷⁴. Finally corruption is higher where human capital is low⁷⁵, and in societies where women are less present in parliament, the administration or the labour force⁷⁶. There has equally been tentative evidence, that countries with weak and politically dependent judicial systems suffer from higher corruption levels⁷⁷. Thus the main indirect measures proposed to fight corruption have been to foster economic competition by opening up the economy to trade, to introduce meritocratic hiring and fair wages for the state administration, to increase education and the participation of women in the workforce and government, and to increase the independence of the judiciary.

Chapter 4 of this thesis contributes to the joint research effort to determine indirect ways of fighting corruption. We show theoretically that the impact of education on corruption depends on the capacities of civil society to monitor government. If those capacities are well developed, education decreases corruption, whereas it may lead to higher corruption if civil monitoring is low. We show empirically that while more basic forms of education do improve corruption even in countries that lack press freedom, increases in higher education only have a positive impact on corruption in countries that profit from a sufficient amount of press freedom. We also show

⁷² Ades/DiTella 1999

⁷³ Rauch/Evans 2000

⁷⁴ See Van Rijckeghem/Weder 1997 for an empirically based discussion of this issue.

⁷⁵ Ades/DiTella 1997a

⁷⁶ Swamy et al 2001

⁷⁷ Ades/Di Tella 1997b

empirically that corruption and press freedom are strongly related.

Chapter 5 of this thesis finally econometrically investigates the importance of political economy and structural reform issues in a concrete example, namely Russian regional growth performance for the period from the start of transition to 2004. It has been motivated by the striking disparity in the development of Russian regions, and its aim is to study to what degree regional differences in the politico-institutional setting, and reform efforts can explain hugely differing growth rates. We furthermore investigate what other variables can explain these differences in economic performance. For this we use panel data for 77 Russian regions from 1994-2004, and apart from the impact of politico-institutional variables and indicators of economic reform, we study the impact of initial conditions, including economic, geographic and structural features, on regional growth performance.

Chapter 2

The Political Economy of Inflation, Demonetisation and Redistribution: Can there be Sustainable Stabilisation in the Presence of Distributive Conflict?

From the point of view of macroeconomic stabilisation the last decade of the 20th century has been highly successful. While in the late 1980s and early 1990s a large number of Latin American and a majority of Eastern European Countries experienced periods of high, if not hyperinflation¹, by 2000 high inflation was, with few exceptions, defeated around the globe. Inflation rates were in the single digit range in a majority of countries, and in the low double digit range in most of the others. We use a political economy perspective to explain the success of stabilisation attempts in the last decade of the 20th century, especially compared with attempts in earlier

¹For an overview of "Modern Hyper- and High Inflations" see Fischer et al. (2002).

decades, where failures abound. Inflation is regarded as the outcome of distributive conflict that leads to large budget deficits which are eventually monetised. In the context of a voting model that investigates the relationship between inflation, monetisation and distributive conflict, we investigate how financial innovation influences individuals' capacity to shield from inflation tax, and thus changes the structure of the political inflation game. It is argued that it is precisely these structural changes that have led to a decrease in the intensity of distributive conflict, thus creating a political environment which has allowed stabilisation to succeed on a broad front².

Our emphasis on an unresolved distributive conflict as the ultimate reason underlying high inflation contrasts with the traditional two main approaches in macroeconomic literature. The optimal taxation approach sees the inflation rate as the choice of a government that optimally sets tax rates arbitrating between different distortionary taxes, one of them being inflation tax³. What might be called the "Phillips curve explanation" regards inflation as the consequence of a deliberate attempt of governments to reduce unemployment and boost national production. In its rational expectations version, this approach comes down to explaining inflation as resulting from a credibility and commitment problem of government, and the standard solution generally proposed is to create an independent central bank⁴. The main shortcoming of these approaches is that they fail to provide convincing explanations of high inflation. Optimal taxation models can produce high inflation only by assuming that high inflation has low efficiency costs -which it clearly has

²It could be argued that the success of stabilisations during the 1990ies resulted mainly from a benign world economic environment or improvements in institutional features, such as more independent central banks. While these aspects undoubtedly did help in some cases, successful stabilisation programmes were started both in periods of global economic recession and growth. Moreover, institutional features are to a large degree endogenously determined by the political process. Thus increasingly independent central banks, when they are not simply thought of as the solution of a time inconsistency problem, should reflect a generally increased inflation aversion, becoming thus the reflection rather than the cause of more fundamental changes.

³see e.g. Mankiw 1987

⁴see Barro/Gordon 1983

not⁵-, or that all other taxes are extremely distortionary, something empirically unreasonable in all but the most underdeveloped countries. Credibility type models are unable to generate high inflation, not to mention hyperinflation, unless one assumes governments to have an irrational distaste of unemployment.

The present work addresses the main shortcoming of these approaches, the neglect of political and distributive struggle in explaining deadlock situations that cause bad economic policies. It belongs in this respect to the strand of formal political economy models which use prisoners dilemma constellations to explain suboptimal policy choices, such as unsustainable budget deficits or high inflation. Aizenmann (1992) for example describes a seigniorage game within a monetary union, where the fact that local monetary authorities can capture the benefits of money emission and socialise the costs, inevitably leads to high inflation. Alesina and Drazen (1991) provide an explanation for stabilisation delays in economies characterised by strong initial macro-imbalances. Using a two person war of attrition type of game where each party tries to push the burden of stabilisation on the other party, they argue that stabilisation only occurs once one of the groups has become sufficiently weakened to admit defeat and shoulder the burden of stabilisation. As we think that outcomes of political power struggles are rarely final, this paper provides a different explanation for lasting stabilisation that focuses on structural changes in the economic environment. The spirit of the model, however, is similar to Alesina/Drazen: distributive conflict leads to policy choices on inflation and stabilisation that are suboptimal from a social welfare point of view, but nevertheless prevail as they allow for redistribution. This idea is equally developed in Sturzenegger and Laban (1994), where the inflation tax is used to finance a transfer from the rich to the poor, although the rich have the possibility of using an inflation tax evasion technology to escape this tax. We refer to this technology as “financial adaptation”. It encompasses currency substitution, capital flight, and more generally any means by which

⁵see Bruno/Easterly 1998 for empirical evidence

an agent reduces his exposure to or use of the local currency. Sturzenegger/Laban show that inflation increases when financial adaptation by the rich rises, leading to a distributive shift at the expense of the poor.

Financial adaptation is equally key to explaining inflationary processes is Mondino et al (1996). They show that in the presence of a fixed budget deficit the simple possibility for agents to substitute away from the local currency can create dynamics that lead to rising inflation. More precisely they describe a prisoners' dilemma situation where interest groups continuously lobby for transfers. These demands leads to a fixed budget deficit that a weak government finances by money creation. Individuals react to increased inflation by using financial adaptation more intensively which decreases the inflation tax base. Thus inflation has to be raised to higher levels each period to finance a budget deficit of a given, constant size. Consequently, currency substitution deepens further, which in turn leads to higher inflation in the next period, and so forth.

While Laban/Sturzenegger and Mondino et al. are the closest in spirit to our work, the model presented here improves on them in two important dimensions. First, we consider an explicit political decision mechanism that makes it possible to explain why redistribution, and thus inflation, occur at all, and to determine endogenously the direction of the transfers. Second, we endogenise the level of redistribution (the budget deficit) which has to be financed by the inflation tax. Supposing the size of the budget deficit as given seems a reasonable assumption only in the short-term. In the medium and long run the budget deficit is clearly a choice variable of the government and should be treated as such, that is it should be endogenously determined in a political equilibrium. Regarding inflationary processes not only as short-term phenomena, but potentially as long-term processes is demonstrated by the example of Latin American countries like Argentina and Brazil that suffered from high inflation for decades.

In the present paper, a voting model with heterogeneous agents that differ prin-

cially in their capacity to generate income, is developed. Agents vote on inflation tax which is a proportion of income and redistributed in a lump sum fashion. One may think of this as a vote for a certain level of redistribution or a size of a fiscal deficit, which can only be covered by inflation tax⁶. An explicit cost of inflation is assumed. Agents can learn how to avoid paying inflation tax, but tax evasion has a cost which increases with the level of evasion. At the beginning of the period, each agent determines his optimal level of tax evasion, rationally, thus correctly, anticipating the inflation tax rate. It is supposed that richer individuals have an advantage over less wealthy individuals in acquiring the evasion technology. Afterwards, an election takes place and the most preferred tax rate of the decisive voter is implemented.

It is shown that depending on parameter values, as e.g. the cost of financial adaptation, or simply people's expectations, varying political coalitions with different inflation outcomes can be obtained in this setting. When financial adaptation technology is very costly, one typically finds coalitions between less-well-off agents, attempting to redistribute in their own favour from richer agents who cannot avoid inflation tax. When financial adaptation is sufficiently cheap, the political outcome differs depending on income distribution. If the society is in a certain sense more egalitarian then extreme coalitions including rich agents (who manage to insulate themselves by and large from the inflation tax) and poor agents form to "squeeze the

⁶As inflation tax is only one specific – though somewhat peculiar – form of taxation, our basic model could in principle also be applied to other contexts of (income) taxation where the possibility of tax evasion exists. However, from a political economy perspective results are likely to be more interesting if sufficiently large parts of the population have the potential for substantial tax evasion (or large changes in evasion behaviour), with almost complete tax avoidance being a realistic option for them. This clearly holds in the case of inflation tax, probably because many ways of avoiding inflation tax are both not illegal and have, under reasonable legislation, no vocation for being so. Whether widespread and large-scale tax evasion - with the possibility of almost complete avoidance for large parts of society - is a realistic feature for many other forms of taxation (including income tax) is at least questionable. Moreover, the exact way the cost of financial adaptation (i.e. tax evasion) is specified here may not be optimal for other forms of taxation, and the extensions of the basic model in section 3 are clearly specific to inflation tax and would not make much sense in most other contexts.

middle-classes". Conversely, in more egalitarian societies, as well as in inegalitarian ones when the cost of inflation tax evasion is sufficiently close to zero⁷, one may get situations in which rich agents and the middle-class (both sufficiently safe from inflation tax) form a coalition against the poor.

The result that the redistributive impact of inflation is somewhat ambiguous seems to fit nicely with the contradicting observations and results found in literature on this subject. The regressiveness of inflation tax has recently received qualified empirical support by Easterly/Fischer (2001), who show that less wealthy agents consider inflation a larger problem, and that on average, inflation increases inequality. However, there is also some evidence about cases where inflation was used to redistribute towards the lower strata of society⁸, with the Argentine populist periods under Peron (1946-55 and 73-75) probably being among the best known episodes.

In our model, agents' preferences with respect to inflationary redistribution depend on the degree to which financial adaptation is available and affordable. Distributional implications result thus not only from different levels of inflation tax evasion, but equally from different inflation rates in political equilibrium, the latter being determined by financial adaptation technology. Another interesting feature of the model is the fact that there are multiple equilibria in the level of inflation tax, and changes in inflation can be entirely driven by changes in expectations. This is closely related to Saint Paul/Verdier (1997) who show that politico-economic redistribution models can generate multiple equilibria in taxation when economic parameters are such that the tax base of the decisive agent is more elastic than the average tax base. In the present framework, a reduction in the cost of financial adaptation shifts political coalitions and may induce a dramatic change in the elasticity of the inflation tax base of the decisive voter, generating the possibility of multiple equilibria.

⁷Such an outcome depends on the poor being strongly constrained in their ability to use financial adaptation.

⁸See Easterly/Fischer (2001) for references.

Moreover, we investigate the impact of external shocks or budget adjustment traps on inflation depending on the level of financial adaptation in the economy. It is shown that economies with a high level of financial adaptation are significantly more sensitive to shocks or budget adjustment traps, and their risk of hyperinflation is consequently dramatically increased. In the last part of this chapter, the model is made dynamic by endogenising the cost of acquiring financial adaptation technology. Stabilisation occurs when permanent high inflation and decreasing costs for financial adaptation technology have led to such an erosion of the inflation tax base that further inflation financed redistribution becomes useless, and the distributive struggle ends. However, as long as inflation tax evasion⁹ possibilities remain limited for some parts of society, high inflation can occur even with low overall levels of the tax base. Hyperinflation, though not necessary, can be helpful for permanent stabilisation insofar as it speeds up the erosion of the inflation tax base.

Based on this model, we argue that the main difference between stabilisation attempts in the last decade of the 20th century and those in earlier decades are increased and cheaper financial adaptation mechanisms that allow agents to substitute away from a weak currency. Learning certainly played a role in this process, but we think that the critical difference came from the fact that, starting towards the end of the 20th century, globalisation and especially integrated financial markets increasingly allowed for fast and low cost currency substitution. As financial adaptation became widespread, monetisation ratios in countries with high actual or past inflation reached extremely low levels⁹. Moreover in those places where they stayed somewhat higher or recovered with stabilisation, agents are ready to switch out of the local currency at the first sign of trouble. This significantly limits the amount of inflation tax that can be obtained by printing money. Redistributive

⁹In 1997 monetisation measured as M1/GDP in Argentina and Russia for example (both countries that suffered from very high inflation in the early 1990ies) was respectively 6.6% and 10.5%. On the contrary in the Czech Republic (a country that has managed to avoid high inflation in recent history) this ratio was 25.4%, roughly the same level as Germany (24.8%) or France (23.8%).

conflict over the inflation tax revenues has thus often become meaningless, creating in many countries the basis for successful stabilisation and sustained low inflation.

1 The general model

We use a standard political economy voting model, where the political process is interpreted as the formation of coalitions that use their power to redistribute income in their favour. Agents are heterogeneous, that is from N distinct classes, where for convenience, each class is assumed to have the same large number of identical individuals that is normalised to 1. Agents from different classes vary in their capacity to generate income. This difference may arise from differences in physical capital (physical capital is thought of as inflation proof assets, such as enterprises or machines) or human capital. An agent with (human and physical) capital h has a per period income of $R(h)$, where $R(\cdot)$ is supposed to be monotonically rising in h . Later on, for analytical convenience, the general framework is restricted to a three class setting in order to solve explicitly for the political outcome.

All individuals decide on the inflation tax rate τ in a general vote. As inflation can be obtained from the inflation tax rate by a simple transformation, that is $\pi = \frac{\tau}{1-\tau}$, inflation and inflation tax are equivalent from the point of view of our model. This is why inflation tax or the inflation tax rate are sometimes abusively referred to as inflation or the inflation rate. The vote on inflation can alternatively, and more realistically, be thought of as a vote on a certain level of redistribution, or the size of a fiscal deficit, which can only be covered by printing money. Inflation tax revenues are assumed to be redistributed in a lump-sum fashion where every individual obtains exactly the same amount. Apart from simplicity, this neutral specification avoids the risk of discretionary results in function of the redistribution scheme assumed. Redistribution thus occurs as agents pay higher or lower levels of inflation tax. In spite of a lump-sum fashion redistribution scheme, redistribution

via inflation tax is not without cost. There is a real cost of inflation¹⁰ $L(\tau)$ that rises over-proportionally with the level of inflation ($\frac{dL}{d\tau} > 0$ and $\frac{d^2L}{d\tau^2} > 0$). As a consequence of this real cost assumption, an outcome where redistributive struggle gives rise to inflation is not Pareto-optimal, though every individual is acting so as to maximise his personal utility. Actually one can think of this situation as a sort of multi-person prisoners' dilemma situation.

In order to concentrate on determining inflation, we do not take into account government expenditures and government revenues other than those derived from inflation tax. This can be rationalised by the observation that it is often politically much easier to obtain inflation tax, as there is generally no need for parliamentary approbation to raise it, making it a very convenient tool for redistribution¹¹. As of deficit finance, for simplicity it is assumed that the country is already highly indebted and that the government has no access to further credit.

Agents can learn how to avoid paying inflation tax, and we will refer to this as financial adaptation. One can alternatively think of financial adaptation as capital flight, currency substitution, or any technology which reduces the role of the local currency as a medium of exchange or stock of value. There is a cost C to reach a certain sophistication of financial adaptation, which then makes it possible to evade a specified part of the inflation tax bill. While there is no specific money demand function in our model, agents' decisions on their level of financial adaptation implicitly determine their money demand¹². In general financial adaptation is more intensively used by agents with high income as they have more to gain from a reduction in their inflation tax rate. However, with decreasing costs of financial

¹⁰Microeconomic foundations of this assumption are provided e.g. by Tommasi (1994) and DeGregorio/Sturzenegger (1994).

¹¹The use of inflation tax could equally be explained by arguing that people in power do not want to use less distortionary taxes in order to constrain future incumbents who might not share their policy preferences in their spending possibilities (see Cukierman et al. 1992).

¹²An agent's money demand is basically the share of his income for which he does not dispose of financial adaptation, and which is hence subject to inflation tax.

adaptation this advantage diminishes. More precisely, an agent's cost of financial adaptation $C(\phi_i, a_i)$ is assumed to increase with the intensity of its use ϕ_i ($\frac{dC}{d\phi} > 0$, $\frac{d^2C}{d\phi^2} > 0$), and to decrease with his ability a_i to access it. This ability, in turn, is positively correlated with human capital, that is $a_i = a(h_i)$.

This specification captures the idea that financial adaptation is relatively cheaper for agents with better education (and thus higher income)¹³, but its cost rises more than proportionally when individuals want to make more intensive use of it. The latter tries to formalise the observation that it is relatively easy to perform important transactions without using the domestic currency whereas it becomes increasingly difficult and costly to make people accept non-domestic currency in everyday operations (like, for example, buying food).

The cost of financial adaptation technology is later endogenised by assuming that it is decreasing in the general level of its use, thus it may be democratised over time: it becomes cheaper if it is more widely used and people learn about it from their own and others past experiences'. This framework captures two major stylised facts quite well, namely that with rising income people pay a lower percentage of their income in the form of inflation tax, and that with rising inflation money demand usually decreases. At the beginning of a period, every agent determines his optimal level of financial adaptation, anticipating rationally, thus correctly, the inflation tax rate. Then there is a vote on the inflation rate, and the election outcome is consequently implemented.

An individual i who chooses the level of financial adaptation ϕ_i has the following net revenue

$$R_N(h_i) = R(h_i)(1 - (1 - \phi_i)\tau - L(\tau)) + \frac{1}{N}T - C_i(\phi_i, a_i). \quad (2.1)$$

The first term describes what is left of the individual's gross income $R(h_i)$ once

¹³See Sturzenegger (1997) for microeconomic foundations of this feature.

effective inflation tax payment and the dead weight loss of inflation $L(\tau)$ have been deducted. The second term characterises the transfer each agent obtains. As total population equals N , each representative agent obtains $\frac{1}{N}$ of the total inflation tax revenues T which are equal to

$$T = \tau \cdot \sum_{i=1}^N (1 - \phi_i) h_i. \quad (2.2)$$

The third term of equation 2.1 finally depicts agent i 's cost of financial adaptation.

For simplicity the revenue is assumed to be a linear function of income $R(h) = h$. Moreover the dead weight loss from inflation is specified as $L(\tau) = \frac{\alpha}{2} \tau^2$, a simple way to capture over-proportionally rising costs of higher inflation, with the parameter α describing how costly inflation is for a given economic environment¹⁴. The cost function for financial adaptation is set as $C_i(\phi_i, a_i) = \frac{c}{2a_i} \phi_i^2$, again a very simple and straightforward way of capturing more than proportionally rising costs with increased levels of financial adaptation, and declining costs with an agent's ease a of using financial adaptation technology. The parameter c describes the cost level of financial adaptation in a country in general.

Thus each individual i tries to maximise his net revenue (supposing for simplicity a linear utility function¹⁵), that is

$$Max_{\phi_i} \left[h_i (1 - (1 - \phi_i) \tau - \frac{\alpha}{2} \tau^2) + \frac{1}{N} \sum_{i=1}^N h_i (1 - \phi_i) \tau - \frac{c}{2a_i} \phi_i^2 \right]. \quad (2.3)$$

The timing is now the following: In the first step, every agent determines his preferred level of financial adaptation technology, rationally anticipating the future

¹⁴Widespread indexation, for example, would be a means of reducing α .

¹⁵To keep the model explicitly solvable we assume that agents are risk neutral and their utility is simply their amount of disposable income. By supposing agents to be risk averse in an environment of some uncertainty our results would be strengthened as the process of currency substitution would be speeded up.

inflation rate. In the second step there is a general election, in which every agent votes for his preferred inflation rate, given the global level of financial adaptation resulting from the first step. The election delivers a decisive voter whose preferred inflation rate is implemented.

The model is solved by backward induction. First, for a given level of financial adaptation for each agent p_i , the preferred inflation tax rate of the decisive voter d is characterised as the solution of:

$$Max_{\tau_d} \left[h_d(1 - (1 - \phi_d)\tau_d - \frac{\alpha}{2}\tau_d^2) + \frac{1}{N} \sum_{j=1}^N h_j(1 - \phi_j)\tau_d - \frac{c}{2a_d}\phi_d^2 \right]. \quad (2.4)$$

In the first stage, each agent is small enough to think that his level of currency substitution has no impact on the inflation rate to be decided thereafter. Thus the evasion decision is determined by the maximisation of his net income, given the inflation rate τ_e he anticipates:

$$Max_{\phi_i} \left[h_i(1 - (1 - \phi_i)\tau_e - \frac{\alpha}{2}\tau_e^2) + \frac{1}{N}\tau_e TB - \frac{c}{2a_i}\phi_i^2 \right] \quad i=1...N. \quad (2.5)$$

where TB is the total inflation tax base.

Taking the first order conditions of these two maximisation problems one obtains¹⁶:

$$\phi_i = \frac{h_i a_i \tau_e}{c} \quad (i = 1...N) \quad \text{and} \quad \tau_d = \frac{\left(\frac{1}{N} \sum_{j=1}^N h_j\right) - h_d - \left(\frac{1}{N} \sum_{j=1}^N h_j \phi_j\right) + \phi_d h_d}{\alpha h_d}.$$

Substituting for ϕ_j ($j=1...N$) and defining $\bar{h} := \frac{1}{N} \sum_{j=1}^N h_j$, $\overline{ah^2} := \frac{1}{N} \sum_{j=1}^N a_j h_j^2$ one obtains

$$\tau_d(\tau_e) = \frac{\bar{h} - h_d}{\alpha h_d} + \frac{-(\overline{ah^2} - a_d h_d^2)}{\alpha h_d c} \tau_e.$$

¹⁶In both cases second derivatives are negatives, so the first order conditions indeed describe maxima.

This equation characterises the tax rate chosen by the decisive voter as the sum of two terms. The first one reflects the usual motive for redistribution. The poorer the decisive voter with respect to the mean, the larger the inflation tax. The second term reflects the impact of expected inflation τ_e on the inflation tax preferred by the decisive voter. Typically if the decisive voter has more ability to evade inflation than the average, the coefficient in front of τ_e is positive and the higher the expected inflation, the higher the preferred inflation tax rate. The reason is that the decisive voter has already insulated himself through financial adaptation from the inflation tax, and therefore is more willing to vote for a high inflation tax. On the other hand if the decisive voter has less ability than average to escape the inflation tax, the coefficient of the second term is negative and the higher the anticipated inflation tax, the smaller the preferred inflation rate. The reason is that the decisive voter is bearing more of the burden of redistribution than average. Hence he is in favour of less inflation.

Summarising our results, a **political equilibrium under rational expectations** is thus a set of values (ϕ_i, τ) that fulfills the following four conditions:

1. Each individual's financial adaptation decision is optimal given the inflation rate he expects. This implies that for each individual the level of financial adaptation ϕ_i maximises equation 2.5, that is:

$$\phi_i = \frac{h_i a_i \tau_e}{c} (i = 1 \dots N). \quad (2.6)$$

2. Expectations are rational, that is the expected inflation rate is equal to the actually implemented rate:

$$\tau_e = \tau_d. \quad (2.7)$$

3. The implemented inflation rate, given $\tau_e = \tau_d$ and each agent's financial adaptation decision, is optimal for the decisive voter (that is τ_d maximises 2.4), which

leads to:

$$\tau_d = \frac{c(\bar{h} - h_d)}{\alpha h_d c + a \bar{h}^2 - a_d h_d^2}. \quad (2.8)$$

4. d is actually the decisive voter in a general election over the inflation rate.

To compute the political equilibria one has to proceed in the following way: Supposing that x is the decisive voter one must first compute the optimal financial adaptation decision of all agents and the optimal inflation of x , the decisive voter. Then it must be verified that this really is a political equilibrium, i.e. that the decisive agent will actually be chosen in the election (or determine the conditions under which that will be the case). To find all equilibria this exercise has to be conducted for each possible decisive voter, that is for N cases. In most cases the model can thus only be solved by simulations for specified parameter values. However if $N=3$, that is when there are three distinct classes, the algebra remains tractable, and the explicit solution of the theoretical model in a three class setting is presented in the following section.

2 Explicit solution of the model in a three class setting

For notational suggestiveness the three different classes will be referred to as poor, middle-class and rich, where an agent's income rises from poor to rich, that is $h_P < h_M < h_R$. As preferences are "well behaved" in the three class case, both the median voter theorem as well as the more recent citizen-candidate model (Besley/Coate 1997) will lead to the same political outcomes¹⁷. For convenience, we will thus use the median voter approach as the computations are significantly simplified¹⁸.

¹⁷As long as we consider one candidate equilibria with sufficiently small entry costs.

¹⁸The median voter theorem applies as - given the exogeneous transfer rule - the policy space is one-dimensional and utility functions are strictly concave.

For d to be the decisive (=median) voter in a rational expectations equilibrium, obviously all agents must expect τ_d , the most preferred inflation rate of d , to be the inflation outcome. For this to be a political equilibrium it must be verified that d is effectively the median voter, that is either that $\tau_{-d}(\tau_d) > \tau_d(\tau_d) > \tau_{-d'}(\tau_d)$ or that $\tau_{-d'}(\tau_d) > \tau_d(\tau_d) > \tau_{-d}(\tau_d)$. $-d$ and $-d'$ are the non-decisive voters and where $\tau_i(\tau_d)$ is the preferred inflation tax rate of i given that the financial adaptation decision has been made knowing that the inflation tax rate will be $\tau_e = \tau_d$. As what interests us is how political equilibria change with variations in the possibility of financial adaptation, we will seek to establish for which values of the parameter c (describing the cost of financial adaptation) political equilibria occur.

In the following it is assumed that the middle-class agents are poorer than the mean, that is $h_M < \bar{h}$, and that $h_M^2 < \bar{h}^2$. Both are empirically reasonable assumptions in most countries. Furthermore, the former is a standard assumption in most political equilibrium models, and the latter a condition that for reasonable choices of the parameters follows from the former. In order to be able to calculate explicit solutions one has to simplify the parameter a , that describes the ease with which individuals can use financial adaptation technology. More precisely it is supposed that $a_p = 0$ and $a_M = a_R = a$, which is a somewhat simplifying way of stating that people with higher capacity have easier access to financial adaptation technologies¹⁹.

We use the term "rich squeezing" for constellations where both middle class and poor favour a higher inflation tax than the rich, with a corresponding political outcome that transfers income away from the rich. "Middle class squeezing" and "poor squeezing" are the equivalent situations with income transfers away from, respectively, the middle classes or the poor. PDV, MDV and RDV stand for the poor (respectively the middle class or the rich) being the decisive voter. MP, PR and MR are simply parameter values (precisely defined below).

¹⁹Though this simplification might seem somewhat strong, it does not alter the qualitative results of our model as simulations by the author have shown.

In order to calculate the political equilibria, one must show under which conditions each possible decisive voter (that is the poor P, the middle-class M and the rich R) will actually be the decisive voter. For example, to find political equilibria with the middle-class being the decisive voter, one has to show that one of the “political equilibrium conditions” holds, that is either $\tau_P(\tau_M) > \tau_M(\tau_M) > \tau_R(\tau_M)$ or $\tau_R(\tau_M) > \tau_M(\tau_M) > \tau_P(\tau_M)$, where $\tau_i(M)$ is the preferred inflation tax rate of i , given that everybody has made his financial adaptation decision anticipating that M will be the decisive voter. We refer to the first case as “rich squeezing”, and the second as “poor squeezing”. In strict analogy the “political equilibrium conditions” for a poor individual to be decisive are $\tau_M(\tau_P) > \tau_P(\tau_P) > \tau_R(\tau_P)$ or $\tau_R(\tau_P) > \tau_P(\tau_P) > \tau_M(\tau_P)$, and for a rich voter $\tau_P(\tau_R) > \tau_R(\tau_R) > \tau_M(\tau_R)$ or $\tau_M(\tau_R) > \tau_R(\tau_R) > \tau_P(\tau_R)$. As previously, we refer to the case in which rich and poor individuals have the lowest preferred inflation rate as rich and poor squeezing respectively, and to the cases where the middle-class is the most inflation averse as “middle-class squeezing”.

We take the “political equilibrium conditions” for a middle-class and a poor individual to be the decisive voter, and do somewhat tedious but straightforward calculations thus obtaining the following relations:

$$\tau_P(\tau_M) > \tau_M(\tau_M) \Leftrightarrow c > \frac{(\bar{h} - h_P)ah_M^2}{(h_M - h_P)\alpha\bar{h}} - \frac{\overline{ah^2}}{\alpha\bar{h}} (:= MP) \quad (2.9)$$

$$\tau_R(\tau_M) > \tau_M(\tau_M) \Leftrightarrow c < \frac{\bar{h}a(h_R + h_M) - \overline{ah^2} - ah_Rh_M}{\alpha\bar{h}} (:= MR) \quad (2.10)$$

$$\tau_R(\tau_P) > \tau_P(\tau_P) \Leftrightarrow c < \frac{(\bar{h} - h_P)ah_R^2}{(h_R - h_P)\alpha\bar{h}} - \frac{\overline{ah^2}}{\alpha\bar{h}} (:= PR) \quad (2.11)$$

$$\tau_M(\tau_P) > \tau_P(\tau_P) \Leftrightarrow c < MP \quad (2.12)$$

When looking at possible equilibria where a rich individual is the decisive voter, one has, for “technical” reasons, to make another differentiation. Let us first suppose that $c < \frac{ah_R^2 - ah^2}{ah_R} (= C_R)$, under which circumstances one obtains the following two relations:

$$\tau_P(\tau_R) > \tau_R(\tau_R) \Leftrightarrow c < PR \quad (2.13)$$

$$\tau_M(\tau_R) > \tau_R(\tau_R) \Leftrightarrow c < MR \quad (2.14)$$

If on the contrary $c > C_R$, one obtains the relations:

$$\tau_P(\tau_R) > \tau_R(\tau_R) \Leftrightarrow c > PR \quad (2.15)$$

$$\tau_M(\tau_R) > \tau_R(\tau_R) \Leftrightarrow c > MR \quad (2.16)$$

This means, for example, that the “political equilibrium conditions” for a rich squeezing equilibrium with M as the decisive voter, $\tau_P(\tau_M) > \tau_M(\tau_M) > \tau_R(\tau_M)$, translate into the cost of financial adaptation c being $c > MP$ and $c > MR$. It has to be verified now whether (or for which parameter constellations) these two conditions can be fulfilled simultaneously. In addition, political equilibria are only considered if $c \geq 0$, as a negative cost of financial adaptation is clearly unreasonable. It turns out that for a non-negative cost of financial adaptation in political equilibrium the implemented inflation (tax) rate is always non-negative.

To be able to conclude for which values of c , the cost parameter of financial adaptation, the above conditions hold, one must know the relative position of MR, MP, PR and C_R . Straightforward (though tedious) calculations show that if $h_M h_R < h_P h_R + h_P h_M$, a condition that can be interpreted as describing a more egalitarian income distribution, $MP, MR > 0$; $PR < 0$; $C_R > MR$ and $PR < MR < MP$. If $h_M h_R > h_P h_R + h_P h_M$, that is income distribution is more inegalitarian, than $MP, MR < 0$; $PR > 0$; $C_R > PR$ and $MP < MR < PR$. For a given case (egalitarian/inegalitarian so-

ciety) and c in a specified interval one can determine whether there is a political equilibrium, and if there is, who is going to be the decisive voter, and which inflation tax rate will be implemented.

Proposition 1 *For c sufficiently small, there always are "corner solution" equilibria of the "poor-squeezing" type with the rich being the decisive voter. These equilibria are characterised by maximal inflation tax evasion of the rich and typically also the middle classes, and relatively high levels of inflation.*

Proof. When for sufficiently small c the optimal financial adaptation decision by rich and the middle becomes constraint by the upper bound (the maximum possible financial adaptation is $\phi_R = \phi_M = 1$ which means complete inflation tax evasion; note that $\phi_P = 0$ by assumption), the optimal tax rate of the decisive voter becomes independent of the theoretically optimal level of financial adaptation (which as above 1 is unrealisable). The preferred inflation tax rate of the decisive voter is therefore simply obtained by substituting the different maximum values for ϕ in 2.4, and deriving the optimal tax rate, which leads to $\tau_d^{Corner} = \frac{h_P}{3\alpha h_d}$. It is easily shown that for the rich being the decisive voter this potentially is a political equilibrium, as $\tau_R^{Corner} = \frac{h_P}{3\alpha h_R} < \frac{h_P}{3\alpha h_M} = \tau_M^{Corner}$, and with the poor being against any inflation (as it only redistributes in their disfavour), the optimal inflation rate of the rich is indeed between the preferred rates of the poor and middle classes. For which values of c can such a corner solution equilibrium occur? As the optimal evasion decision compatible with an expected inflation rate of $\tau_R^{Corner} = \frac{h_P}{3\alpha h_R}$ is $\phi_i = \frac{h_i}{h_R} \frac{ah_P}{3\alpha c}$, $i=M,R$, we can easily calculate the values of c for which $\phi_i > 1$ for $i=M,R$. We obtain the conditions that $c < \frac{ah_P}{3\alpha}$ and $c < \frac{h_M}{h_R} \frac{ah_P}{3\alpha}$. As $\frac{h_M}{h_R} < 1$, the second condition is the binding condition such for $\phi_R = \phi_M = 1$, and we will therefore define $c_{corner} := \frac{h_M}{h_R} \frac{ah_P}{3\alpha}$. It can easily be shown that $c_{corner} < C_R$, implying that corner solution equilibria can only occur up to a certain cost of tax evasion

(which intuitively makes sense)²⁰.■

Proposition 2 *If $h_M h_R > h_P h_R + h_P h_M$, that is in a relatively “inegalitarian” society, there are “rich squeezing” equilibria where a middle-class individual is the decisive (median) voter whatever the cost of financial adaptation $c > 0$. If the cost of financial adaptation is $0 < c \leq PR$, there are also “middle-class squeezing” equilibria with a poor agent being the decisive voter, as well as “middle-class squeezing” interior solution equilibria with a rich agent being the decisive voter. There are no other interior solution political equilibria.*

Proof. We know that in a relatively “inegalitarian” society $MP, MR < 0, PR > 0, C_R > PR$ and $MP < MR < PR$.

Middle Class Decisive Voter : For “rich squeezing” equilibria with a middle class individual as decisive voter it must hold that $\tau_P(\tau_M) > \tau_M(\tau_M) > \tau_R(\tau_M)$, which using equations 2.9 and 2.10 is equivalent to $c > MP$ and $c > MR$. As MR and MP are both negative, these conditions hold for any (non-negative) cost c of financial adaptation. For “poor squeezing” equilibria with a middle class individual as decisive voter it must hold that $\tau_R(\tau_M) > \tau_M(\tau_M) > \tau_P(\tau_M)$, which using equations 2.9 and 2.10 is equivalent to $c < MP$ and $c < MR$. As MP and MR are negative, there are thus no non-negative c for which these conditions are fulfilled, consequently in the “inegalitarian” case there cannot be poor squeezing equilibria with a middle class individual as decisive voter.

Poor Decisive Voter : For “rich squeezing” equilibria with a poor individual as decisive voter it must hold that $\tau_M(\tau_P) > \tau_P(\tau_P) > \tau_R(\tau_P)$, which using equations 2.11 and 2.12 is equivalent to $c > PR$ and $c < MP$. As $MP < PR$ this is impossible, thus this type of equilibrium does not exist in this case. For “middle

²⁰It is, unfortunately, analytically not possible to further gain interesting evidence concerning the position of c_{corner} with respect to the points MR, PR or MP , as these positions depend on exact parameter values. Obtained equations are also usually too complex to allow for meaningful interpretation of the different constellations of parameter values.

class squeezing” equilibria with a poor individual as decisive voter it must hold that $\tau_R(\tau_P) > \tau_P(\tau_P) > \tau_M(\tau_P)$, which using equations 2.11 and 2.12 is equivalent to $c < PR$ and $c > MP$. As $MP < PR$ there are thus equilibria for non-negative c , that is in the interval $[0, PR]$.

Rich Decisive Voter : For ”middle class squeezing” equilibria with a rich individual as decisive voter it must hold that $\tau_P(\tau_R) > \tau_R(\tau_R) > \tau_M(\tau_R)$, which under the assumption that $c < C_R$ and thus using equations 2.13 and 2.14 is equivalent to $c < PR$ and $c > MR$. As $MR < C_R$ there are thus equilibria for non-negative c , that is in the interval $[0, PR]$. Under the assumption that $c > C_R$, and thus using equations 2.15 and 2.16, one obtains the conditions that $c > PR$ and $c < MR$. As $MP < PR$ this is impossible, thus this type of equilibrium does not exist.

For ”poor squeezing” equilibria of the interior solution type with a rich individual as decisive voter it must hold that $\tau_M(\tau_R) > \tau_R(\tau_R) > \tau_P(\tau_R)$, which under the assumption that $c < C_R$ and thus using equations 2.11 and 2.12 is equivalent to $c > PR$ and $c < MP$. As $MP < PR$ this is impossible, thus this type of interior equilibrium does not exist. Under the assumption that $c > C_R$, and thus using equations 2.15 and 2.16, one obtains the conditions that $c < PR$ and $c > MR$. However as we know that $C_R > PR$, there are no non-negative c that fulfill all three conditions, thus this interior equilibrium does not exist. ■

Proposition 3 *If $h_M h_R < h_P h_R + h_P h_M$ (that is a relatively “egalitarian” society), “rich squeezing” equilibria with a middle-class individual as decisive voter occur when the cost of financial adaptation $c > MP$. Moreover, there are rich squeezing equilibria with a poor individual being the decisive voter if $0 < c < MP$. If the cost of financial adaptation is $0 < c < MR$, there are “poor squeezing” interior solution equilibria with a middle-class individual as decisive voter, as well as “poor squeezing” interior solution equilibria with a rich agent being the decisive voter. There are no other interior solution political equilibria.*

Proof. We know that in a relatively "egalitarian" society $MP, MR > 0, PR < 0, C_R > MR$ and $PR < MR < MP$.

Middle Class Decisive Voter : For "rich squeezing" equilibria with a middle class individual as decisive voter it must hold that $\tau_P(\tau_M) > \tau_M(\tau_M) > \tau_R(\tau_M)$, which using equations 2.9 and 2.10 is equivalent to $c > MP$ and $c > MR$. As $MP > MR$ (and both are positive), these conditions hold for any cost of financial adaptation $c > MP$. For "poor squeezing" equilibria with a middle class individual as decisive voter it must hold that $\tau_R(\tau_M) > \tau_M(\tau_M) > \tau_P(\tau_M)$, which using equations 2.9 and 2.10 is equivalent to $c < MP$ and $c < MR$. As $MR < MP$, these conditions hold for any non-negative cost of financial adaptation $c < MR$.

Poor Decisive Voter : For "rich squeezing" equilibria with a poor individual as decisive voter it must hold that $\tau_M(\tau_P) > \tau_P(\tau_P) > \tau_R(\tau_P)$, which using equations 2.11 and 2.12 is equivalent to $c > PR$ and $c < MP$. As $MP > PR$ and PR negative this conditions hold for any cost between $0 < c < MP$. For "middle class squeezing" equilibria with a poor individual as decisive voter it must hold that $\tau_R(\tau_P) > \tau_P(\tau_P) > \tau_M(\tau_P)$, which using equations 2.11 and 2.12 is equivalent to $c < PR$ and $c > MP$. As $MP < PR$ this is impossible.

Rich Decisive Voter : For "middle class squeezing" equilibria with a rich individual as decisive voter it must hold that $\tau_P(\tau_R) > \tau_R(\tau_R) > \tau_M(\tau_R)$, which under the assumption that $c < C_R$ and thus using equations 2.13 and 2.14 is equivalent to $c < PR$ and $c > MR$. As $PR < MR$ this is impossible. Under the assumption that $c > C_R$, and thus using equations 2.15 and 2.16 one obtains the conditions that $c > PR$ and $c < MR$. As $C_R > MR$ this is impossible. For "poor squeezing" equilibria of the interior solution type with a rich individual as decisive voter it must hold that $\tau_M(\tau_R) > \tau_R(\tau_R) > \tau_P(\tau_R)$, which under the assumption that $c < C_R$ and thus using equations 2.11 and 2.12 is equivalent to $c > PR$ and $c < MP$. As $MR < MP$, these conditions hold for any non-negative cost of financial adaptation $c < MR$. Under the assumption that $c > C_R$, and thus using equations 2.15 and 2.16 one obtains the

conditions that $c < PR$ and $c > MR$. As $PR < MR$ this is impossible. ■

Proposition 4 *The inflation rates in the political equilibria as specified in propositions 2 and 3 for, respectively, a poor, a middle-class or a rich individual being the decisive voter, are*

$$\tau_{PDV} = \frac{c(\bar{h}-h_P)}{\alpha h_P c + ah^2}, \tau_{MDV} = \frac{c(\bar{h}-h_M)}{\alpha h_M c + ah^2 - ah_M^2} \text{ and } \tau_{RDV} = \frac{c(\bar{h}-h_R)}{\alpha h_R c + ah^2 - ah_R^2}.$$

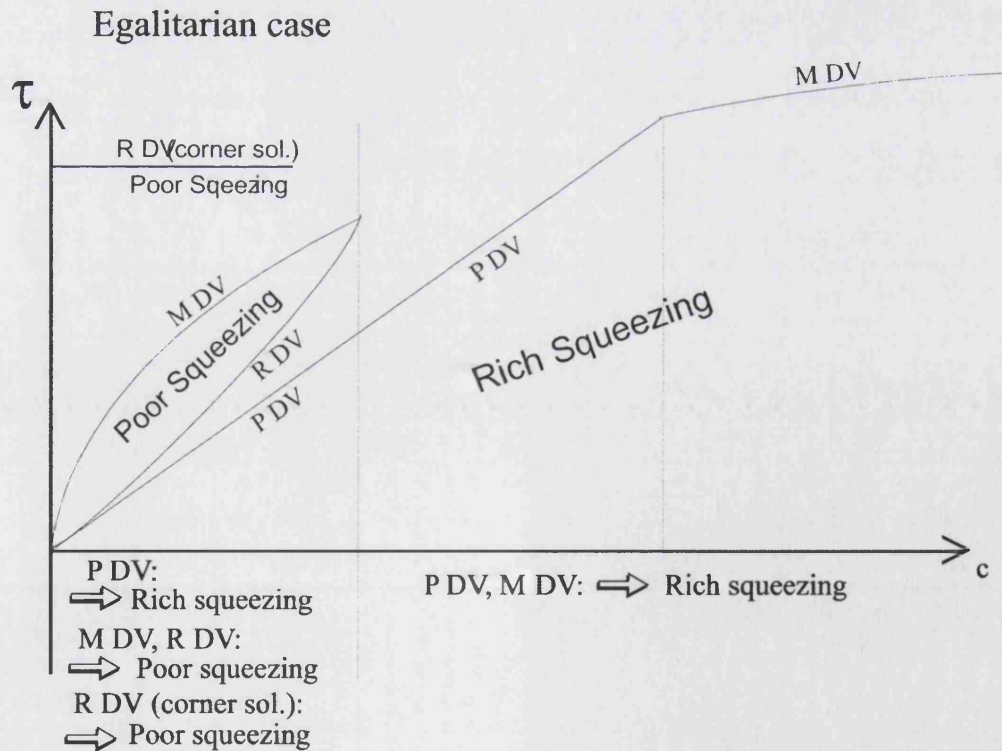
The corresponding levels of financial adaptation of individuals i are respectively

$$\phi_i^{PDV} = \frac{ah_i(\bar{h}-h_P)}{\alpha h_P c + ah^2}, \phi_i^{MDV} = \frac{ah_i(\bar{h}-h_M)}{\alpha h_M c + ah^2 - ah_M^2} \text{ and } \phi_i^{RDV} = \frac{ah_i(\bar{h}-h_R)}{\alpha h_R c + ah^2 - ah_R^2}.$$

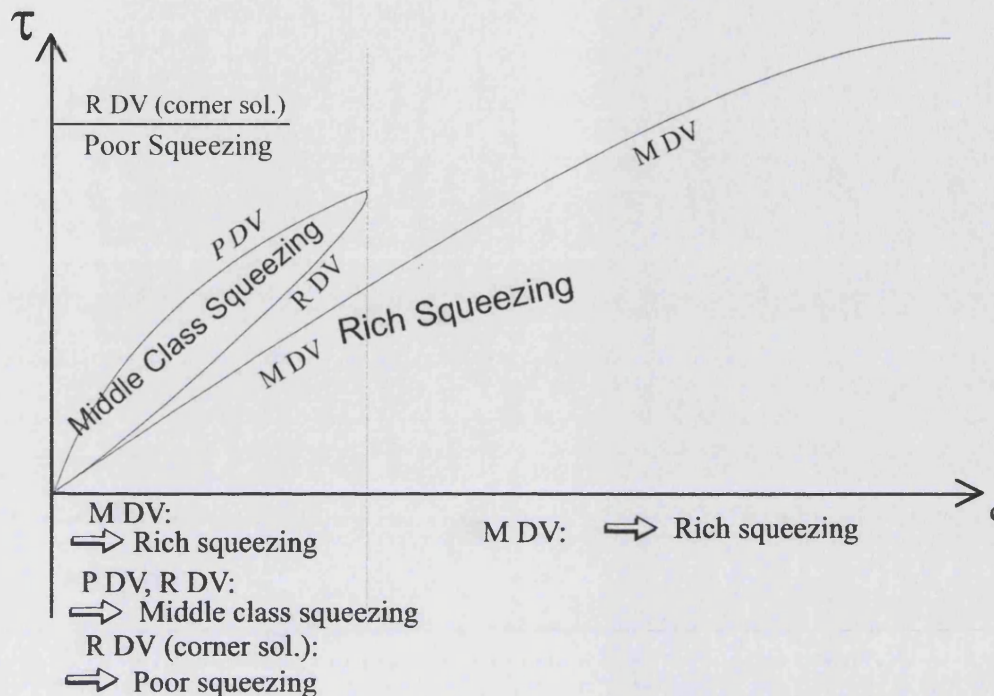
For political equilibria as specified in proposition 1 with a rich being the decisive voter and financial adaptation decisions being $\phi_R = \phi_M = 1$ and $\phi_P = 0$, inflation is $\tau_{RDV}^{Corner} = \frac{h_P}{3ah_R}$

Proof. Follows directly from equations 2.8 and 2.6, as well as the proof of Proposition 1. ■

The results can be summarised in the following graphs (note that these graphs are only supposed to give a qualitative impression) :



Inegalitarian case



These graphs show the cost level of financial adaptation on the horizontal, and the inflation (tax) rate on the vertical axis. M DV (R DV, P DV) designate the intervals where there are equilibria with a middle-class (rich, poor) individual being the decisive voter. Both graphs clearly show the existence of equilibria bifurcations when financial adaptation technology parameter, c , changes. In both the egalitarian and the inegalitarian case, for large values of c (that is when financial adaptation is very costly to implement), a middle-class agent is to be the decisive (=median) voter and a unique equilibrium prevails. The poor agents would favour more inflation whereas the rich would prefer less. For a slightly lower c one has, in the egalitarian case, equilibria where a poor agent is going to be the decisive (=median) voter. In this case middle income agents favour higher inflation and high income agents prefer low inflation. These are thus the cases where poor and middle-class agents form a coalition to redistribute income to them from the rich ("Rich Squeezing"). Rich agents cannot prevent this as the cost of financial adaptation technology is

still too expensive to allow extensive use of it. As long as the rich cannot evade the inflation tax it is optimal for the other agents to form a coalition against them, as redistribution from the rich is the most profitable option for everybody else.

For sufficiently low values of c , that is when the use of financial adaptation technology is widely practised by rich agents, these same agents can eventually overcome the coalition formed against them. This becomes possible as redistribution from them becomes less beneficial as they can avoid paying inflation tax to a large extent. In a more egalitarian society there might emerge a coalition between high and middle income agents to redistribute income away from the poor ("Poor Squeezing") with relatively moderate inflation rates, and typically with a middle class individual being the decisive (=median) voter (though in certain constellations a rich individual could also be the decisive voter). In the inegalitarian case there can be coalitions between poor and rich agents who favour higher inflation rates than middle-class individuals thus "squeezing the middle-classes", with a poor agent (and under certain constellations with a rich agent) being the decisive voter.

Moreover, both in an egalitarian and an inegalitarian society, for c sufficiently small there are also "corner solution" equilibria. Those equilibria - where a rich individual is the decisive voter - are typically characterised by both the rich and the middle classes completely evading inflation tax, and using relatively high inflation rates to redistribute income away from the poor which cannot avoid inflation tax.

In any case, as there are multiple equilibria for low values of c , each of the groups containing the decisive voter can constitute an equilibrium if people expect this to happen²¹. For low values of c apart from the poor or middle-class squeezing there are still rich squeezing equilibria, and the middle-class or different poor squeezing cases only occur if people expect inflation to be sufficiently high. This is because only when the rich agents expect inflation to be high will they be willing to acquire sufficiently high levels of financial adaptation, making beneficial for them to join a

²¹A self-fulfilling expectations equilibrium of the Saint Paul/Verdier (1997) type.

coalition with the poor or the middle-classes. If people expect inflation to remain moderate, even in a situation where the poor and middle-class form a coalition against the rich, it is optimal for the latter to acquire less financial adaptation and accept to pay (relatively low) inflation tax on a larger part of their income.

One can see that for most cases inflation (tax) converges to zero when the cost of financial adaptation c goes to zero. Low values of c mean that financial adaptation is widely used, and thus the inflation tax base becomes very small. This ends inflation as the distributional struggle via inflation taxation has become meaningless as there is almost nothing left to redistribute. However, the corner solution equilibrium with complete tax evasion by the rich and middle classes and high inflation rates consists even when c goes to zero. This indicates that even when financial adaptation is rather cheap, high inflation remains a possibility as long as some parts of society have only limited capacity to evade the inflation tax. Whether in such a situation low inflation or the high inflation equilibria prevail depends solely on agents' inflation expectations.

Finally, given that for a large range of values of c one finds multiple equilibria, the question might seem relevant whether all these cases are equally likely or whether some of these equilibria are more or less robust than others. As is shown in the Appendix, the equilibria where either a poor or a middle-class agent are decisive voters are robust to small errors in anticipations, whereas those equilibria with a rich individual are not. The intuition behind this finding is that equilibria become unstable if the capacity of the decisive voter to evade inflation is sufficiently above average levels, as in such circumstances errors in inflation expectations are no longer automatically corrected but become amplified (see appendix). Corner solution equilibria are "semi-stable". When inflation expectations are slightly too low, errors become amplified, exactly as with the other equilibria where a rich is the decisive voter. However, if inflation expectations are too high this does not have any impact: as maximal evasion is constraint, neither financial adaptation decisions nor optimal

tax rates are affected.

Though the main aim of this paper is not to discuss the impact of income distribution on inflation, we would nevertheless like to comment briefly on this subject. A standard assumption, though not very well founded theoretically, is that more unequal income distribution leads to higher inflation. Beemtsma/van der Ploeg (1995) find some empirical support for this thesis. Though our results might be seen as roughly consistent with that idea, insofar as more inequality could sharpen the redistributive struggle, we think that the question whether inequality leads to more inflation is ambiguous²². If one thinks of inflation as a means by which the group in power may redistribute income in their own favour, than more inequality between in- and out of power agents will only give rise to higher inflation if redistribution can be raised. This will mainly be the case when inflation is used to redistribute from the rich to the less well off, because only then will higher inequalities always enable a higher redistribution level. If, on the other hand, inflation is used to redistribute from the less well off to richer strata of society (who, through financial adaptation, evade inflation tax), then more inequality might actually reduce inflation, as in such a case less well off agents have less income that is worth taxing away.

3 Introducing shocks or slow adjustment

So far it has been assumed that the only reason for inflation is the conscious attempt of individuals to redistribute income in their favour via inflation tax financed transfers. This simplification has made it possible to concentrate on the redistributive effects of inflation, and to show how the incentives to create inflation for redistributive purposes vary with different levels of financial adaptation. But, in addition to these longer term determinants of inflation, there must equally be short-term effects. Otherwise we would usually see declining - or at least stable - inflation with

²²Which, by the way, might be a reason for the rather thin empirical proof for this hypothesis.

rising levels of financial adaptation, especially ruling out episodes of hyperinflation. One explanation why this phenomenon might not be observed is that with rising levels of financial adaptation the real cost of inflation α might fall. This would imply that inflation-financed redistribution would become less costly to society, which could further deepen the redistributive struggle and lead to rising inflation rates. This may be a promising feature to explore in further research, however it is not the focus of this work.

The main reason our model predicts constantly declining inflation with rising levels of financial adaptation is the assumption that in each period *any* level of redistribution desired by the decisive agent can be implemented. This is, of course, an unrealistic assumption in the short run. It usually takes time to change transfers and the size of a budget deficit, especially when those are to be cut. Furthermore, inflation is often used to create the necessary resources to “balance” the budget (or at least keep the deficit within the limits that international financial donors/markets are willing to finance) if the economy has been hit by shocks. This is easily understandable from a political economy viewpoint. Raising “ordinary” taxes or cutting expenditures, in addition to being unpopular, usually requires parliamentary majorities that are often politically difficult to obtain. Inflation financing often has the advantage of having no immediate political cost, and being easy to implement. In the following section short-term elements are incorporated into the general model, namely shocks and budget adjustment traps.

First, it is assumed that the economy is hit by shocks that, if negative, demand additional taxraising or cuts in government spending (and, if positive, make it possible to lower taxes or spend more). In order to avoid results that are mainly driven by informational asymmetries it is supposed that agents can observe the shocks. Thus they take them into account when making their optimizing decisions. Denoting shocks by ε this changes the formalisation in the following way:

Financial adaptation decisions are now taken by maximizing

$$Max_{\phi_i} \left[h_i(1 - (1 - \phi_i)\tau_e - \frac{\alpha}{2}\tau_e^2) + \frac{\varepsilon}{N} + \frac{1}{N}\tau_e TB - \frac{c}{2a_i}\phi_i^2 \right]; i = 1 \dots N$$

and the decisive voter determines his optimal inflation rate by maximizing

$$Max_{\tau_d} \left[h_d(1 - (1 - \phi_d)\tau_d - \frac{\alpha}{2}\tau_d^2) + \frac{\varepsilon}{N} + \frac{1}{N}\tau_d \left(\sum_{j=1}^N (1 - \phi_j)h_j \right) - \frac{c}{2a_i}\phi_i^2 \right]$$

under $\tau_d \left(\sum_{j=1}^N (1 - \phi_j)h_j \right) \geq \varepsilon$. This condition simply states that the income from inflation tax has to be at least as important as the amount of spending required by the shock.

Alternatively, suppose that the budget deficit is not freely adjustable. More precisely there is a minimal size of the budget deficit D in a given period that has to be financed from inflation tax. Replacing ε with D , the conditions of this maximisation problem are identical to the one stated above, with the only difference being that the term that captures the transfer due to the shock $\frac{\varepsilon}{N}$ disappears. The constraint in this case simply states that the income from inflation tax has to be at least as important as the minimal size of the budget deficit D .

It immediately follows that as long as the constraint is non-binding, the model basically does not change from the long-run inflation model presented in section 1. The most interesting case is thus naturally when the condition is binding. Then inflation is entirely determined by the need to finance the deficit or the shock. Thus it becomes irrelevant who is going to be the decisive voter as far as determining inflation levels is concerned. Under these circumstances, the inflation tax - referring notationwise to the budget deficit case²³ - will be such that for a given inflation tax base the money raised is equal to D . So for $\tau = \frac{D}{\sum_{j=1}^N (1 - \phi_j)h_j}$ substituting

²³In the case of shocks simply replace D by ε .

$\phi_i = \frac{h_i a_i \tau e}{c}$ ($i = 1 \dots N$), and assuming rational expectations, the resulting quadratic equation is²⁴

$$\tau = \frac{\bar{h}c}{ah^2} - c \sqrt{\frac{\bar{h}^2}{4ah^2} - \frac{D}{Nah^2c}}. \quad (2.17)$$

Simple derivation of the solution with respect to c shows that τ is decreasing in c (*i.e.* $\frac{\partial \tau}{\partial c}$ is negative). Thus a shock or a not immediately compressible budget deficit of a given size will have a higher inflationary impact when financial adaptation is more widely used (that is for a lower c). In addition, for a smaller c , the term under the root in equation 2.17 becomes negative for lower values of D . When this term becomes negative the government can no longer finance its needed amount of tax income by inflation tax, however hard it tries. This situation arises as expectations of higher inflation lead to a more extensive use of financial adaptation such that the inflation tax base decreases at a faster rate than inflation increases, which we interpret as an hyperinflationary outburst. The fact that for a smaller c , a lower budget deficit D or shock ε is sufficient to trigger hyperinflation illustrates how, for higher levels of financial adaptation, economies become more likely to end up in a hyperinflationary situation in the case of negative events.

4 The dynamics of adaptation technology

This section illustrates how the static setting might be expanded to a dynamic one. The main assumption is that the cost function of financial adaptation technology is not fixed, but changes over time. More precisely, a kind of trickle-down effect is supposed, implying that the financial adaptation technology becomes cheaper when it becomes more widely used as in Uribe (1995). This can be justified by stating that agents simply learn from the experiences of their friends and neighbours or that

²⁴There is a single economically reasonable solution of the quadratic equation as only for the negative square root a zero budget deficit coincides with zero inflation.

when enterprises start to sell financial adaptation technologies on a larger scale, the cost of these technologies goes down. Supposing economies of scale for the organisation of capital flight or the provision of foreign currency denominated accounts, for example, seems to be a reasonable assumption. Moreover, for higher levels of currency substitution the use of non-domestic currency will become more widely accepted in transactions thus the costs of using it will decrease. More precisely the cost parameter c is assumed to follow the following equation:

$$c_t = c_{t-1} + f - \lambda A(c_{t-1}) \quad (2.18)$$

where f is the rate at which people forget about financial adaptation (which makes it more costly) and $A(c_{t-1})$ is the total level of financial adaptation of the previous period.

An interesting question to investigate now is how the cost of the financial adaptation technology (and thus the inflation tax base and the inflation rate) evolve over time. Unfortunately in doing so one encounters one of the main problems of political economy modeling, namely that the complex structure of models with possible changes of the decisive voter usually does not allow for completely forward looking agents. To overcome that problem it is traditionally assumed that either the decisive voter does not change over time, which is often a somewhat unrealistic assumption that clearly does not hold in this model, or that agents are to some point myopic. We do the latter, insofar as in our dynamic setting the decisive agents do not take into account how the price level of financial adaptation will change in the future based on their actions today. Though it would undoubtedly be preferable to use a complete forward looking framework, we believe that this assumption does not pose a great problem in this case for two reasons: Firstly, financial adaptation, though sometimes occurring over a long period, is a process that rarely happens more than once in a country. Assuming that agents are not completely rational in foreseeing how it will

evolve does not seem to be too far from reality. Secondly, using a time inconsistency argument, one sees that the inflation rate chosen by the decisive voter, (given the future evolution of the cost of financial adaptation) could never be lower than his optimal rate without bearing in mind this information. This occurs because if the other agents believe the decisive voter to implement an inflation rate that would be below his one period optimal inflation rate and would acquire financial adaptation accordingly, this would already deliver the optimal evolution path of the price of financial adaptation for the decisive voter, who would thus optimally fall back to his (higher) one period optimal rate. Thus in a complete forward looking model inflation could only be higher, which would only speed up the process of financial adaptation, but qualitatively would not change the results otherwise.

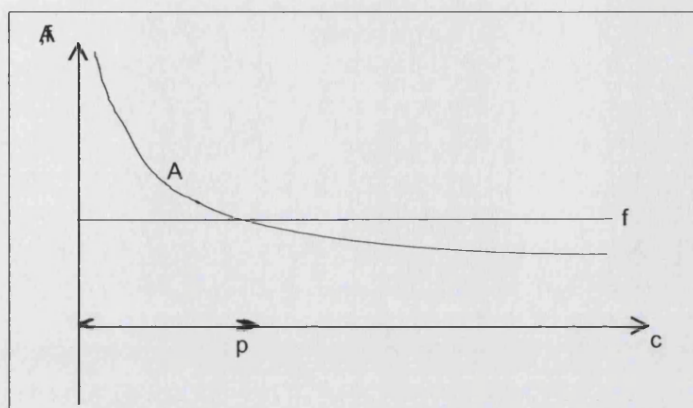
Let us return to the total level of financial adaptation, which is now $A(C_{t-1}) = \sum_{j=1}^N h_j \phi_j$. Using equation 2.6 to substitute for ϕ_j and then using equations 2.8 and 2.7 to substitute for τ_e under the assumption that d is going to be the decisive voter, this becomes

$$A(C_{t-1}) = \frac{N \overline{ah^2} (\overline{h} - h_d)}{\alpha h_d c_{t-1} + \overline{ah^2} - a_d h_d^2}. \quad (2.19)$$

Though the exact description of the evolution of the cost parameter c depends heavily on the exact structure of the parameter values, supposing that f , the rate at which people forget about financial adaptation is small, one typically gets the following picture²⁵:

²⁵In the graph we have only drawn the line for total financial adaptation in the cases where M is the decisive voter. Typically for the cases where P or R are the decisive voter one obtains lines that are above the f line without crossing it. This results from the fact that for those political equilibria financial adaptation is usually high, and there is thus a tendency for the cost of financial adaptation to decline further. These cases do not add anything to the dynamic structure.

Moreover, for certain parameter constellations one can obtain stable equilibria at high inflation rates; though this result is interesting we do not want to overstress it as it depends crucially on choosing the "right" parameter values, whereas in general one obtains results as shown in the graph.



If the economy is on the right-hand side of point $c=p$ (which means that the cost of the financial adaptation strategy is very high), then the dynamics will drive the cost further up. This will allow the poorer agents to use more inflation to redistribute even more in their own favour as the financial adaptation possibility for the richer agents is practically excluded by its massive cost. This describes a situation where inflation rises, while at the same time the inflation tax base remains constant. This can be seen as a good approximation of a case of successful capital controls and prohibition to hold foreign currencies. To the left of point p , the dynamics will start to drive c down.

It can thus be seen that in a long-run perspective, everything that increases the cost parameter c (for example capital controls or the prohibition of possessing foreign currencies) will lead to higher levels of inflation, whereas - assuming that no group of society is constrained in its ability to use financial adaptation - everything that helps to keep c down (full convertibility, legal dollar denominated bank accounts, foreign currencies as a legal means of payment, etc.) helps to stop inflation. In the short-run all these measures might nevertheless have the opposite effect: in artificially expanding the inflation tax base, the government only needs a lower inflation tax rate to raise a given level of revenue, which might, in the case of external shocks or problems in the budget adjustment process, help to avoid a hyperinflation. Thus

our model clearly shows the trade-off between inflation fighting policies that -more or less artificially- try to broaden the inflation tax base: they might have a beneficial short-term impact, but usually only at the cost of making things worse in the long-run. It might still be useful to apply those measures in situations of temporary crisis, especially if there is a realistic chance that the distributive conflict will end in the foreseeable future and a country will return to stability and social consensus. However, our model suggests that in chronically unstable countries with a long track record of distributive struggle, these measures should be avoided as - though giving temporary relief - they will, most likely, only make things worse in the future.

Conclusion

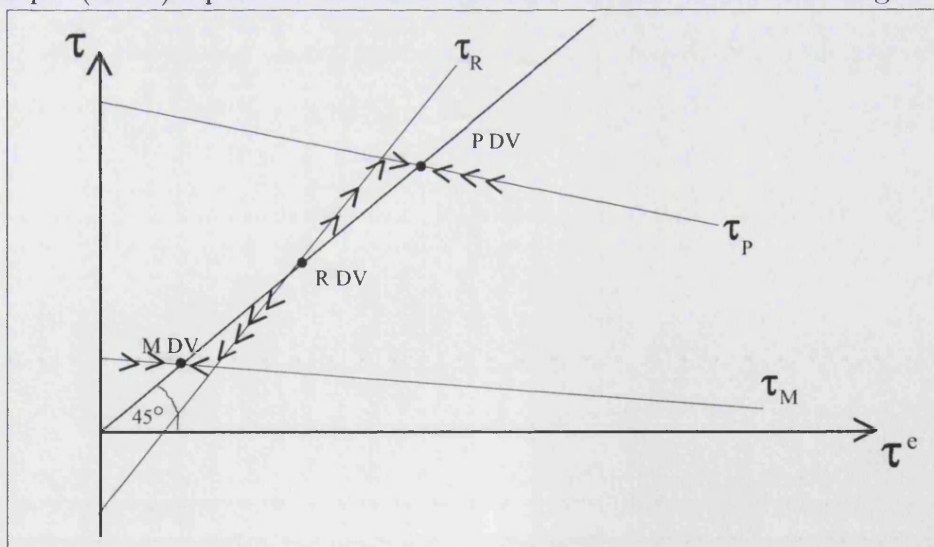
In this paper a theoretical framework has been developed to investigate the interaction between distributional struggle, inflation and financial adaptation. We have discussed how different levels of financial adaptation lead to different coalitions and distributional outcomes. By endogenising the cost of financial adaptation we have shown how dynamically an economy can be driven from high to low levels of monetisation, where it then becomes particularly vulnerable to shocks or budget adjustment traps, and thus might suffer from hyperinflationary outbursts. We have argued that, as inflation is caused by budget deficits resulting from distributive struggle, final stabilisation occurs when the widespread use of financial adaptation has led to an erosion in the inflation tax base, so that inflation becomes useless for generating tax income. However, we also have shown that as long as inflation tax evasion possibilities remain limited for some parts of society, high inflation can occur even with low levels of the tax base. The model presented explains why stabilisation attempts in polarised societies might be doomed to failure in the early stages of an inflationary process with low levels of financial adaptation, unless demonetisation takes away the incentives to use inflation for redistributive ends. Financial liberal-

isation, by facilitating financial adaptation, can be a helpful tool for overcoming such situations of distributive struggle, especially when available to all parts of society. It should be noted, however, that low inflation by itself does not necessarily signify the end of distributive struggle which could simply have shifted to other spheres (e.g. wage bargaining in the private sector). Finally, a higher level of financial adaptation also increases the risk of hyperinflationary outbursts if the budget deficit cannot be kept under very strict control. In addition, as often mainly improving the position of wealthier agents, financial liberalisation can have regressive distributional consequences.

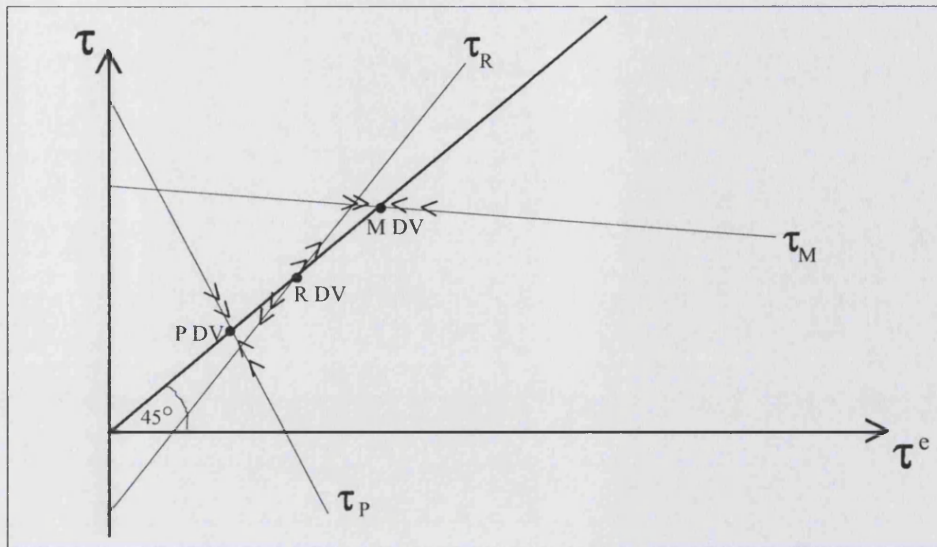
Appendix

Stability of equilibria

Given that for a large range of values of c we get multiple equilibria the question seems important whether all these cases are equally likely or whether some of these equilibria are unstable. Using equation 2.8 under the three different possibilities that people expect respectively a poor, a middle-class or a rich agent to be the decisive voter, we obtain the following equations: $\tau_P = \frac{\bar{h}-h_P}{\alpha h_P} + \tau_e \frac{-\bar{a}h^2}{\alpha h_P c}$, $\tau_M = \frac{\bar{h}-h_M}{\alpha h_M} + \tau_e \frac{-(\bar{a}h^2 - a_M h_M^2)}{\alpha h_M c}$ and $\tau_R = \frac{\bar{h}-h_R}{\alpha h_R} + \tau_e \frac{-(\bar{a}h^2 - a_R h_R^2)}{\alpha h_R c}$. Given τ a function of τ_e we see that the intercept falls from the first to the third equation (and is negative for the third equation). Given our earlier assumptions, the slope is positive for the first equation, mostly positive for the second equation (though negative under certain parameter constellations) and negative for the third²⁶. Bearing in mind that at each equilibrium point (that is $\tau = \tau_e$) the resulting inflation tax rate τ must fall between the optimal inflation tax rates of the other two groups for a given τ_e , a multiple (three) equilibria situation will look like one of the following two graphs:



²⁶The graphs shown below are depict the case where the slope of the second equation is negative, but their message would be qualitatively unchanged if the slope was positive.



Consequently we find two robust equilibria where either M or P are the decisive voter, the equilibrium of R being the decisive voter is not robust and converges towards either of the other ones if there are the slightest changes or errors in anticipations.

This can also be deduced more formally. Looking at equation 2.8 $\tau_d(\tau_e) = \frac{\bar{h}-h_d}{\alpha h_d} + \frac{-(ah^2-a_d h_d^2)}{\alpha h_d c} \tau_e$ the second term reflects the impact of expected inflation τ_e on the inflation tax preferred by the decisive voter. Typically if the decisive voter has more ability to evade inflation than the average, the coefficient in front of τ_e is positive, if the decisive voter has less ability than average the coefficient of the second term is negative. Importantly, equilibria will be stable to errors in anticipations if $\frac{-(ah^2-a_d h_d^2)}{\alpha h_d c}$ is smaller than one, as in this case errors in anticipations will be rectified through an error-correction process. If however this term is larger than one any errors in anticipations will be amplified, and hence equilibria will be unstable. From the above it results that equilibria are unstable if the capacity of the decisive voter to evade inflation tax is sufficiently above average levels. In this case a small overshoot of inflation expectations above the equilibrium value will lead to an even larger increase in the optimal inflation rate of the decisive voter, which in turn will further increase expectations etc.

Straightforward calculations show that under the standard assumptions made in section 2 the coefficient in front of τ_e is always smaller than one for equilibria where P or M are decisive voters, and is always larger than one for equilibria where R is decisive voter. This confirms the intuition obtained by the two above graphs.

Chapter 3

The Political Economy of Reform: Privatisation Beyond Machiavellism

There is hardly a subject that, over the two last decades, has raised as much interest and passion in the economic profession as privatisation. While the economic mainstream in the seventies and early eighties rationalised the advantages of state ownership in a large number of sectors, in the late eighties the general consensus started slowly but surely to shift towards widespread support of privatisation of most state assets. The debate in the early nineties focused on the boundaries of efficient private ownership¹, and the changes in the former communist countries were accompanied by a passionate economic debate about how to privatise their large and inefficient state sectors².

Given the huge interest in normative features of privatisation, it is somewhat surprising that relatively little attention was devoted to positive issues. Neither the

¹See Hart/Shleifer/Vishny(1996) for the most fundamental contribution on this issue.

²See e.g. Roland(1994), Roland/Verdier(1994) and Boycko/Shleifer/Vishny(1995) for fundamental contributions.

real motivations of governments that privatised, nor their methods in doing so attracted much interest, with the exceptions of Perotti and Guney (1993) and Perotti (1995)³. Following these pioneering studies, in recent years the interest in positive issues of privatisation has increased, and some interesting contributions have emerged. Though not exclusively focused on positive issues, the survey by Megginson and Netter (2000) provides an excellent starting point to familiarise with the recent history of and the empirical literature on privatisation. Megginson et al (2004) investigate what determines whether state assets are sold in the financial markets through share-issue privatisation, or sold directly to investors. Jones et al. (1999) examine the effect of political and economic factors on the terms governments set in privatisations. Bortolotti/Pinotti (2003) investigate the relation between electoral systems and privatisation outcomes. On the theoretical side, Bennet et al.(2000) present a framework of how to conceptually understand insider privatisation. Perotti/Biais (2001), in what has become the canonical political economy explanation for privatisation, focus on how privatisation can be strategically exploited to change political preferences.

More precisely they argue that right-wing parties use privatisation in a Machiavellian fashion to increase the wealth of the middle-classes in order to ensure their future political support for right-wing policies. Underpricing in initial public offerings would be the vehicle through which this wealth transfer would be effected. As it would be more expensive to “buy” the middle-classes, that is to lift their income above the mean income, when income differences between the rich and the

³Perotti/Guney observe that share-issue privatisation (opposed to direct asset sales by auction) are dominant at the beginning of privatisation programs, and explain this by the desire of the policymaker to create a broad ownership structure in order to render renationalisation more difficult. Perotti explains the observation that the British government usually kept equity stakes in the early stages of the privatisation programme by showing that it is in the interest of market oriented governments, provided that control is effectively transferred to the private sector, to perform gradual privatisation. This way they can credibly commit to keeping their hands off the privatised companies, as political intervention would reduce the future sales value of the equity stake retained.

middle-class are larger, one would expect more underpricing in more unequal societies. Finally, as only right-wing governments would have incentives to sell assets below their true value, this would equally explain differences in privatisation discounts between right and left-wing policymakers.

Perotti/Biais quote several stylised facts that would corroborate their view. First, there seems to be a general tendency for excessive underpricing of assets, with underpricing being calculated as the % gain of a privatised company the first day it is traded (Biais/Perotti 2001, Jones et al 1999). One would expect some underpricing in privatisations as, mainly due to problems of asymmetric information, initial share offerings of private companies are on average also underpriced. It is however hard to come up with economic reasons why state assets in share-issue privatisations (henceforth SIPs), that *a priori* are better-known and less risky, should sell at equal or even larger discount than private companies sold in initial public offerings. Second, according to Jones et al. (1999) there seems to be a tendency for greater underpricing in countries that -following some proxies as the share of government in GDP- are in some way more right-wing. Third, discounts seem to be higher in more inegalitarian countries (measured by the Gini coefficient). There is however a problem as the Machiavellian privatisation approach would equally predict that the larger a SIP, the smaller the degree of underpricing. This results from the fact that if the value of the privatised companies is bigger, a smaller discount (as measured in percentage terms) will already do the trick of lifting the middle-class above the mean. However, Jones et al. report the discount to be independent of the size of a SIP.

While we clearly agree that not only economic, but equally political considerations have played a role in the set-up of privatisation programs, and that there have been cases where strategic “Machiavellian” considerations seem to have played a prominent role⁴ (and Perotti/Biais make an important contribution in highlight-

⁴Britain seems a good case in point

ing and explaining these cases), we find “Machiavellism” implausible as a general political economy explanation⁵. We thus establish a minimal, but relatively general framework of how to think about privatisation from a broader political economy perspective, which in addition allows to address broader questions related to privatisation. Our model allows for strategic privatisation initiatives. However, it also considers other political economy, and standard economic motives for privatisation, and establishes under which conditions the different motivations are likely to be relevant⁶. Our framework explains not only the stylised facts that a “Machiavellian” privatisation approach can convincingly answer, but also those where this approach remains unconvincing.

We show that, indeed, in many constellations privatisation occurs for “standard” efficiency and political economy reasons, i.e. the potential for welfare increases due to efficiency gains from private ownership, and in some cases the possibility for the policymaker to use privatisation to redistribute part of these efficiency gains to its own constituency via underpriced assets. We also, in addition to “Machiavellian privatisation”, find another possibility of *strategic* privatisation which we refer to as

⁵To give two concrete examples where we see the focus on the Machiavellian approach as misguided: Perotti/Biais stress the ‘Machiavellian’ aspect of Malaysian privatisation, in which sizeable wealth was transferred to the majoritarian ethnic Malayan and other bumiputra groups. As the ethnic Chinese control a large part of the economy, the ethnic Malayan and other bumiputra groups have traditionally been economically weak. It is however these ethnic groups that have had a political majority for the last twenty years (even though the Prime Minister relied on a broad coalition with Chinese business interests to secure his overwhelming majority in parliament). It seems therefore quite difficult to argue the case of a rich political group primarily handing out bounties to another one to buy its political support. An interpretation that sees those in power mainly transferring wealth to their -arguably less wealthy- constituency seems much more convincing. Privatisation in Nazi Germany between 1933-37 is also commonly regarded as having been driven by the strategic motive of the Nazis to win over the support from German industrialists. While widening their political base was certainly among the motives of the Nazis, this simplistic view fails to acknowledge that a large part of the privatised assets actually went to party members and party organisations, and hence simply was a wealth transfer to the core Nazi constituency (see Bel 2006).

⁶Loosely speaking the conditions for strategic “Machiavellian privatisation” are that the potential for efficiency gains from the assets that are up for privatisation must be quite substantial, without exceeding a certain threshold. Such a situation is more likely when either pre-privatisation incomes of the middle class are not far below the mean (while, at the same time, the income of the rich is far above it), or when pre-privatisation tax rates are very high.

"Machiavellian support".

Our privatisation model draws on the political economy model of taxation by Meltzer/Richard (1981), as well as the "citizen-candidate" model developed by Besley/Coate (1997). In our model, citizens from three distinctive classes (poor, middle-class and rich) compete for power. The winner of a general election where voters vote strategically becomes the head of the executive (the "president") and has to decide on whether or not and how to privatise, and set tax rates. However, and here we depart from the citizen-candidate model, we model government not as a single agency, but (based on Alesina/Rosenthal 1995) as divided. Divided government, either coalition governments or "presidents" lacking an absolute majority in the legislative, are not an exception but almost the rule⁷.

Thus the elected president has to deal with a parliament reflecting the distribution of preferences in the population, that is the share of the seats in parliament of each social group corresponds to its population share. Given the divided structure of government, the president cannot simply implement his/her most preferred policies, but depends on a majority in parliament. In the spirit of the seminal paper by Romer/Rosenthal (1978) we see the president as an agenda setter, making policy proposals on certain issues to parliament, which may accept them or not. In case of refusal, the status quo prevails.

In our model all the stylised facts mentioned earlier appear naturally even for non-strategic privatisation. The intuitive explanation for non-strategic underpricing is policymakers' use of privatisation to redistribute to their clientele via discounts. The lower discount at which left-wing policymakers privatise also has a very straightforward explanation that only necessitates the uncontroversial assumption that poorer agents participate less actively in privatisations than more well-off individuals. The idea is the following: when right-wing or centrist governments

⁷Strohm (1984), based on a sample of 323 governments in 15 western democracies, reports divided government in more than 85% of cases.

privatise at a discount, their clientele (respectively rich or middle-classes) largely benefits from the bargain price. On the other hand, when left-wing policymakers privatise at large discounts, not only do their clientele draw little profit from the discount (as they usually are not acquiring a large part of the assets), but they may even be negatively affected as a discounted privatisation may decrease the government's transfer potential. Hence the low enthusiasm of left-wing policymakers for discounted privatisations. It is equally not surprising that privatisations in more inegalitarian countries are more heavily discounted, given that right-wing governments privatise at a larger discount than their left-wing counterparts. It just requires the relatively uncontroversial assumption that countries that frequently have right-wing governments (mainly representing the interests of the better-off) will have a tendency to be more inegalitarian. Finally, our model also succeeds in explaining the stylised facts where a pure Machiavellian approach fails, namely that underpricing is independent of the size of the privatised company (as measured by the market value of the shares on offer). When privatisation occurs for the above-mentioned "standard" motives the underpricing is independent of the size of the offer.

Finally, as mentioned, our model allows us to address broader questions related to privatisation, for example concerning the circumstances necessary for privatisation to proceed, and the main beneficiaries of a privatisation initiative. Here, we discuss the connection between privatisation and the efficiency of a country's tax system. We show that inefficient taxation decreases the likelihood of privatisation being politically feasible. This is because the possibilities of compensating the losers from the discounted asset sale may be insufficient, a feature that may explain the general lack of enthusiasm for privatisation especially among the poor in less developed countries.

1 The model

Our model uses simplified elements both from Meltzer/Richard (1981) and Besley/Coate (1997). More precisely we consider an economy (of total size 1) with 3 groups of individuals, rich (R), middle-class (M) and poor (P) of size $0 < \mu_i < 1/2$ ($i=r, m, p$). Each group has a capital stock K_i that is equally split among the members of the group, that is each individual has a capital $\frac{K_i}{\mu_i}$ that he uses to generate income. For simplicity's sake, we suppose individuals' utility functions to be linear, so that an individual's net income (after taxes and transfers) exactly represents his utility level. To simplify further, we assume that one unit of capital creates one unit of revenue. Thus, the revenue of social group i is $R_i = K_i$, and the revenue of an individual belonging to group i is $\frac{R_i}{\mu_i}$. Moreover, we assume that poor individuals do not have any capital (and are unable efficiently to use physical capital). Thus they cannot generate income.

The main function of Government is to tax income and to redistribute it as a lump sum monetary transfer (one could equally think of this transfer as the provision of a public good). We assume everybody in the economy profits equally from this transfer. This avoids the results being dependent on a particularly biased way of redistribution. Though it is referred to as income tax, we consider taxation in a larger sense. Individuals are seen both as wage earners and enterprise owners. Thus all types of taxes that the enterprise is paying would be included in an individual's income tax.

In a general vote, each individual i votes such as to maximise his personal well-being as represented by his net income (after tax and transfer), that is

$$\frac{R_i}{\mu_i}(1 - \tau) + T. \quad (3.1)$$

In the preceding equation the first term describes an individual's net revenue (apart from transfers), and the second term the share in the transfers an individual

obtains. This transfer is financed by the government's tax revenue, and the profit of the state owned enterprises Π , that is $T = \sum_j R_j \tau + \Pi$.

The political equilibria is based on a slightly altered version of the "Citizen-Candidate" model⁸. More precisely citizens from three distinctive classes (poor, middle-class and rich) compete for power. The winner of a general election where voters vote strategically becomes the head of the executive. For simplicity we will refer to him as the "president". More precisely he has to decide on whether to and how to privatise, and set tax rates. Here, we depart from the citizen-candidate model by assuming government to be divided between the president and a parliament. We model parliament as reflecting the distribution of preferences in the population, that is the share of the seats in parliament of each social group corresponds to its population share. While such an outcome is obviously obtained when parliament is elected under proportional representation, purists could argue that this is not the case in majoritarian parliament elections. Hence the applicability of our model would be limited. However, under most circumstances even a parliament elected by a majority system will, by and large, represent the population's preferences, which for our results would be sufficient (we only need that none of the three social groups -that by definition comprise less than 50% of the population- obtains an absolute majority in parliament.).

Given the divided structure of government, the president cannot simply implement his most preferred policies. He depends on a majority in parliament. In the spirit of the seminal paper by Romer/Rosenthal (1978) we see the president as the agenda setter, making policy proposals on different issues to parliament, which can accept or reject each of them. If a policy proposal is refused, the status quo prevails with respect to this issue.

The exact timing of the political game is now as follows:

1. Both a president and a parliament are elected, the former directly by absolute

⁸See Besley/Coate(1997).

majority rule (following the citizen-candidate model), the latter by proportional representation.

2. The president decides whether he wants to pursue a privatisation initiative, and asks parliament for approval.

3. If parliament agrees, the terms of the privatisation are negotiated with the potential buyers. Thus the exact price of the assets in the privatisation (implying the discount) will depend to some degree on the respective bargaining powers of the president and the potential buyers. As everybody is rational, fully informed and forward looking, the president will only propose privatisation if it will succeed, and on terms that will allow it to succeed.

4. Once privatisation completed (or the decision not to privatise taken) the president can propose to change the tax rate, and if he obtains majority support for his proposition the tax rate is changed.

While it might seem unusual to think of privatisation as being targeted towards a special social group, privatisations are usually structured to have a large impact on a particular group. For example, closed insider privatisation, or tenders for large entities are mainly oriented towards the rich. In such a set up it would be very difficult for middle-class individuals to win control over privatised assets, as they would lack the necessary connections and/or financial power⁹. By contrast, public share offerings (possibly with a limit to the amount of shares an individual can buy, or special financial incentives for retail investors), or the sale of large enterprises in small entities, would favour privatisation towards members of the middle-class. While we do not claim that in reality privatisation is entirely restricted to one class, in a large number of cases it will be biased in favour of some type of individuals¹⁰. Assuming that privatisation is targeted towards one social class is a simple way of

⁹Supposing that they are credit constrained.

¹⁰Following Keloharju et al. (2007) retail incentives have been widely used in SIPs, and the value of these incentives has been substantial. Retail incentives have also had a large impact on participation of retail investors (read: the middle classes) in privatisations.

capturing this stylised fact, while keeping the model simple.

All individuals have perfect information, are rational and forward-looking in any of their decisions, and pursue their own best interests given the constraints they face. We solve the model backwards. We first determine all policy choices that a given policy-maker would take if in office (and get approved by parliament), and only then look at who will be the winner at the election stage.

The determination of the tax rate in our set-up is standard for political economy models. The rich obviously want minimal taxation, and the poor maximal taxation (we assume the maximal tax rate τ^{\max} to be constrained to be strictly inferior to one¹¹). The preferred tax rate of the middle-class (including the median individual) depends on their relative income position. If middle-class individuals are richer than the mean, they want minimal taxation. If they are poorer than the mean they want maximal taxation. We take the simplifying assumption that if, historically, the middle-class has been below the mean, the tax rate at the beginning of the period is maximal, and in the opposite case, the tax rate at the beginning of the period is minimal. Thus, if post-privatisation the middle-class is poorer than the mean, the post privatisation tax rate will be maximal (i. e. τ^{\max}), if they are richer than the mean, it will be minimal (i. e. τ^{\min}). The post-privatisation tax rate depends therefore on the privatisation outcome. To underline this feature we will therefore - if the post-privatisation tax rate is different from the pre-privatisation rate - note those rates respectively τ^{BP} (before privatisation) and τ^{AP} (after privatisation); in cases where the tax rate remains unchanged we will simply note it as τ .

¹¹ Full taxation is empirically unrealistic. In addition, this constraint has the technical advantage of eliminating "division by zero" problems. It can also be justified by the assumption of a deadweight cost of taxation which is low (here zero) up to a certain level of taxation, and becomes higher (here infinite) thereafter. Such a switch could for example occur if beyond a certain tax rate agents migrate to the informal ("home production") sector, as e.g. in Acemoglu/Robinson 2000.

2 Determining privatisation

Let us denote U_i^{BP} the utility of an individual i before privatisation, and U_i^{AP} its utility after privatisation.

Based on equation 3.1, an agent's utility before privatisation is $U_i^{BP} = (1 - \tau^{BP}) \frac{R_i}{\mu_i} + T^{BP}$ where the total transfer is $T^{BP} = \Pi + \sum_j \tau^{BP} R_j$. During privatisation, assets are sold at a price P to the individuals of one social group¹², and for simplicity we assume that each member of the social group acquires the same amount of privatised assets. Thus the "old" capital stock of the new owners of the former state assets decreases by P . Following our simplifying assumption that one unit of capital creates one unit of income, their income decreases by P . However, by owning the former state assets, they now have an additional income stream. While there is still some controversy whether and, if so, under which conditions private ownership is more efficient than state ownership¹³, it seems at least relatively uncontroversial that under efficient private ownership outcomes are usually better than under state ownership. While the emergence of efficient private ownership structures depends in part of how privatisation is conducted and is nothing that should be taken for granted, this is another complex subject which is beyond the reach of this chapter. We therefore simply abstract from these issues here and make the - we think generally reasonable - assumption that private ownership is more efficient than state ownership. Due to increased efficiency private owners are able to obtain $\Pi + \Delta\Pi$ from their new assets (bearing in mind that under state ownership the

¹²Obviously in reality individuals from different social groups may end up buying assets during the privatisation process. We use the assumption of one social group acquiring ownership of all the assets as a simple stylised way of stating that one of the social groups obtains a larger ownership share in the privatisation process, a feature that for a majority of privatisations does not seem overly controversial.

¹³Sabirianova et al. 2005 e.g. show that in Russia and the Czech Republic in the 1990s privatisation to domestic owners did not markedly improve efficiency. Djankov and Murell 2002 also find that in transition countries commercialised state ownership was superior to some forms of private ownership, though generally remained inferior to relatively concentrated private ownership by outsiders.

profit of the state owned companies was Π). Thus the utility of an individual i who acquired state assets during privatisation is $U_i^{AP} = (1 - \tau^{AP}) \frac{[R_i + \Pi + \Delta\Pi - P]}{\mu_i} + T^{AP}$. Individuals $-i$ who did not buy state assets are only affected via the transfer (and an eventual change in the tax rate), thus their post-privatisation utility is simply $U_{-i}^{AP} = (1 - \tau^{AP}) \frac{R_{-i}}{\mu_{-i}} + T^{AP}$.

Total government revenue, that consisted of individual's tax payments and profits from the public companies before privatisation, is now diminished by the latter. However, in return the government obtains privatisation receipts, which in our simple static model are used to finance the transfer¹⁴. Moreover, as long as taxation is possible, the government profits equally from the increased income of individuals who are now more efficient owners of the former state assets. Total government income, that is the total transfer after privatisation, is equal to $T^{AP} = \tau^{AP}(R_i + \Pi + \Delta\Pi - P) + P + \sum_{-i} \tau^{AP} R_{-i}$.

2.1 Left-wing government

Assume first that a left-wing president has been elected. For a left-wing government to propose a privatisation initiative, poor individuals post-privatisation must be better off than before¹⁵. As, by assumption, poor individuals do not have an income of their own, this boils down to an increase in the amount of redistribution in the economy post-privatisation, that is $\Delta T = T^{AP} - T^{BP} \geq 0$. Substituting for T^{AP} and T^{BP} and solving for P this gives us the minimum price P^{\min} below which a

¹⁴In a dynamic model (dynamic in the sense that cash flows repeat themselves every period), the government -assuming a stock market with a return to capital as in the private sector- could convert the privatisation revenue into a constant cash flow P .

¹⁵We assume that the decision to privatise or not does not affect the relative income position of the middle class (i.e. whether they are above or below the mean). This - together with the assumption that initial tax rates reflect the relative position of the middle class - implies that tax rates will not be changed, i.e. $\tau^{AP} = \tau^{BP} = \tau$. For simplicity, we hence use the notation τ when discussing privatisation under left wing government.

left-wing government does not privatise:

$$P^{\min} = \Pi - \frac{\tau}{1 - \tau} \Delta\Pi. \quad (3.2)$$

While the left-wing government as the agenda setter has the power to decide whether or not to propose privatisation, it obviously cannot force privatisation on potential buyers. Thus when acquiring state assets, the utility of a prospective buyer must also increase, that is $\Delta U_i = U_i^{AP} - U_i^{BP} \geq 0$. Substituting for U_i^{AP} and U_i^{BP} and solving for P gives us the maximal price P^{\max} at which privatised assets will actually be bought

$$P^{\max} = \Pi + \Delta\Pi + \frac{\mu_i}{1 - \mu_i} \frac{1}{1 - \tau} \Delta\Pi. \quad (3.3)$$

For privatisation to proceed, obviously the maximal price must be equal or above the minimal one, a feature that we will refer to as the “feasibility” condition. Straightforward calculations show us that this is always the case. Thus privatisation is “technically” feasible- there is an equilibrium price at which the government is willing to sell and there are individuals willing to buy.

In addition, we see that if privatisation is “technically” feasible, it is also politically feasible, i.e. there is a majority of people in the population -and thus in parliament- who prefers it to the status quo (state ownership of the assets). This results simply from the fact that for both the poor and the class of buyers privatisation increases their utility¹⁶.

Apart from structural economic features, the exact privatisation price P depends on the bargaining power of the government and the prospective buyers. We assume Nash bargaining, where α is the bargaining power of the left-wing policy maker, which leads to the optimisation problem

¹⁶As in this case the general transfer would increase, privatisation would even have full public support from the whole political spectrum.

$Max_P (\Delta T_p)^\alpha (\Delta U_i)^{1-\alpha}$, with the solution

$$P^* = \Pi - \frac{\tau}{1-\tau} \Delta \Pi + \frac{\alpha}{(1-\mu_i)(1-\tau)} \Delta \Pi. \quad (3.4)$$

By construction, $P^{\min} \leq P^* \leq P^{\max}$, this obviously implies that at price P^* the utility of the parties involved in the privatisation increases. More precisely the increase in utility for each individual belonging to the social group represented by government -the poor- is $\Delta U_P = \frac{\alpha}{1-\mu_i} \Delta \Pi$, and the change in utility for an individual from the social group acquiring the assets is

$$\Delta U_i = \frac{(1-\alpha)}{\mu_i} \Delta \Pi. \quad (3.5)$$

For completeness it should be noted that the utility for a (rich or middle class) individual i from the social group that is not acquiring the assets is $\frac{\alpha}{1-\mu_i} \Delta \Pi$.

Having found the privatisation price, we can now establish the discount -the difference between the “market” value of the assets and the price P at which they will be privatised. According to capital market theory, the price of an asset should be the net present value of all future cash flows that it earns, which in our static setting without any temporal discounting simply is the profit from assets after privatisation, i.e. $\Pi + \Delta \Pi$. Consequently, in absolute terms the discount D is $\Pi + \Delta \Pi - P$, which substituting and rearranging comes to

$$D = \frac{1-\mu_i-\alpha}{(1-\mu_i)(1-\tau)} \Delta \Pi. \quad (3.6)$$

Partial derivatives are $\frac{\partial D}{\partial \alpha} < 0$, this simply means that the discount decreases with the left-wing government’s degree of bargaining power. Moreover $\frac{\partial D}{\partial \Delta \Pi}$, $\frac{\partial D}{\partial \tau} > 0$ if $\alpha < 1 - \mu_i$ and $\frac{\partial D}{\partial \mu_i} < 0$. This means that as long as the policy maker’s bargaining power is not overwhelmingly strong, the discount increases both with the potential efficiency gains from privatisation and a higher degree of redistributive taxation. The

former results from the fact that if there is a larger potential gain from privatisation, the buyers will get their share of this gain (unless their bargaining power is extremely weak). The latter highlights the feature that, in the presence of a higher degree of redistributive taxation, the poor are willing to allow for a larger wealth transfer to private owners (middle-class or rich), as they will profit via redistribution from increased profits of privatised enterprises.

Lastly, the discount is higher if the number of buyers μ_i is small. This results from the fact that if the social group that buys the assets is less numerous, it will capture a smaller share of the government transfer, and hence insist on a lower price for the assets. A more interesting interpretation of this feature, however, is to assume that population is equally split between classes, and interpret μ_i as the share of the total transfer a social class obtains. In this interpretation, the discount increases when the buyers' share of the transfer is below average. An example is when transfers are targeted at the poor. In such a case, where transfers are skewed against the buyers and towards the poor, the former will capture a smaller and the latter a larger part of the efficiency gains from privatisation, with respect to the situation of a uniform redistribution. Hence the buyers will demand a larger discount, which a left-wing government would be willing to grant.

We have so far mainly considered the question whether and at what price privatisation will take place, but have not considered who will actually gain ownership of the state assets during the privatisation process. We will come back to this point in more detail when we start to discuss the connection between the efficiency of the tax system and privatisation outcomes, and will for the time being, just give the general answer that the left-wing policy-maker will choose to privatise assets in favour of a social group in such a way, as to maximise the increase in the utility of the poor.

2.2 Centrist government

Suppose now that a centrist president, representing the interests of the middle-class, has been elected. Such a government would obviously want to privatise state assets at the largest possible discount to its clientele, the middle-class. However, due to the need for support in parliament, it has to take into account the fact that privatisation must be preferred to the status quo by a majority in parliament, representing a majority of the population¹⁷. This means that privatisation must increase (or at least not decrease) the utility for the members of another social class as well. We first explore what we refer to as the "standard" case, namely a situation where the privatisation at the lowest feasible price does not lead to shifts in ownership patterns in the economy that would lead to changes in the tax regime¹⁸. We then discuss the case where privatisation implies a change in tax rates, referring to it as a privatisation with "Machiavellian support", and explore the conditions under which "standard" or "Machiavellian supported" privatisation occurs.

In the standard case, for potential buyers to be willing to acquire the assets, the price must be below P^{\max} as specified in equation 3.3. In addition, for privatisation to be supported by a social class that does not acquire privatised assets, the price of the assets must be above the threshold P^{\min} as determined in equation 3.2. The constraints are thus the same for a centrist government as for a left-wing policy maker. However there is a major difference between this case and that of a left-wing government. There is no need for a bargaining process over the price of the asset sale, as the interests of the buyers and the government (both middle-class) are identical. Consequently the assets will be privatised at the lowest possible price P^{\min} , that is

$$P^* = \Pi - \frac{\tau}{1 - \tau} \Delta \Pi \quad (3.7)$$

¹⁷We assume that members of parliament vote in favour of a law if it does not decrease the utility of their clientele.

¹⁸This implies that tax rates will not be changed, i.e. $\tau^{AP} = \tau^{BP} = \tau$. For simplicity, we hence use the notation τ for the "standard case" under centrist government.

and the discount will consequently be

$$D = \frac{1}{1 - \tau} \Delta \Pi. \quad (3.8)$$

Under these circumstances the gain from privatisation for a middle-class individual will be $\Delta U_M = \frac{\Delta \Pi}{\mu_M}$, that is the middle-class captures the whole surplus from privatisation. Comparing a centrist president with a left-wing one with some bargaining power¹⁹, we see immediately that a centrist government privatises at a larger discount. This occurs naturally without any strategic or Machiavellian intentions by those in power.

As mentioned above, in addition to the standard case there also is possibility for "Machiavellian support" from the rich for discounted privatisation by a centrist policy-maker that would actually redistribute away from the poor. This is the situation if the privatisation discount is sufficiently large to lift middle-class individuals that were poorer than the mean before privatisation above the mean post-privatisation. Under these circumstances, privatisation shifts the political equilibrium of taxation (from maximal to minimal). Hence the rich can gain from supporting a privatisation in favour of the middle-classes even at an extreme discount. As "Machiavellian supported" privatisation requires that the relative income position of the middle-class changes from being below the mean to being above it post-privatisation, the middle-class before privatisation must obviously be poorer than the mean, which implies that the pre-privatisation political equilibrium tax rate is maximal, i. e. $\tau^{BP} = \tau^{\max}$. Moreover, in order to achieve the lifting of the middle-class above the mean post privatisation, the discount must be sufficiently large. More precisely we need $(1 - \tau^{\max}) \frac{R_M}{\mu_M} + T < R_R + R_M + \Pi$ and $\frac{1}{\mu_M} (R_M + \Pi + \Delta \Pi - P) + T > R_R + R_M + \Pi + \Delta \Pi$, where the left-hand side in both

¹⁹In the extreme case where a left wing president has no bargaining power at all, he would privatise at the same price and with the same discount as a centrist president.

equations is the expected income of a middle-class individual respectively pre- or post-privatisation, and the right-hand side is the mean income in society respectively pre- or post-privatisation (given that there are μ_M middle-class individuals and that the size of the total population has been normalised to 1, and assuming for simplicity that the tax rate after the privatisation $\tau^{AP} = \tau^{\min} = 0$). Substituting for T , which is $T = (R_R + R_M)\tau^{\max} + \Pi$ pre, and $T = P$ post privatisation, and arranging the above equations leads to $\frac{R_M}{\mu_M} < \bar{R}$ (which simply restates that a middle-class individual pre-privatisation must be poorer than the mean), and another condition that we will refer to in what follows as the “lifting condition”:

$$\Pi + \Delta\Pi - P > \frac{\mu_M}{1 - \mu_M} \left(\bar{R} - \frac{R_M}{\mu_M} \right) \quad (3.9)$$

where $\bar{R} = \frac{R_R + R_M}{1}$ is mean private income before privatisation, excluding the part of income that comes from state enterprises and is redistributed via transfers.

As the policymaker’s clientele will profit directly from privatisation, he will want to privatise at the lowest possible price. However, in order to ensure political support from the rich in parliament, the privatisation price must be set so as not to decrease the utility of the rich, that is so that $\Delta U_R \geq 0$. This change in the utility of a rich individual is $\Delta U_R = (\tau^{\max} - \tau^{\min}) \frac{R_R}{\mu_R} + \Delta T$, where the first term describes the increasing utility due to a reduction in the tax rate and the second term the change due to the change in the general transfer. This change in the transfer is more precisely $\Delta T = -(\tau^{\max} - \tau^{\min})R_R + [\tau^{\min}(R_M + \Pi + \Delta\Pi - P) - \tau^{\max}R_M] + [P - \Pi]$. The first and second term describes the change in the transfer due to the change in tax income from the rich and middle-classes respectively, and the third term the change in the transfer that results from a changing amount of state owned assets. Substituting for ΔT in the above equation for ΔU_R , assuming again for simplicity that the minimal tax rate (which will be implemented post-privatisation) is zero, we obtain $\Delta U_R = \tau^{\max} \left(\frac{R_R}{\mu_R} - \bar{R} \right) + (P - \Pi)$. Resolving for P we obtain the minimal

price at which the rich are willing to privatise $P^{\min} = \Pi - \tau^{\max}(\frac{R_R}{\mu_R} - \bar{R})$. Obviously the price must also be such that privatisation increases the utility of middle class individuals $\Delta U_M = \tau^{\max}(\frac{R_M}{\mu_M} - \bar{R}) + \frac{1}{\mu_M}(\Delta\Pi - (1 - \mu_M)(P - \Pi))$ (again assuming the post-privatisation tax rate to be zero). Consequently the maximum price at which the middle-class is willing to buy is $P^{\max} = \Pi + \frac{1}{1 - \mu_M}\Delta\Pi - \frac{\mu_M}{1 - \mu_M}\tau^{\max}(\bar{R} - \frac{R_M}{\mu_M})$. Straightforward calculations show that $P^{\max} \geq P^{\min}$ always holds, thus privatisation is always feasible from this point of view.

Given that there is no bargaining (the middle-class has all the bargaining power) the effective price will be the minimal price $P^* = \Pi - \tau^{\max}(\frac{R_R}{\mu_R} - \bar{R})$ and thus the discount $D = \Delta\Pi + \tau^{\max}(\frac{R_R}{\mu_R} - \bar{R})$, and the gain in utility for a middle-class agent $\Delta U_M = \frac{1}{\mu_M}\Delta\Pi + \frac{1}{\mu_M}\tau^{\max}R_R\frac{\mu_P}{\mu_R}$. The gain for a poor agent will be $\Delta U_P = -\tau^{\max}R_R\frac{1}{\mu_R}$.

Substituting $P^* = P^{\min}$ for P in the lifting condition (equation 3.9) we obtain that $\Delta\Pi > \frac{\mu_M}{1 - \mu_M}(\bar{R} - \frac{R_M}{\mu_M}) - \tau^{\max}(\frac{R_R}{\mu_R} - \bar{R})$,²⁰ which basically states that for ‘‘Machiavellian supported’’ privatisation to go ahead, the value of the potential efficiency gain from privatisation $\Delta\Pi$ has to be sufficiently large, where this value must be the greater, the larger the initial distance of the middle-class from the mean income, and the more numerous the middle-class (or in an alternative interpretation: the larger their share of the transfer provided by government). A higher tax rate and a higher income for the rich with respect to the mean decrease the needed efficiency gain for Machiavellian supported privatisation to go ahead. This arises from the fact that under a higher level of redistribution the rich are more eager to support a privatisation that would lead to a fall in the political equilibrium tax rate, and are

²⁰Note that, for different reasonable parameter values, this condition can be restrictive or not. E.g. if one assumes the middle class to account for just below half, and the rich for 1/3 of the population, and the revenue of a rich individual to be three times as large as for a middle class individual, the condition becomes restrictive (i.e. requiring efficiency gains) as soon as maximal tax rates are below 40 percent. On the other hand, when the rich and the middle class account each for 30 % of the population, and with the revenue of a rich individual double the size of a middle class one, the lifting condition will never be restrictive, i.e. in such a constellation Machiavellian supported privatisation would go ahead even in the absence of efficiency gains.

thus willing to support privatisation at larger discounts.

Assuming a centrist government, what kind of privatisation should be expected. As the utility for a middle class individual is always higher under Machiavellian supported privatisation compared to the "standard case"²¹, whenever possible the middle class would prefer a Machiavellian supported privatisation. Whether such a possibility exists comes down to the question of whether $\Delta\Pi > \frac{\mu_M}{1-\mu_M}(\bar{R} - \frac{R_M}{\mu_M}) - \tau^{\max}(\frac{R_R}{\mu_R} - \bar{R})$. Under certain parameter constellations this is always the case, so privatisation by a centrist will always be of the Machiavellian supported type, under other constellations Machiavellian supported privatisation will only be feasible if the value of potential productivity gains from privatisation is sufficiently large. Consequently, a larger initial distance of the middle-class from the mean income, and a more numerous middle-class (or in an alternative interpretation: a larger share of the transfer provided by government to them) will increase the likelihood of centrist privatisation to be of the standard type. In contrast, a higher tax rate and a higher income for the rich with respect to the mean increase the chances for Machiavellian supported privatisation.

2.3 Right-wing government

Suppose now that a right-wing government representing the interests of the rich is in power. There are also two possible cases of privatisation, a standard and a Machiavellian one, which we explore in turns in the following. In the standard case a right-wing government - similar to the centrist-government standard case - would want to privatise state assets at the largest possible discount to its clientele. However it is constrained by the need for political support. The constraints for a right-wing government in the standard case are exactly the same as those for a centrist government. So, the assets will be privatised at the same price and with

²¹The middle class obtains not only the total efficiency gain from privatisation as in the standard case, but manages also to capture a share of the tax savings of the rich.

the same discount as in the case of a centrist policy-maker. The only difference is that assets are now sold to the rich²². Comparing the discount at which different policymakers privatise, we see that right-wing and centrist governments privatise at discounts superior to those of left-wing policy-maker²³. Moreover, a general feature under any policy-maker is that higher tax rates increase the discount at which companies are privatised (see equations 3.6 and 3.8). This results from the fact that with higher levels of taxation, a larger part of the efficiency gains from private management will be redistributed, thus compensating those who did not profit directly from the discounted sale of state assets. This, in turn, increases the willingness of the losers of the discounted sale to suffer wealth transfers to the new owners during the privatisation process.

In addition there can be the possibility of “Machiavellian privatisation”, that is the case where a right-wing policy-maker privatises assets strategically at a heavily discounted price in favour of the middle-classes in order to change their political preferences, and thus to obtain lower tax rates in political equilibrium. The difference with “Machiavellian support” is that here, rather than simply tolerating the distribution of state assets at bargain prices by a centrist president to his clientele, the right actually accepts that a right-wing president gives away state assets at a heavy discount to a social class different from his own clientele.

Obviously for this situation to be possible, as in the case of "Machiavellian support", the relative income position of the middle-class must be below the mean pre-privatisation - implying a maximal tax rate - and the relative income position of the middle class must change with the privatisation from being below the mean to being above it, which implies that the “lifting condition” (equation 3.9) must hold.

However there is one major difference: In the case of “Machiavellian support” a

²²As argued before, selling the assets to the rich is a metaphor for a privatisation set-up that favours asset acquisition by the rich. We use this simplification to keep our model focussed on the most important features and thus tractable.

²³In the extreme case where a left-wing president has no bargaining power, i.e. $\alpha = 0$, he privatises at the same price and discount as a centrist or right-wing president.

centrist president was privatising to his own constituency, having thus all the bargaining power with respect to pricing the assets, and only being required to assure that the utility of the rich increased to assure their support for his policy in parliament. Now, however, the rich have a bargaining position, as it is a right-wing government that negotiates the details of the privatisation with the potential middle-class buyers. Moreover, the rich have a new outside option, namely a discounted privatisation of the assets to themselves.

We model the bargaining process as before, that is the relevant parties bargain over the joint potential surplus. The increase in utility from a “Machiavellian” privatisation for the middle-class and the rich (assuming after privatisation $\tau^{AP} = \tau^{\min} = 0$) are the same as in the case of Machiavellian support, and consequently so are the minimum price at which a right-wing policy-maker is willing to sell, and the maximum price at which the middle-class is willing to buy. The same condition must hold for privatisation to be feasible. Supposing Nash bargaining (α being the bargaining power of the rich) leads to a privatisation price of $P^* = \Pi - \tau^{\max} \left(\frac{R_R}{\mu_R} - \bar{R} \right) + \frac{\alpha}{1-\mu_M} [\Delta\Pi + \tau^{\max} R_R \frac{1-\mu_M-\mu_R}{\mu_R}]$. Substituting P^* in the utility equations we get the increase in utility from “Machiavellian” privatisation for middle-class and rich individuals to be respectively, $\Delta U_M = \frac{1-\alpha}{\mu_M} [\Delta\Pi + \tau^{\max} R_R \frac{\mu_P}{\mu_R}]$ and $\Delta U_R = \frac{\alpha}{1-\mu_M} [\Delta\Pi + \tau^{\max} R_R \frac{\mu_P}{\mu_R}]$. However, as we mentioned before, for Machiavellian privatisation to proceed it must not only fulfill the lifting condition, but also increase the rich’s utility by more than if the rich simply privatised the assets to themselves at the largest possible discount. As we have seen before (2.3), under such a scenario the utility of a rich individual would increase by $\frac{\Delta\Pi}{\mu_R}$. Consequently the fact that ΔU_R must be larger than $\frac{\Delta\Pi}{\mu_R}$ leads to the additional condition that $\Delta\Pi < \alpha \frac{1-\mu_M-\mu_R}{1-\mu_M-\alpha\mu_R} \tau^{\max} R_R$, which basically states that for Machiavellian privatisation to be feasible the bargaining power of the rich α must be sufficiently strong, and also their revenue R_R must be sufficiently large in comparison to $\Delta\Pi$ in order to ensure that the rich prefer the gain from lower taxation to grabbing the (underpriced) assets themselves while

continuing to pay taxes. Especially, when the pre-privatisation tax rate is already relatively low (for example because a country has limited administrative capacity to enforce higher tax rates) the incentives for the rich to undertake Machiavellian privatisation are very limited²⁴.

3 Election outcomes

So far, we have discussed the privatisation outcomes for different parties in power, without taking into account whether the assumed political outcome could actually realise. We now explore the conditions under which a given party is able to win power (i.e. the presidency) in the electoral process. As mentioned earlier we place ourselves in a citizen-candidate framework. Our choice is motivated by the fact that the “Citizen-Candidate” model is far more general than the “median voter” approach, and delivers political (voting) equilibria even when the latter is inapplicable. More precisely the “citizen-candidate” model splits the political selection process into two-stages. First there is an entry stage, in which each citizen chooses strategically whether to run as a candidate for president or not. A small entry cost in this stage prevents more than one candidate with the same preferred policy running for office. In a second stage, all citizens vote and elect one of the running candidates, who then implements his most preferred policy. At this point we innovate with respect to the standard citizen-candidate model, insofar as the elected policy-maker will be constrained in implementing his most preferred policy by the need for political support. More precisely we assume that he needs an absolute majority in parliament (and thus among the population) to support his policy, which requires that they prefer his proposal to the status quo²⁵.

²⁴This could help to explain why in Russia in the mid-nineties of the last century - in a situation of widespread tax evasion - the most valuable assets were largely privatised at very substantial discounts to the ruling elite.

²⁵For simplicity we assume that parliamentarians who have no preference between a new law and the status quo, vote in favour of the new law.

Our framework implies that either one citizen stands unopposed and wins²⁶ or various citizens from different groups run and tie. In this case the winner is chosen in a lottery, which signifies that the preference of each of the n running candidates is implemented with a certain probability. We assume that, if there is a tie, the probability of a citizen becoming president equals the share of votes cast for him. Thus a situation with multiple candidates necessitates that each class that is represented by a candidate prefers the expected payoff from choosing a policy-maker among the candidates by lottery after a tie, to supporting any candidate from another class.

In the following table we present a list of the payoffs for individuals. More precisely, the cases of the table below present the payoff, that is their change in utility, for poor, middle-class and rich individuals under left, centrist and right-wing presidents.

	Poor	Middle Class	Rich
<i>Left – wing · president</i>	$\frac{\alpha}{1-\mu_i} \Delta\Pi$	$\frac{\alpha}{1-\mu_R} \Delta\Pi \quad \frac{1-\alpha}{\mu_M} \Delta\Pi$	$\frac{\alpha}{1-\mu_M} \Delta\Pi \quad \frac{1-\alpha}{\mu_R} \Delta\Pi$
<i>Centrist · president</i>	0	$\frac{\Delta\Pi}{\mu_M}$	0
<i>Centrist · president Machiavellian · Support</i>	$\frac{\tau^{\max} R_R}{\mu_R}$	$\frac{\Delta\Pi}{\mu_M} + \frac{\tau^{\max} R_R \mu_P}{\mu_M \mu_R}$	0
<i>Right – wing · president</i>	0	0	$\frac{\Delta\Pi}{\mu_R}$
<i>Right – wing · president Machiavellian · privatisation</i>	$\frac{\alpha}{1-\mu_M} (\Delta\Pi + \tau^{\max} R_R \frac{\mu_P}{\mu_R}) - \tau^{\max} \frac{R_R}{\mu_R}$	$\frac{1-\alpha}{\mu_M} (\Delta\Pi + \tau^{\max} R_R \frac{\mu_P}{\mu_R})$	$\frac{\alpha}{1-\mu_M} (\Delta\Pi + \tau^{\max} R_R \frac{\mu_P}{\mu_R})$

In the following we will first discuss the political equilibria in situations where Machiavellian support and Machiavellian privatisation are not "technically" feasible (see discussion above), before turning to those situations where they are. We see that the poor profit from privatisation only under a left-wing president, and have

²⁶In those cases where the median-voter framework applies, the elected citizen will be the median voter.

no preference between a centrist and right-wing policy-maker. Thus they stand to gain only by voting for a left-wing candidate. A middle-class individual would obviously prefer a centrist president, as this would give him the largest gain from privatisation. However, as in the absence of "Machiavellian" privatisation possibilities the middle-class gains more from privatisation by a left than a right-wing president, they might have an incentive to vote for a left-wing presidential candidate, thus ensuring the election of a left-wing government, instead of presenting their own candidate for the presidency whose accession to power is uncertain. This same logic holds equally for the rich, who would obviously prefer a right-wing president, but might under certain conditions be willing to vote for a leftist president. Assume that social class i (either the rich or the middle-class) are the ones that would be chosen by a left-wing president to receive state assets. Remember that, in the case of a tie²⁷, the probability for each candidate to become the policy-maker is given by the numerical weight of the social group that he represents. It follows that social class i (rich or middle-class) votes for a left-wing policy-maker if $\Delta U_i^{Left} > \mu_P \Delta U_i^{Left} + \mu_M \Delta U_i^{Centrist} + \mu_R \Delta U_i^{Right}$, that is the change in class i 's utility under the left U_i^{Left} is larger than the expected change in utility under a tie between a candidate from each social class. By substituting these values into the above equation and rearranging it we find that class i will vote for a left-wing policy maker as long as $\alpha < \frac{\mu_i}{1-\mu_P}$, which, in the case of social groups of equal size, boils down to $\alpha < 1/2$. This signifies that a left-wing policy-maker will be elected as long as he is sufficiently weak and willing to hand over a substantial part of the efficiency gains from privatisation to the buyers. However, for $\alpha > \frac{\mu_i}{1-\mu_P}$ there will not be a clear coalition (there will be a candidate from each social class), and thus any social group can rise to power. Thus while there will be a tendency for left-wing politicians who are willing to privatise to be elected, standard privatisation can occur under a politician of any colour - evidently supposing the constraints as laid out in the

²⁷That is the case where no candidate obtains an absolute majority

previous sections are fulfilled.

Assume now that Machiavellian support would be feasible, while Machiavellian privatisation was still no option.²⁸ As both the rich and poor are not going to profit from such a situation (the situation of the poor deteriorates, but also - as the middle class having all the bargaining power would capture all the surplus - the utility of the rich would not improve significantly), they are not going to vote for a middle class candidate but instead prefer to vote for their own candidate. Machiavellian support could still occur, but only in a situation where candidates from all three classes tied, and provided the middle class candidate would be the winner of the ensuing lottery. The possibility of Machiavellian support also has another impact, as it reduces the constellations where the middle class would elect a left-wing President. This results from the fact that the possibility of Machiavellian support renders the Presidency of a middle class individual more lucrative for the middle classes, and hence increases their expected returns from a situation of a tie and ensuing lottery.

Finally, we look at constellations where both Machiavellian support and privatisation would be technically feasible options and where the rich - once in office - would actually prefer Machiavellian privatisation to privatising the assets to themselves. As any of the Machiavellian schemes deteriorates the expected payoff for the poor of not being in power themselves, they continue to vote for a leftist candidate. It is easily shown that the expected utility of the rich increases more if they field their own candidate (even if this implies a lottery) than with a poor or middle class president, so a rich individual will always stand in the elections. Straightforward calculations also show that the middle class always prefer voting for themselves rather than for a poor candidate (the possibility of Machiavellian privatisation under a rich President increases their expected pay-off from a tie and ensuing lottery). Whether

²⁸The inverse case is impossible, and hence not treated. If Machiavellian supported privatisation was unfeasible, this would signify that the lifting of the middle class income above the mean cannot be achieved in a situation where the middle class has all the bargaining power. There will consequently be no possibility to achieve this lifting above the mean in a situation of Machiavellian privatisation where the bargaining power of the middle class is diminished.

the middle class prefer to vote for a rich candidate (assuring his election) or to vote for a middle class candidate (with the ensuing tie and lottery) depends on exact parameter values. More precisely, for the middle class to vote for "Machiavellian privatisation"²⁹ it must hold that

$$\frac{[(1 - \alpha)(1 - \mu_R) - \mu_M]}{\mu_M} (\Delta\Pi + \tau^{\max} R_R \frac{\mu_P}{\mu_R}) > \alpha \frac{\mu_P}{1 - \mu_R} \Delta\Pi$$

While it is difficult to evaluate this equation fully as for reasonable values of the parameters relatively small changes in these values can change whether the equation holds or not, the equation shows nonetheless that the middle class vote for the rich only if the bargaining power α of the rich is sufficiently weak, otherwise the middle class prefers to vote for their own candidate.

4 Privatisation of state assets that provide targeted transfers

So far we have been assuming that direct and indirect profits from state enterprises are equally spread across the population to keep the model as simple and general as possible³⁰. This is not always a reasonable assumption. Often special social groups benefit disproportionately from the fact that enterprises are state owned, an advantage they generally risk losing during privatisation.

The most common case of targeted profits from state ownership probably arises

²⁹This is assuming that a left wing policymaker would privatise to the rich. If he privatised to the middle class, the equation would change to $-\alpha\Delta\Pi + \frac{[(1-\alpha)(1-\mu_R)-\mu_M]}{\mu_M} (\tau^{\max} R_R \frac{\mu_P}{\mu_R}) > 0$. The reasoning for the evaluation of this equation is the same as in the former case.

³⁰On some occasions we have in previous sections reinterpreted μ as the share a certain social group would get from the total state transfer. This is however fundamentally different from the scenario we consider here. In both cases redistribution is, or can be, skewed towards the poor. However in the scenario under consideration now, targeted redistribution to the poor is only possible from state owned assets, which implies especially that privatisation of these assets takes away the possibility of any targeted redistribution.

through over-employment, for example by keeping unprofitable branches of enterprises running, or by producing with inefficiently high labour inputs. Thus the indirect profits from state ownership seem in a large number of cases to be directed to the lower classes. We try to capture this feature by assuming that the share λ of the profit from state assets Π is targeted directly at the poor, with the remainder $(1 - \lambda)\Pi$ being spread equally across the population.

How does such a targeting of the transfer from state owned assets impact on privatisation initiatives? The main impact is that poor individuals, who before were willing to support privatisation as long as the general transfer increased (i.e. $\Delta T \geq 0$), will now demand that the transfer increases sufficiently to compensate them for the loss of the targeted transfer $\lambda\Pi$. The minimum price of privatised assets acceptable to the poor will be $P^{\min} = \Pi - \frac{\tau}{1-\tau}\Delta\Pi + \frac{1-\mu_p}{\mu_p(1-\tau)}\lambda\Pi$. The maximal price potential buyers are willing to pay will be

$$P^{\max} = \Pi + \Delta\Pi + \frac{\mu_i}{1-\mu_i}\frac{1}{1-\tau}(\Delta\Pi + \lambda\Pi). \quad (3.10)$$

Unsurprisingly, both the minimal and the maximal price increase with respect to the general case. This results from the fact that privatisation contains an additional implicit redistribution away from the poor to the other social groups, which increases both the price a left-wing government would demand, as well as the price the buyers are willing to pay. In consequence the sale price of the assets increases, and so the discount decreases. More importantly the feasibility condition for the sale to take place becomes

$$\Delta\Pi \geq \frac{1 - \mu_i - \mu_p}{\mu_p}\lambda\Pi.$$

This means that, in contrast to the case of non-targeted transfers where privatisation was always feasible, a left-wing government will only privatise when the efficiency gains from privatisation are sufficiently large.

How does the fact that transfers from state assets are targeted to the poor

change the privatisation process under a centrist or right-wing president³¹? The maximal price at which agents are willing to buy the assets is unchanged with respect to the above situation, that is equation 3.10 must hold. Moreover the minimum price at which the poor are willing to support privatisation is unchanged. However, the minimal privatisation price for a right-wing government to secure support from the middle-class representatives in parliament, or for a centrist politician to secure support from those of the rich, changes to $P^{\min} = \Pi - \frac{\tau}{1-\tau}\Delta\Pi - \frac{1}{(1-\tau)}\lambda\Pi$.

Compared with the standard case (section 2 of this chapter), the minimum price at which the poor would support privatisation increases, but decreases for the rich and the middle-class. As our support constraint only requires a majority to prefer privatisation over the status quo, the support of the poor is not needed for privatisation to go ahead as long as the middle-class support a right-wing government's privatisation efforts and vice versa. Consequently the condition for privatisation to be feasible becomes $\Delta\Pi \geq -\lambda\Pi$, which obviously always holds.

When government assets are used to provide targeted transfers to the poor, left-wing governments will not privatise in some situations where right-wing or centrist policy-makers would privatise. This is because efficiency gains from privatisation are not sufficiently large for a leftist politician's taste. This seems to reflect well the observation that left-wing policymakers have often been more reluctant to privatise. However, they appear to have been willing to do so when the efficiency gap of the state sector got extremely large. Finally, election outcomes under targeted transfers differ insofar as the middle-class or rich will be more reluctant to support a left-wing presidential candidate (as they will profit less from his privatisations). Moreover they will never vote for a left-wing policy-maker in a situation where right and centrist policymakers would privatise, but a left-wing politician would not.

What are the main empirical predictions of our model with respect to elections

³¹To avoid unnecessary complication we abstract here from the possibility of strategic privatisation.

and underpricing? First, privatisation can happen under any type of policy-maker. Second, if state assets were used to provide targeted transfers to the poor, a left-wing policy-maker will require much higher potential efficiency gains than centrist or right-wing policymakers in order to be willing to privatise. This implies that left-wing governments are less likely to privatise than centrist or right-wing governments. Third, if a left-wing policy-maker privatises when elected, there will be a tendency for leftist governments to be elected, especially if they are going to be politically weak³². Fourth, there will be underpricing. Fifth, left-wing policy-makers who privatise will sell assets at a lower discount than their right-wing or centrist counterparts. Sixth, and finally, higher tax rates increase the discount at which companies are privatised.

5 The impact of the tax system on privatisation outcomes

We have, in the previous sections, set up a framework for thinking about privatisation that takes into account both the electoral process, as well as bargaining between relevant groups. We now use this framework to investigate the connection between the tax system and privatisation outcomes. Specifically, we focus on how “inefficiencies” in the tax system can have an impact on privatisation outcomes.

So far we have assumed that privatised assets are risk-free, and that investors are risk neutral. In reality, however, neither of these is the case. Consequently, privatisation can usually only take place at a discount on the value of the assets as measured by the net present value of future income streams. For simplicity, we use a very crude method of introducing risk in our model by assuming that the utility for a risk averse individual i of an uncertain cash flow with an expected value of $\Pi + \Delta\Pi$ is the certainty equivalent of this cash flow. We describe this certainty

³²That is when α , the bargaining power of a left wing government, is low.

equivalent by $(1 - \sigma)(\Pi + \Delta\Pi)$, where $\sigma \in [0, 1]$ is a proxy for the riskiness of the assets. Alternatively, if one prefers to keep the assumption of risk neutrality, one can also interpret σ as a transaction cost parameter, and hence $\sigma(\Pi + \Delta\Pi)$ as the transaction cost. Under both assumptions (either risk non-neutrality or transaction costs) the utility of an individual i who acquired state assets during privatisation is $U_i^{AP} = \frac{1-\tau}{\mu_i} [R_i + (1 - \sigma)(\Pi + \Delta\Pi) - P] + T^{AP}$. Taking into account this change in utility for the acquirer of state assets, the privatisation game obviously changes. Results are qualitatively robust, with the main difference being that the feasibility constraint for privatisation $\sigma \leq \frac{1}{1-\tau} \frac{\Delta\Pi}{\Pi + \Delta\Pi}$ becomes binding³³ regardless of the government's political orientation, that is assets must not be too risky (or in the alternative interpretation transaction costs must not be too high) for privatisation to be possible³⁴.

So how can one think about the efficiency of the tax system? While the actual tax rate depends on the political equilibrium in a country, the maximal effective tax rate could be considered as a reasonable proxy for the efficiency of a tax system. The maximal effective tax rate could be low for example if corruption is a widespread phenomenon in a country, as a corrupt tax administration would allow taxpayers to get away with paying only a fraction of their taxes due. Another possibility would be if potential income tax intakes are low compared with the cost of running a large tax administration (e.g. in a very poor country). In this case it may simply be pointless to tax large parts of the population.

As we have seen, under risk averse agents (respectively transaction costs) the feasibility constraint $\sigma \leq \frac{1}{1-\tau} \frac{\Delta\Pi}{\Pi + \Delta\Pi}$ for privatisation becomes dependent on the tax rate. More precisely, a higher tax rate increases the feasibility of privatisation in two ways. First, it permits an increased transfer. Thus it allows a higher compensation

³³ Even if there are no targeted transfers.

³⁴ It should be noted, however, that the tax system only influences privatisation outcomes as long as post-privatisation taxation is not zero, i.e. as long as the middle class continues to support taxation.

for individuals who do not buy privatised assets, and hence lose out on the transfer that was previously financed by the state enterprises. This, in turn, increases their willingness to accept a more highly discounted sales price for the assets. Second, a higher tax rate decreases the "value" of capital, and hence makes agents more willing to risk capital (or to suffer a certain capital loss under the transaction cost interpretation), which results in potential buyers willing to pay more for privatised state assets³⁵.

For countries with a high business and political risk - respectively high transaction costs - (that is high σ) the feasibility condition for privatisation might simply become unattainable if taxation levels are too low. Typically³⁶ this would be the case if the political equilibrium allowed for maximal taxation, but maximal effective taxation levels are not sufficient to allow for the necessary redistribution to compensate politically relevant losers from privatisation. Unfortunately countries where business and political risk or transaction costs are high are often the ones that lack adequate redistribution mechanisms (being poor with inefficient and corrupt administrations). As a consequence even efficiency and aggregate welfare improving privatisation may simply be politically unfeasible in these countries. This results from the fact that risk aversion / transaction costs make potential buyers of the assets unwilling to pay a price that would make it possible to compensate the losers of the privatisation process directly. Moreover the lack of efficient redistribution mechanism makes it impossible to compensate losers from privatisation through the redistribution of efficiency gains post-privatisation. Under these circumstances any

³⁵This somewhat counterintuitive feature arises from the fact that individuals pay for privatised assets with their capital stock. While a higher tax rate decreases the value of their capital stock for the owners, as it decreases their revenue from it, it increases their willingness to trade their capital stock for more risky, newly privatised assets or to incur transaction costs.

³⁶There would equally be the possibility that the country is in a political equilibrium that does not allow for sufficient taxation, as the middle class (with income above the mean) and the rich both prefer minimal taxation. In reality, however, one would expect the rich and middle-classes to somehow overcome the commitment problem they would have strictly following this model, and come to an agreement over how to split the assets between them.

privatisation achieved during periods of (quasi) totalitarian rule or under international pressure will be threatened by reversal.

Less extreme inefficiencies in a tax system are, for example, particular evasion mechanisms for certain social groups. By this we mean a mechanism that would allow either the middle-class or the rich to pay taxes at a rate well below the rate of the other social class. A case where the rich pay taxes at a lower effective rate as the middle-classes could be a situation where rich individuals or large corporations have an disproportionate advantage in tax evasion, due to their being politically better connected. A case where, on the contrary, the middle-class paid a lower effective tax rate than the rich could³⁷ be a situation where sufficiently small companies (representing the middle-classes) were able to work in the unofficial sector of the economy, and thus escape the attention of the tax authorities³⁸.

Calculating the price at which a left-wing government would, in the presence of risk and risk aversion (respectively transaction costs), privatise $P^* = (\Pi - \frac{\tau}{1-\tau}\Delta\Pi)\frac{1-\mu_i-\alpha}{1-\mu_i} + \frac{\alpha(1-\sigma)}{1-\mu_i}(\Pi + \Delta\Pi)$, we find that the change in utility for poor individuals from privatisation is $\Delta U_P = \frac{\alpha}{1-\mu_i}[\Delta\Pi - \sigma(\Pi + \Delta\Pi) + \tau(\Pi + \Delta\Pi)]$. We see that if a left-wing government privatises, the utility of the poor increases more, the higher the tax rate of the buyer of the privatised assets. Consequently, if there is a sizeable difference in tax rates between rich and middle-classes³⁹ a left-wing government would prefer to privatise the assets in favour of the social group with the highest effective tax rate as this leads to a larger increase in the poor's transfer. This implies that, in countries where administrative inefficiencies favour tax evasion of the rich and powerful, one would expect to find rather traditional electoral coalitions. These electoral coalitions of left and middle-classes would elect left-wing govern-

³⁷Obviously apart from a situation where there is a progressive income tax.

³⁸For anecdotal evidence of such situations see FT, June 16, 1999 "Brazil's regional drinks makers slake thirst for value - The tax regime and growing demand have penalised leading brands" or Moscow Times, August 31, 1999 "Residential Construction Remains Profitable".

³⁹And assuming that risk aversion, bargaining power, and population size between rich and middle class is not too different.

ments, that would predominantly privatise towards the middle-classes. In contrast, countries where administrative inefficiency favours tax evasion of the middle-class would show a tendency for “populist” coalitions. These coalitions between rich and poor would increase wealth inequality by handing over state assets to the rich, while at the same time decreasing income inequality through higher income redistribution⁴⁰⁴¹.

Conclusion

In this chapter we have developed a simple political economy framework to investigate privatisation of state assets. In our model, privatisation occurs in order to achieve welfare increases when private ownership is more efficient. Underpricing is used as a way for the policy-maker to redistribute part of these efficiency gains to its own constituency, but can also be used for strategic purposes. This wider focus contrasts with the recent political economy literature on privatisation which sees privatisation mainly from a narrow strategic perspective as a Machiavellian tool of right-wing governments to manipulate the preferences of middle-class voters.

⁴⁰Borlotti/Pinotti (2003) present empirical evidence that more left wing governments have tended to privatise less in domestic SIPs, but have rather done so via direct asset sales or in international SIPs - i.e. have had a tendency to sell state assets to the rich or foreigners.

⁴¹Argentina might be an interesting example of such a “populist” coalition. Under a Peronist government at the beginning of the nineties, assets were privatised mostly in discounted direct asset sales to the better off. Privatisation stayed largely popular, not least because in the following years transfers and social spending increased, both in relative and absolute GDP terms. Recent unpopularity of free market reforms in Argentina is largely unrelated to past privatisation, but mainly results from the increasing unemployment and poverty that have resulted from the 2001/02 financial crisis. To underline the point that in the nineties the Argentine government presented a populist coalition a quote from *El Pais* (October 9, 1999) about Argentina under the rule of President Carlos Menem:

”In these ten years the “Justicialismo” (=the party of Carlos Menem) transformed its constituency and consequently the social alliance that it represented historically. It stayed with the extremes of the social spectrum. Those who have the least and those who have the most. The numerical weight of the former and the economic power of the latter. For the time of the election and for the time to govern. It had been said that such a combination was highly unstable, but for ten years Carlos Menem proved that for him it was not. The “justicialist” rhetoric oscillated between a strong social and populist stress, and a cold economic neo-liberalism.”

We have shown that our simple political economy approach convincingly explains all stylised facts of privatisation, including those where a “Machiavellian” interpretation does not provide plausible answers. We have, moreover, explored the conditions under which each of the different motives that our model allows for will be the driving force for privatisation. We have, finally, used our framework to explore the connection between inefficiencies in a country’s tax system, and privatisation outcomes.

Chapter 4

The Political Economy of Reform: Fighting Corruption

“The more I observe the main effects of a free press, the more convinced I am that, in the modern world, freedom of the press is the principal and, so to say, the constitutive element in freedom.” (Alexis de Tocqueville, 1805-1859)

“Society does not believe the President when he says he will fight against the Mafia because a large part of the public sees him almost as the boss. ...The President doesn't even believe it himself when he says he is fighting the Mafia¹.”

Given the overwhelming empirical evidence on its negative consequences², fighting corruption has become an important issue. This fight, in principle, can be led in two ways. The direct way is for governments to tackle corruption in their countries “from above”, by trying to promote honesty and cleaning up bureaucracies. Pressure from international donors, for example making aid payments dependent on “good governance”, can provide additional incentives for reluctant governments

¹Former Argentine Interior Minister Gustavo Beliz speaking about Carlos Menem, Reuters article quoted from IASOC Criminal Organisations, Vol. 10, No. 4.

²See for example Mauro 1995/1998, Wei 1997/2000, Isham et al. 1997, Friedman et al. 2000, Le Van/Maurel 2007, and Del Monte/Papagni 2001. See also Aidt 2003, Jain 2001 and Dreher/Herzfeld 2005 for surveys on the issue.

to join the crusade. The indirect way is to encourage measures that, by inducing structural changes, would lead to permanently lower corruption levels.

While the direct approach has the advantage of simplicity, it is often problematic because government officials are not always sincerely interested in fighting corruption, as they are potentially its largest beneficiary. Moreover, corruption is usually a deeply entrenched problem, and even politicians sincerely interested in fighting it may simply not have enough time and strength to overcome it. Thus focus has recently started to shift to indirect ways of fighting corruption. Propositions of such structural improvements from the economic profession include³ : increased competition, a more independent judicial system, meritocratic hiring in bureaucracies, and an increased share and responsibility of women in governments and administrations. In addition it has been argued that economic growth reduces rent seeking, and can therefore be a substitute for good governance⁴.

The international donor community has also started stressing the need for strengthening civil society at large, and press freedom especially. James D. Wolfenson, former President of the World Bank, e.g. argued that “a free press is not a luxury”, but “at the absolute core of equitable development”⁵. This stress on the importance of press freedom has coincided with the simultaneous appearance of economic articles that show a strong correlation between a free press and low corruption levels across countries⁶. This work proposes the strengthening of press freedom as a way of fighting corruption. The empirical relevance of the findings of these articles can, however, be challenged as the cross-sectional correlation between corruption and press freedom might be spurious. More developed countries have higher levels of press freedom, as well as higher corruption scores, i.e. lower levels of corruption (see Table 1),

³See respectively Ades/Di Tella 1999, Ades/Di Tella 1997b, Rauch/Evans 2000, et Swamy et al. 2001.

⁴See Aidt/Dutta 2003.

⁵In a speech to the World Press Freedom Committee, Washington, D.C., November 8, 1999.

⁶Both Stapenhurst(2000) and Brunetti/Weder(2003) show this strong correlation in work undertaken simultaneously with and independently from ours.

and a correlation between the latter might therefore not provide much proof. One possibility to get around this problem is the focus on developments within countries. Reiniak and Svenson (2004), for example, show that in Uganda the dissemination of information on government grant programs for schools in newspapers strongly reduced local "diversion" of these funds.

Table 1 - Correlations in 2004

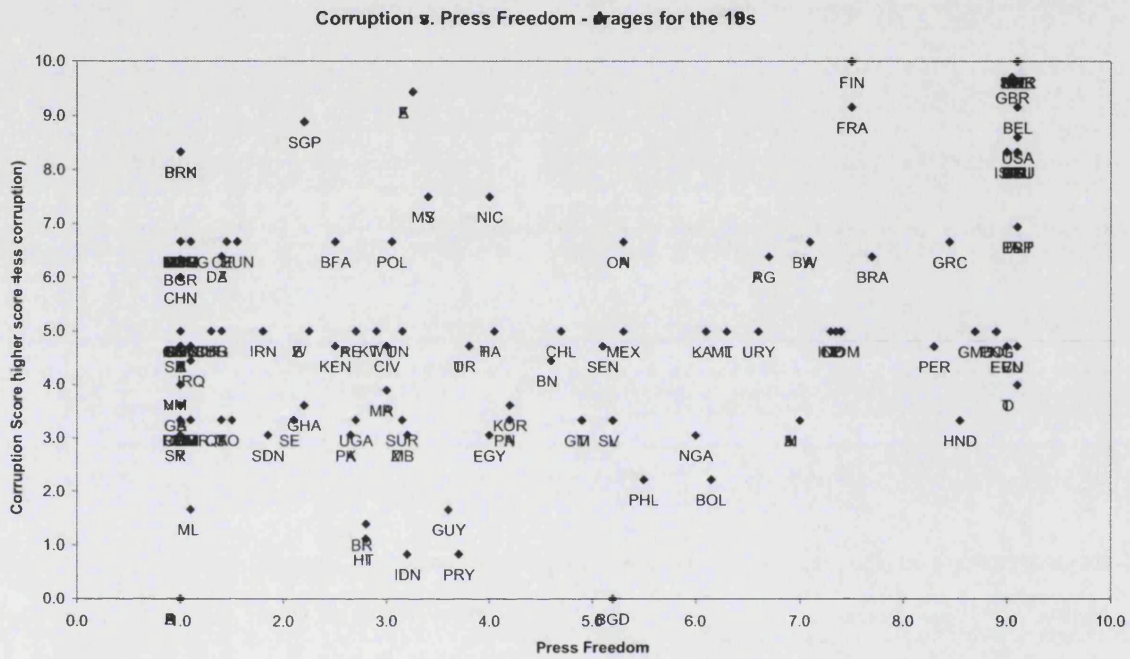
	Corruption	Press Freedom	LogGDPpc	Rule of Law	Primary Edu.	Secondary Edu.	Tertiary Edu.
Corruption	1						
Press Freedom	0.63*	1					
LogGDPpc	0.62*	0.58*	1				
Rule of Law	0.61*	0.35*	0.64*	1			
Primary Education	0.34*	0.35*	0.62*	0.33*	1		
Secondary Education	0.46*	0.43*	0.79*	0.53*	0.69*	1	
Higher Education	0.47*	0.51*	0.75*	0.53*	0.58*	0.77*	1

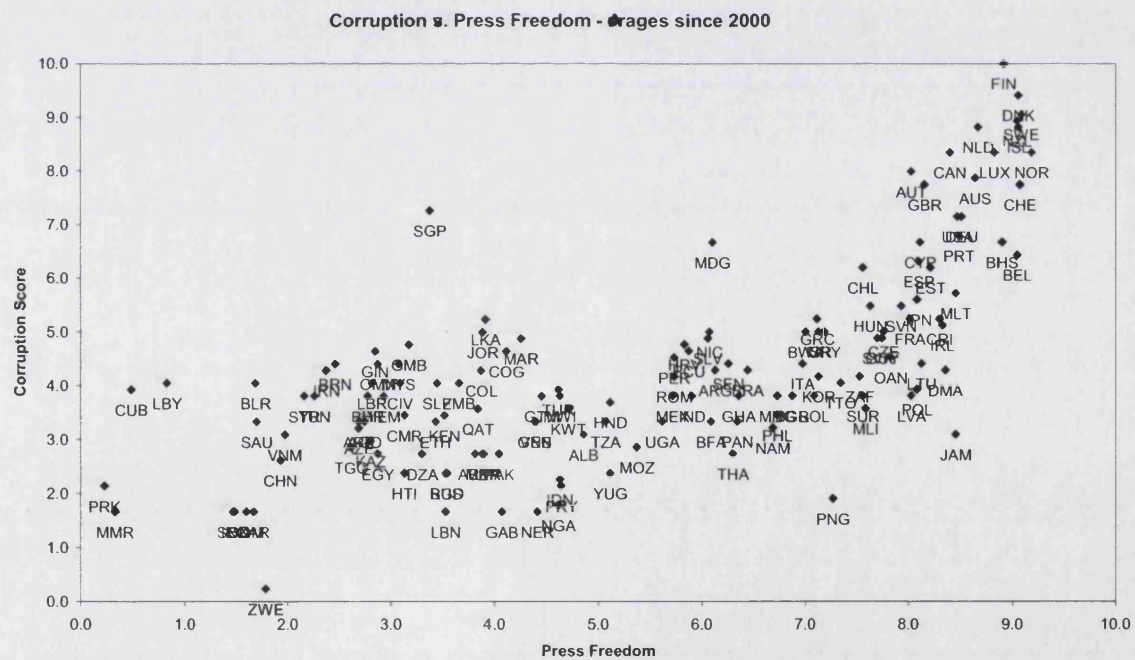
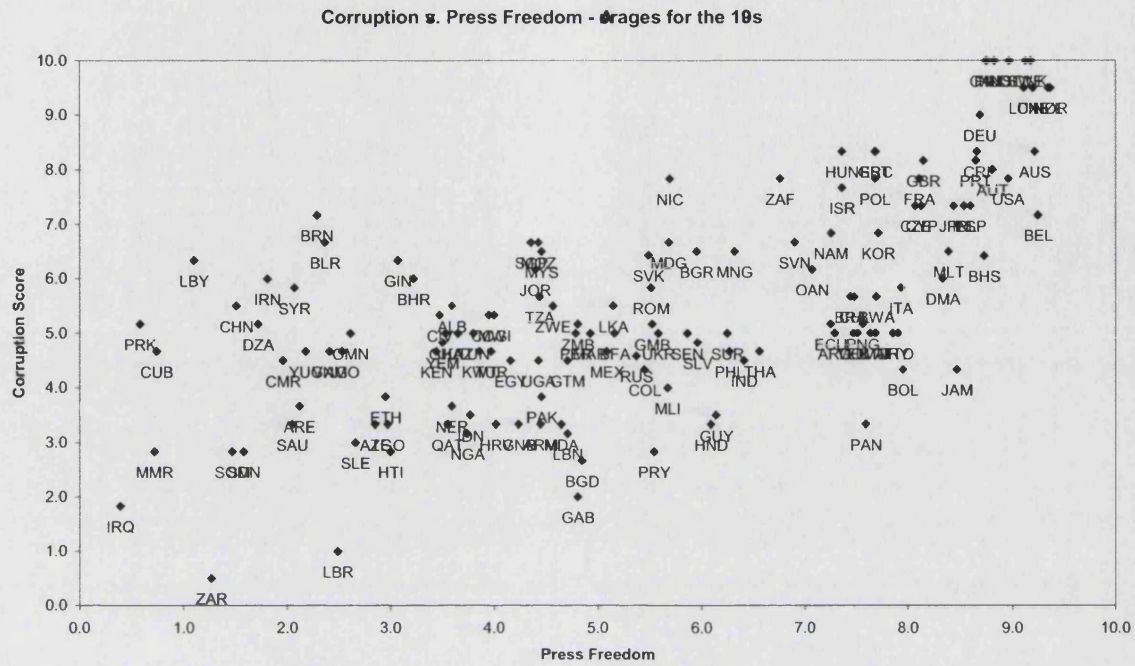
*Correlation highly significant (1% level)

We construct a panel data set that allows us to follow the evolution of corruption and press freedom over roughly 20 years in approximately 140 countries. In exploiting these data we concentrate on fixed-effect regressions techniques, which allows us to abstract from different corruption levels between countries, and to focus on developments with respect to corruption, press freedom and other variables of interest within countries over time.

The following graphs show average levels (as far as data are available) for the last decades of corruption and press freedom by country. Especially the charts for the more recent periods shows the aforementioned strong positive cross-section correlation between press freedom and absence of corruption. The charts, however, also indicate that there has been a significant evolution over time. While in the eighties the correlation was less pronounced with a large number of "outlier countries" showing either "excess press freedom" or "excess corruption", there has been

a general tendency for those countries, especially the ones where corruption levels were unexpectedly benign, to converge to the norm over time. Closer inspection of the charts reveals that "overly" high press freedom did not always result in corresponding improvements in corruption, but that countries where corruption was better than what would have seemed indicated by levels of press freedom were only rarely able to sustain their good score on corruption.





In addition to controlling for a “direct” link of developments in corruption and press freedom, we use the data-set to investigate an additional indirect channel

through which press freedom influences corruption, namely via the effect of education on corruption. As mentioned earlier, there is a high correlation between low corruption levels and most variables that describe a country's level of development, including human capital. This latter correlation between corruption and education, in turn, has been interpreted as proof that education decreases corruption⁷. We show that this negative correlation between education and corruption levels does not necessarily hold at the margin, that is that increases in education do not necessarily decrease corruption. We develop a simple model where bureaucrats abuse their position to seek bribes, but risk detection for unlawful behaviour. The probability of being detected and fined depends on the efficiency of monitoring technology, such as a free press or an independent judicial system. A general increase in human capital will now lead to an increase in the efficiency of these monitoring agencies, but will at the same time increase the capacity of bureaucrats to extract bribes unpunished.

Our main theoretical result is that the impact of changes in education on corruption depend on how well civil society monitors those who enjoy the power of public office. In a country with well developed monitoring agencies, more education decreases corruption, whereas it may lead to higher corruption elsewhere. Simplifying somewhat, this possible negative impact of education on corruption results from the fact that, in the absence of any efficient control mechanism, educated agents may simply use their newly acquired capacities to become more efficient corruption rent seekers. Using our panel data set, and considering press freedom as a proxy for the quality of a society's monitoring agencies, we find empirical support for this conjecture. We show that while primary and secondary education may improve corruption even in countries that lack press freedom, increases in higher education only have a positive impact on corruption in countries that profit from a sufficient amount of

⁷Ades/DiTella(1997a) in a cross-section sample of 32 countries find that education reduces corruption.

press freedom.

There is little, but growing literature on the relation between corruption and civil liberties. Treisman (1999) argues that while current levels of democracy do not influence corruption levels, long periods of democratic exposure actually decrease corruption. Brunetti/Weder (2003) introduce a differentiation between extortive and collusive corruption. They define the former as the case where a public agent abuses his power to force citizens to pay a bribe for a service that he is supposed to provide anyway, and the latter as a situation where a public agent provides an illegal service to a citizen in exchange for a bribe. They show empirically that while press freedom is highly correlated with low overall corruption, it is not so with extortive corruption, and they conclude that press freedom has an impact mainly on collusive corruption. Isham/Kaufman/Pritchett (1997) show that in countries with more developed civil liberties the performance of government projects is greatly improved. Mauro (1998) finds empirical proof that corruption reduces government spending on education. Persson et al. (2003) investigate the link between electoral rules and corruption, and find that proportional elections are associated with more corruption. Finally Acemoglu/Verdier (1998/2000), though mainly occupied with property rights and market failure, investigate the theoretical relationship between corruption and the allocation of talent in a general equilibrium framework.

In section 1 we develop the theoretical model outlined above. Section 2 gives details on data and methodology, and section 3 presents the empirical results on corruption, press freedom and education.

1 A simple model of corruption and education

We present a simple illustrative model here, delegating a more general version to Appendix A2. Suppose an economy consists of bureaucrats and regular citizens, where bureaucrats provide a service that citizens need monopolistically. Monopolists

can use their power to extract a rent from citizens in the form of a bribe B . But this gain for bureaucrats does not come without risk. The higher the bribe rate b an official demands (the bribe rate being the percentage of the value of the service he provides that he demands for himself), the higher his risk of being caught and sentenced for corruption. This is because a citizen might prefer not to obtain the service and instead denounce the corrupt official. Distinguishing between the bribe B and the bribe rate b , and using the latter as our measure of corruption, has the advantage that the level of corruption does not increase automatically with the general level of economic activity.

We assume that better educated bureaucrats can provide higher quality goods or services. As the bureaucrat's service is of higher value to his client, he can extract a higher bribe from him for a given bribe rate. The rent he extracts increases therefore with the bribe level b he chooses and with the quality of his services, described by his human capital h_B . Formally - and for simplicity- we assume that $B = b * h_B$. Bureaucrats, however, risk detection by a monitoring agency M . Such a monitoring agency could, for example, be a free press or an independent justice system. We set the level of monitoring to depend both on the level of human capital of the monitors h_M , as well as the freedom of the monitoring agency to pursue its task. In the following we will refer to this capacity of the monitoring agency to fulfill its monitoring role as the level of freedom of the press (FP), but this could also be seen as shorthand for the level of power and independence any other monitoring agency may have. Formally we set $M = h_M * FP$.

If a corrupt official is detected he loses the bribe and his wage, and is sentenced to pay a fine F . His probability of being detected and sentenced P_D decreases with his own human capital h_B , but rises with the chosen bribe rate b . In addition it rises with the capacity of the monitoring agency, M , that is $P_D = b - \gamma_1 * h_B + \gamma_2 * M$ (where γ_1 and γ_2 are simply two parameters such that P_D remains in the interval $[0,1]$).

An official's utility is therefore equal to his expected wage plus the expected bribe minus the expected fine

$$U = (w + B) * (1 - P_D) - P_D * F. \quad (4.1)$$

Using the above defined equations for B , M and P_D to substitute for in 4.1 we obtain $U = w + b * h_B * (1 - (b - \gamma_1 * h_B + \gamma_2 * h_M * FP)) - (b - \gamma_1 * h_B + \gamma_2 * h_M * FP) * F$. For simplicity we assume the human capital level of all agents in the economy to be equal, that is $h = h_B = h_M$. A bureaucrat now chooses his bribe level b such as to maximise his utility, which - substituting the equations for B , M and P_D defined above into 4.1 and taking the partial derivative - leads to the following first order condition⁸:

$$h - 2bh - \gamma_1 h^2 - \gamma_1 h^2 * FP - F + w = 0. \quad (4.2)$$

What is now the impact of a general rise in human capital on corruption measured by the bribe rate? Define $G(b, h) := h - 2bh - \gamma_1 h^2 - \gamma_1 h^2 * FP - F + w$. Implicit differentiation of G yields

$$\frac{\partial b}{\partial h} = -\frac{1 - 2b - 2\gamma_1 h - 2\gamma_1 h * FP}{-2h}.$$

Education will decrease corruption if $\frac{\partial b}{\partial h}$ is negative, that is if

$$\frac{1 - 2b}{2h} - \gamma_1 * (1 + FP) < 0.$$

It immediately results from this that the likelihood of education to decrease corruption is higher if press freedom (or more generally the power and independence of monitoring agencies) is higher. In Appendix 2 we show that this feature is quite robust to the exact specification of the different equations in our model, only necessitating the assumption that the strength of the monitoring agency is some

⁸This is a maximum as the second order derivative is obviously negative.

multiplicative function of the human capital of the monitoring agents and the independence of the agency - which indeed seems a reasonable assumption. This implies that while education would generally be expected to decrease corruption, it may fail to do so if a country lacks sufficiently independent monitoring systems, as for example a free press, a hypothesis we test econometrically in the following.

2 Data and methodology

We focus on the dynamic dimension and hence do not use the widely known “Transparency International” data for corruption, as these data have only been available on a regular basis since 1996. Instead we use a corruption perception index compiled by a private risk rating agency “Political Risk Services Group” which is regularly published in the International Country Risk Guide (ICRG). This index is compiled using less information than the TI Index, but has the advantage of being consistently available for a relatively long period (we use data from 1984-2006) and for a larger number of countries (about 140). To measure press freedom, we use yearly data obtained from “Freedom House” yearly reports (1980-2006) on press freedom in the world. We scale variables to fluctuate between 0-10, where higher numbers indicate a better state of affairs, namely higher levels of press freedom, or lower corruption levels. In addition, we use the general classification from Freedom House of countries as having a free press, a partly free press, and no free press, equally available for the 1980-2006 period.

As proxies for a society’s level of education we use enrollment data from various sets of World Bank’s “World Development Indicators”. More precisely we use net enrollment data for primary and secondary education, and as those data are unavailable for tertiary enrollment we use gross enrollment data for the latter. Moreover, as enrolment is unlikely to have an immediate effect on the level of education of potential corruption rent seekers, we lag it by 10 years. In addition we use per

capita GDP (in PPP terms at 2000 prices), trade openness (the sum of exports & imports as % of GDP) and a proxy for natural resource exports (based on the share of manufactured goods exports) from the same World Bank tables. Lastly, we use rule-of-law ratings from the above-mentioned ICRG publication. These data are available annually for the 1984-2004 period (some of them up to 2006), albeit not for all countries in all years. Table 2 provides some descriptive statistics of the data.

Table 2 Descriptive Statistics

Corruption Score						Rule of Law					
	Obs	Mean	Std. Dev.	Min	Max		Obs	Mean	Std. Dev.	Min	Max
1985	120	5.5	2.6	0.0	10.0	1985	121	5.3	2.7	1.7	10.0
1990	127	5.6	2.4	0.0	10.0	1990	128	5.1	2.7	0.0	10.0
1995	131	5.9	2.1	0.0	10.0	1995	131	7.1	2.3	1.7	10.0
2000	140	5.0	2.1	1.7	10.0	2000	140	6.6	2.3	1.7	10.0
2005	140	4.2	2.0	0.0	10.0	2005	140	6.2	2.5	0.8	10.0
Raw material exports						Press Freedom					
	Obs	Mean	Std. Dev.	Min	Max		Obs	Mean	Std. Dev.	Min	Max
1985	129	67.0	28.3	3.7	100.0	1985	127	4.3	3.3	1.0	9.0
1990	132	61.6	29.8	4.1	99.9	1990	127	5.5	3.3	1.0	9.5
1995	147	56.8	30.1	4.8	99.0	1995	187	5.3	2.4	0.0	10.0
2000	157	53.3	31.3	3.9	99.8	2000	187	5.4	2.6	0.0	10.0
2004	112	48.0	30.3	2.9	98.0	2004	193	5.4	2.5	0.3	9.1
Trade Openness						Primary Education					
	Obs	Mean	Std. Dev.	Min	Max		Obs	Mean	Std. Dev.	Min	Max
1985	140	72.3	42.4	8.2	224.8	1985	109	78.6	21.7	9.8	100.0
1990	164	75.1	42.8	7.5	252.6	1990	113	79.0	22.4	9.1	100.0
1995	170	82.1	43.4	3.1	290.9	1995	148	80.1	19.8	23.3	99.9
2000	166	88.0	46.3	20.2	282.9	2000	156	84.0	17.1	25.3	100.0
2004	148	92.5	47.6	30.9	371.5	2004	124	87.6	13.9	32.8	99.9
Secondary Education						Higher Education					
	Obs	Mean	Std. Dev.	Min	Max		Obs	Mean	Std. Dev.	Min	Max
1985	84	48.6	28.0	2.7	95.4	1985	144	13.8	12.3	0.1	55.4
1990	88	51.3	27.5	4.3	96.8	1990	151	15.6	14.0	0.3	69.2
1995	104	55.6	28.0	2.1	98.8	1995	161	18.2	16.4	0.2	73.4
2000	140	60.1	28.1	3.2	99.5	2000	156	23.1	20.9	0.3	82.8
2005	103	66.8	26.5	4.0	99.9	2004	122	30.1	25.4	0.2	89.5

A word of caution is necessary before using this data-set. The ICRG corruption

index that we are exploiting is based on the perception of country experts by one single agency only. It might thus be argued that it is less precise than, for example, the Transparency International (TI) index which is compiled from various surveys (there could, in particular, be problems with comparability of data across countries). However, apart from the fact that there is no choice if one wants to exploit a long time dimension of twenty years, correlation of the ICRG corruption index and the TI index is quite high⁹ (around 0.8). Moreover we are convinced that an index compiled by a single agency is more precise than an index compiled from a multitude of sources that vary from year to year to track what we are most interested in, namely the changes in a given country over time.

Given very different forms of corruption, empirical work on the subject has been criticised for not having a clear idea of what is actually being measured, or for measuring the wrong type of corruption. The corruption perception of foreign country experts or businessmen, it is argued, is heavily biased to how exactly foreigners or foreign investors are treated in a country, and is not necessarily connected to the local population's experience. Moreover, this critique also points out that top level corruption and petty corruption are completely different social phenomena, and therefore not necessarily correlated. It is obvious that these objections do raise points that merit further research, and especially increased efforts to collect more differentiated data. However, in most places different types of corruption seem to be correlated, and the problems that foreign investors face in a country seem to be similar to those local businesses are confronted with - apart from few exceptions. We do therefore strongly believe that the data for corruption that we and others have been using are an interesting and meaningful first proxy. Thanks to these data it has finally become possible to study issues connected with corruption in a serious econometric way, instead of dealing with them in the realm of pure speculation, as was the case until some years ago.

⁹The exact numerical value depends on the year considered.

Based on the theoretical model developed in section 1 we can expect education to have a more beneficial impact on corruption in countries with better monitoring institutions (as a free press or an independent judiciary) than in countries where civil monitoring is poorly developed. Although this is not explicitly specified in the model, there should be a difference between types of education. In our model, a potential increase in corruption from more education depends on the possibility of better educated bureaucrats becoming more sophisticated corruption rent-seekers. Primary education by itself is, however, rarely sufficient to be employed in a country's administration. Hence we would expect a possible negative effect from education on corruption to be confined to more advanced education, particularly higher education.

As we want to test whether the impact of education on corruption differs with the regime of press freedom, we divide our sample into three groups, looking separately at countries that are classified as having no press freedom, a partly free press, or a free press¹⁰. Then, for all three samples, we run identical regressions in which we try to explain corruption levels through education, while controlling for other variables that have been identified as influencing corruption. We also use a second approach, looking at multiplicative cross-effects of press freedom and education, testing thereby whether the impact of education on corruption is stronger when press freedom is higher. For both approaches described above we use country fixed effects panel regressions, because unlike other studies, we are not mainly interested in the cross-section distribution (we know that, in general, more developed countries have higher levels of education and lower levels of corruption), but we want to

¹⁰We have unfortunately been unable to obtain sufficient time series data on the independence of the judicial system. We decided not to use data on the "rule of law" as a substitute for judiciary independence, because our focus is on the control mechanisms of society to check those in power. A country may be characterised by a high degree of rule of law in general (for example a military dictatorship), but this may still be insufficient when it comes to controlling those at the top. We therefore restrict our examination to the degree of press freedom as a proxy for civic society's monitoring capacities.

know the impact of changes in a country's education levels on corruption¹¹. We include time fixed effects in all our regression, mainly to ensure that changes in the compilation of data over time do not influence our results. We also control for autocorrelation in our regressions. More precisely we estimate equations of the form $y_{it} = \alpha + x_{it}\beta_1 + z_{it}\beta_2 + \nu_i + \varsigma_t + \epsilon_{it}$, $i=1,\dots,N$; $t=1,\dots,T_i$, where $\epsilon_{it} = \rho\epsilon_{t-1} + \eta_{it}$, $|\rho| < 1$ and η_{it} i.i.d. with mean 0 and variance σ^2 . The ν_i are country fixed-effects, and the ς_t time fixed-effects. Estimations are done following the methods derived in Baltagi/Wu (1999). When using the first approach described above, y_{it} is the corruption score variable, x_{it} is the relevant education variable, and z_{it} is a vector of control variables. When using the second approach x_{it} becomes a vector comprising press freedom, the relevant education variable and a multiplicative cross-term of education and press freedom.

While a number of variables have been identified in the literature as influencing corruption, and would therefore be potential control variables in our regressions, a large part of those variables concern structural features such as dominant religions or origin of legal systems. As such variables are time invariant (unless one regards extremely long time spans), they cannot be used in country-fixed-effects regressions. We therefore have to restrict our control variables to those with a sufficient amount of variation in the time domain. More precisely we use trade openness (measured as the sum of exports and imports over GDP), income levels (measured by the logarithm of GDP per capita), natural resource exports (measured as the share of non-manufactured goods), the rule of law (as measured by expert perceptions) and the level of press freedom itself¹².

We also undertook a series of robustness checks: The rule of law variable was

¹¹Unsurprisingly -as some of our variables have different effects in the time and cross-section dimension- a random effects specification is clearly rejected by Hausman tests.

¹²We include press freedom even in the regressions where we have split the sample along the lines of the regime of press freedom, as even within a group of countries with similar levels of press freedom (i.e. free, partly free, or not free) differences in press freedom could still have some impact on corruption.

compiled based on the perceptions of the same individuals as our corruption index, which could lead to an artificially high correlation between the two variables; moreover there may be problems with endogeneity. We therefore systematically run our regressions excluding the rule of law variable (the largest part of these results are reported, see tables 3-5). We also excluded the press freedom variable from a number of regressions (see tables 3-6). We moreover reran our regressions progressively adding the control variables in different orders. We moreover excluded some outliers, as well as all transition countries from the regressions (results not reported). We found our results to be qualitatively robust to all these changes.

3 Econometric results

In this section we report the main regression results with regard to press freedom, human capital and corruption. Before doing so, we would briefly like to draw attention to the fact that we find somewhat different results for the relation between corruption and trade openness than in the literature, but as not the focus of this paper we delegate discussion of this to Appendix A3. For the split sample, results for higher education are reported in Table 3, for secondary education in Table 4, and primary education in Table 5. Results for the regressions using multiplicative cross-effects are reported in Table 6. At this stage we would like to make two observations: first, we indeed find press freedom to be strongly connected to corruption. This relation holds in most regressions even controlling for country and time fixed effects plus numerous other control variables, pointing to it not being simply a spurious relation (see tables 3-6). Second, as regards the link between education and corruption, education generally seems to rather have a positive effect on corruption scores (i.e. to decrease corruption) when using the whole sample, though this effect is usually not significant at conventional levels (see also tables 3-6).

Table 3 Higher Education & Corruption

	Split Sample						Full Sample	
	Press Regime: Not Free		Press Regime: Partly Free		Press Regime: Free			
Higher Education	-0.01 (0.16)	-0.006 (0.09)	0.05 (1.47)	0.054 (1.59)	0.039 (1.93)*	0.043 (2.11)**	0.014 (0.96)	0.015 (0.97)
LogGDPpc	-0.42 (0.69)	0.023 (0.03)	-0.27 (0.56)	-0.112 (0.23)	-0.466 (0.67)	-0.359 (0.50)	-0.453 (1.21)	0.042 (0.11)
Trade Openness	-0.004 (0.75)	-0.005 (0.97)	-0.007 (1.27)	-0.008 (1.44)	-0.005 (1.00)	-0.005 (1.10)	-0.002 (0.84)	-0.002 (0.83)
Raw material exports	-0.001 (0.09)	0 (0.09)	-0.002 (0.28)	-0.001 (0.23)	-0.005 (0.64)	-0.008 (0.90)	-0.004 (0.96)	-0.004 (0.94)
Rule of Law	0.249 (4.39)*		0.119 (2.22)*		0.11 (2.53)*		0.194 (7.42)*	
Press Freedom	0.079 (1.04)		-0.044 (0.65)		0.055 (0.55)		0.057 (2.40)*	
Nb. of Observ.	425	425	543	543	763	763	1820	1832
Nb. of countries	56	56	69	69	62	62	118	118
Rho	0.77	0.81	0.66	0.66	0.66	0.68	0.71	0.72
R2 (within)	0.24	0.19	0.30	0.29	0.23	0.22	0.17	0.13

T-statistics in parentheses * significant at 10% level; ** significant at 5% level; *** significant at 1% level

Note: The above table reports the results from panel regressions with both country and time fixed effects, also controlling for autocorrelation (following Baltagi-W). We regress corruption on the variables in the column to the left. See the Appendix for a detailed description of variables and sources. Each column of the table presents the estimated coefficient values and t-statistics from one regression, where the sample used for the regression varies as indicated in the first row of the table. Not free, partly free, and free refer to a restriction of the full sample to a subsample of countries and periods where the press has been, respectively, not free, partly free, or free. The last four rows give, respectively, the number of observations used in a regression, the number of countries from which these observations are taken, the estimated autocorrelation coefficient, and the within R2. Note that the sum of the countries used in different subsamples can exceed the total number of countries of the full sample, as countries can be classified differently with respect to press freedom for different periods.

Table 4 Secondary Education & Corruption

	Split Sample						Full Sample	
	Press Regime: Not Free		Press Regime: Partly Free		Press Regime: Free			
Secondary Education	0.062 (1.99)**	0.065 (1.8)*	-0.004 (0.14)	-0.001 (0.02)	0.022 (0.96)	0.025 (1.05)	0.007 (0.41)	0.006 (0.35)
LogGDPpc	-0.23 (0.26)	0.08 (0.09)	-0.191 (0.30)	0.015 (0.02)	-0.038 (0.04)	0.096 (0.11)	-0.255 (0.50)	0.206 (0.39)
Trade Openness	-0.009 (1.35)	-0.011 (1.68)*	-0.012 (2.19)*	-0.013 (2.37)*	-0.009 (1.46)	-0.008 (1.43)	-0.006 (1.87)*	-0.006 (1.81)*
Raw material exports	0.004 (0.57)	0 (0.50)	-0.008 (1.13)	-0.008 (1.07)	-0.004 (0.43)	-0.006 (0.60)	-0.003 (0.63)	-0.003 (0.57)
Rule of Law	0.246 (2.90)*		0.137 (2.07)*		0.159 (3.06)*		0.201 (6.04)*	
Press Freedom	0.107 (1.17)		-0.054 (0.64)		0.085 (0.69)		0.057 (1.79)*	
Nb. of Observ.	247	247	310	310	574	574	1193	1205
Nb. of countries	31	31	47	47	50	50	85	85
Rho	0.79	0.82	0.65	0.65	0.64	0.67	0.70	0.73
R2 (within)	0.31	0.25	0.38	0.37	0.23	0.21	0.17	0.13

T-statistics in parentheses * significant at 10% level; ** significant at 5% level; *** significant at 1% level
For methodological explanations see Table 3.

Table 5 Primary Education & Corruption

	Split Sample						Full Sample	
	Press Regime: Not Free		Press Regime: Partly Free		Press Regime: Free			
Primary Education	0.042 (1.8)*	0.046 (1.8)*	0.021 (0.96)	0.021 (0.99)	-0.03 (0.73)	-0.028 (0.66)	0.005 (0.33)	0.006 (0.3)
LogGDPpc	0.044 (0.07)	0.21 (0.32)	-0.283 (0.48)	-0.091 (0.16)	-0.404 (0.51)	-0.272 (0.33)	-0.301 (0.66)	0.07 (0.15)
Trade Openness	-0.005 (0.93)	-0.006 (1.05)	-0.011 (2.31)*	-0.012 (2.47)*	-0.006 (1.02)	-0.006 (0.99)	-0.004 (1.52)	-0.004 (1.43)
Raw material exports	0.004 (0.75)	0.004 (0.67)	0.001 (0.20)	0.002 (0.25)	-0.008 (0.87)	-0.011 (1.14)	-0.001 (0.35)	-0.001 (0.34)
Rule of Law	0.141 (2.10)*		0.1 (1.65)*		0.171 (3.43)*		0.175 (5.88)*	
Press Freedom	0.113 (1.31)		-0.046 (0.62)		0.074 (0.65)		0.081 (2.96)*	
Nb. of Observ.	324	324	419	419	623	623	1444	1456
Nb. of countries	48	48	62	62	58	58	115	115
Rho	0.74	0.77	0.70	0.70	0.64	0.67	0.70	0.72
R2 (within)	0.34	0.30	0.31	0.30	0.24	0.21	0.17	0.14

T-statistics in parentheses * significant at 10% level; ** significant at 5% level; *** significant at 1% level
For methodological explanations see Table 3.

Turning to the results for the split sample, we find that for tertiary education there is generally a substantial difference between countries with and without press freedom (Table 3). Coefficients for education are generally negative in the “no free

press” sub-sample (though insignificant at conventional levels), but are positive in the “partly free” or “free press” sub-samples, and for the "free press" sub-sample significantly so. This effect does not hold for primary or secondary education, which even in countries that lack press freedom (Tables 4-5) has a strong positive effect on corruption.

In the regressions with multiplicative cross-effects (i.e. using the product of an education variable with the press freedom score) results are inconclusive (Table 6).

Table 6 Multiplicative Cross-Effects: Education & Press Freedom Score

Press Freedom	0.081 (2.98)*	0.033 (0.37)	0.055 (1.75)*	0.057 (0.99)	0.056 (2.38)*	0.078 (2.41)*
Primary Education	0.006 (0.45)	0.004 (0.26)				
Primary Educ. * Press Freedom		0.001 (0.54)				
Secondary Education			0.004 (0.26)	0.005 (0.26)		
Secondary Educ. * Press Freedom				0 (0.03)		
Higher Education					0.01 (0.72)	0.03 (1.22)
Higher Educ. * Press Freedom						-0.002 (0.98)
LogGDPpc	-0.289 (0.74)	-0.296 (0.75)	-0.105 (0.23)	-0.108 (0.24)	0.041 (0.11)	0.047 (0.13)
Trade Openness	-0.004 (1.62)	-0.004 (1.60)	-0.006 (2.03)*	-0.006 (2.03)*	-0.003 (0.93)	-0.003 (0.93)
Raw material exports	-0.001 (0.19)	-0.001 (0.18)	0 (0.48)	-0.002 (0.48)	-0.003 (0.89)	-0.003 (0.87)
Rule of Law	0.173 (5.92)*	0.174 (5.94)*	0.199 (6.07)*	0.199 (6.09)*	0.19 (7.37)*	0.189 (7.37)*
Nb. of Observ.	1439	1439	1189	1189	1812	1812
Nb. of countries	115	115	85	85	118	118
Rho	0.71	0.71	0.71	0.71	0.72	0.72
R2 (within)	0.18	0.18	0.18	0.18	0.17	0.17

T-statistics in parentheses

Note: The above table reports the results from panel regressions with both country and time fixed effects, also controlling for autocorrelation (following Baltagi-W). We regress corruption on the variables in the column to the left. See the Appendix for a detailed description of variables and sources. Each column of the table presents the estimated coefficient values and t-statistics from one regression, where the sample used for the regression varies as indicated in the first row of the table. The last four rows give, respectively, the number of observations used in a regression, the number of countries from which these observations are taken, the estimated autocorrelation coefficient, and the within R2.

Taken together, our empirical findings provide some evidence for the predictions of our model, as at least with one of our two approaches we find the impact of increases in higher education on corruption to depend positively on the level of press freedom, with the possibility of higher education not having any beneficial impact on corruption in countries that lack press freedom. We however find that primary and secondary education may have a positive impact on corruption even in countries that lack press freedom. As mentioned earlier, finding results consistent with our model rather for higher levels of education seems intuitively reasonable¹³ in the kind of framework we use, as it is mainly more advanced levels of education that would be expected to reinforce a civil servant's rent-seeking capacity.

Finally, our econometric results do not simply fulfil standard statistical significance criteria, but - maybe even more importantly - coefficients are also of a relevant order of magnitude. Using the results from the split sample, differences in coefficients for the impact of (10 year lagged) tertiary education enrolment on corruption between countries that lack press freedom, and those that have a free or at least partially free press are in the order of 0.04-0.07 (depending on the exact specification). This means that if a country increases tertiary enrolment for example by 10 percentage points, if it lacks press freedom it will - in average - forgo an improvement in its corruption index by around half a point. To this comes the direct effect of press freedom on corruption, where coefficients are mostly in the order of

¹³Differences in the relationship between primary and higher education with corruption also has the advantage of clearly indicating that results are not driven mainly by reverse causation. It has been shown that corruption increases "corruption prone" public spending (e.g. for infrastructure projects), and decreases spending on more "corruption proof" items as salaries or education (Mauro 1998). It would be unsurprising if such an effect was stronger in countries that lack mechanisms to monitor those in power, that is e.g. where press freedom is low. Hence corruption may lead to less education, and such an effect could be stronger, the less developed press freedom. However, in such a case, corruption should, for a given level of press freedom, have an impact on all forms of education in the same way. Our empirical finding that, for a given level of press freedom, the relation between corruption and education seems to be somewhat different between basic and higher education is incompatible with the "reverse causation" explanation.

0.06-0.08. An increase in press freedom by 3 1/2 points - which is roughly what is needed to move from the middle of the no press freedom range to the middle of the partial press freedom range - will hence add a further improvement in corruption of roughly 1/4 point, indicating that a move from no press freedom to partial press freedom - accompanied by an increase in tertiary education of 10 percentage points (5 percentage points)- would decrease corruption by roughly 3/4 of a point (1/2 a point). Given that corruption is measured on a scale from 0-10, changes of that order are not spectacular, but are not trivial either. This indicates that while press freedom alone is unlikely to win the fight against corruption, it has nonetheless an important contribution to make.

Conclusion

With this chapter, we hope to have drawn attention to an area that, by and large, has been absent from political economy literature in general, and the literature on corruption in particular, namely press freedom. We have presented two channels through which low levels of press freedom can lead to increased corruption. In addition to direct evidence that increased press freedom is related with lower corruption levels- both in the cross-section and time dimension-, we have argued that in countries with low levels of civil monitoring of those in public office, increases in education (especially higher education) might not have the expected positive impact on corruption, as they might principally increase agents' rent seeking capacity. We provided empirical evidence that while primary and secondary education may improve corruption even in countries that lack press freedom, increases in higher education only have a positive impact on corruption in countries that profit from a sufficient amount of press freedom.

Appendix

A1 Data sources / Description of variables

Corruption

This indicator reflects the degree of corruption (a higher score means less corruption). Corruption is expected to be encountered “in the form of demand for special payments and bribes connected with import and export licences, exchange controls, tax assessments, police protection, or loans”. Forms of “excessive patronage, nepotism, job reservations, and 'favour-for-favours' are also considered risky for foreign business. Source: International Country Risk Guide (ICRG), various April issues. (the ICRG is a publication from a private risk rating agency called Political Risk Services Group, based in East Syracuse, New York. The publication offers indexes of different kinds of risk, covering about 140 countries).

Rule of Law

This variable reflects “the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes”. A grade corresponding to low risk is assigned to countries “with an established law and order tradition, ... sound political institutions, a strong court system, and provisions for an orderly succession of power” Source: ICGR, various April issues, Political Risk Services Group.

Press Freedom

The indexes for press freedom are based on a yearly Freedom House survey on press freedom in the world. In each country surveyed the “system of mass communication is assessed. The degree to which each system permits the free flow of information to and from the public determines the classification of each country’s news and information media as being 'free', 'partly free', or 'not free'.” In compiling the survey Freedom House measures the degree to which “law and administrative decisions of the government influence the content of the news media”, the degree of

“political influence or control over the content of the news system”, “the economic influences on the media exerted either by government or private entrepreneurs”, and the degree “of oppression of the news media exhibited in many forms (from killing ... to interfering with news production or distribution)”. Source: Freedom House, yearly press freedom report.

Higher Education

Gross school enrollment, tertiary. Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Estimates are based on the International Standard Classification of Education (ICSED). Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. Source: World Bank Development Indicators, 1999, 2006.

Secondary Education

Net school enrollment, secondary. Net enrollment ratio is the ratio of the number of children of official school age (as defined by the national education system) who are enrolled in school to the population of the corresponding official school age. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialised teachers. Source: World Bank Development Indicators, 1999, 2006.

Primary Education

Net school enrollment, primary. Net enrollment ratio is the ratio of the number of children of official school age (as defined by the national education system) who are enrolled in school to the population of the corresponding official school age. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music. Source: World Bank Development

Indicators, 1999, 2006.

GDPpc

- GDP per capita based on purchasing power parity (PPP) in 2000 prices. GDP PPP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar in the United States. GDP measures the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims. Gross domestic product at purchaser values (market prices) is the sum of gross value added by all resident and nonresident producers in the economy plus any taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current international dollars. Source: World Bank Development Indicators, 2006.

Natural Resource Exports

Proxy for export share of natural resources, based on export share of manufactured goods data. Source: World Bank Development Indicators, 2006.

Trade Openness

Trade openness is the sum of exports and imports of goods and services measured as a share of gross domestic product. Source: World Bank Development Indicators, 2006.

A2 Generalised Model

This annex provides a generalisation of the model presented in the main chapter. Suppose an economy consists of bureaucrats and regular citizens, where bureaucrats provide a service that citizens need monopolistically. Monopolists can use their power to extract a rent from citizens in the form of a bribe B . But this gain for bureaucrats does not come without risk. The higher the bribe rate b an official demands (the bribe rate being the percentage of the value of the service he provides that he demands for himself), the higher his risk of being caught and sentenced for corruption. This is because a citizen might prefer not to obtain the service and instead denounce the corrupt official. Distinguishing between the bribe B and the bribe rate b , and using the latter as our measure of corruption, has the advantage that the level of corruption does not increase automatically with the general level of economic activity.

We assume that better educated bureaucrats can provide higher quality goods or services. As the bureaucrat's service is of higher value to his client, he can extract a higher bribe from him for a given bribe rate.

The probability P_D of a corrupt official being detected and sentenced to pay a fine F is not independent from the society he lives in. If there is a monitoring agency M , as for example a free press or an independent justice system, the risk for corrupt agents of being discovered and punished rises with the power and capacity of these monitoring agencies.

An official's utility is equal to his expected wage, w , plus the expected bribe minus the expected fine

$$U(b, h_B, h_M, FP, F, w) = w(1 - P_D(..)) + B(b, h_B)(1 - P_D(..)) - P_D(..) * F. \quad (4.3)$$

where $P_D(..)$ stands for $P_D(h_B, b, M(h_M, FP))$.

$B(b, h_B)$, the rent an official extracts, increases with the bribe level b he chooses and with the quality of his services, described by his human capital h_B . His probability of being detected and sentenced $P_D(h_B, b, M(h_M))$ decreases with his own human capital h_B , but rises with the chosen bribe rate b . In addition it rises with the monitoring of his activity, $M(h_M)$, that itself depends positively on the level of human capital of the monitors h_M .

For simplicity we assume the human capital level of all agents in the economy to be equal, that is $h = h_B = h_M$, and normalise the wage to 0. To gain notational clarity we drop the parameters in the B and P functions. A bureaucrat now chooses his bribe level b such as to maximise his utility, which leads to the following first order condition¹⁴:

$$B_b(1 - P) - BP_b - (F + w)P_b = 0. \tag{4.4}$$

What is now the impact of a general rise in human capital on corruption measured by the bribe rate? Define $G(b, h) := B_b(1 - P) - BP_b - P_b(F + w)$. Implicit differentiation of G yields

$$\frac{\partial b}{\partial h} = - \frac{B_{bh}(1 - P) - B_b [P_M M_h + P_h] - B_h P_b - (B + F + w)P_{bh}}{\frac{\partial G}{\partial b}}.$$

Straightforward calculations (using the fact that the second order condition of equation 4.3 must be negative to insure that the bribe rate is maximised) shows that $\frac{\partial G}{\partial b}$ is always negative. Education will decrease corruption if $\frac{\partial b}{\partial h}$ is negative, that is if

$$\underbrace{B_{bh} [1 - P]}_{1(+)} - \underbrace{P_M M_h B_b}_{2(-)} - \underbrace{P_h B_b}_{3(+)} - \underbrace{P_b B_h}_{4(-)} - \underbrace{(B + F + w)P_{bh}}_{5(?)} - \underbrace{(B + F + w)P_{Mb} M_h}_{6(-)} < 0.$$

The first term accounts for the possibility of a more educated bureaucrat to extract higher rents. Making the reasonable and natural assumption of B_{bh} being

¹⁴We drop the index D in the probability function to avoid confusion with partial derivatives.

positive (that is an increase in a bureaucrat's human capital, and thus the value of his service, increases his bribe the more, the higher is his bribe rate) we thus find that an increase in overall education leads to a rise in corruption due to a higher productivity of bureaucrats. The second term, which describes the increase of the probability of being caught due to an increase in the capacities of the monitoring agencies is negative. Consequently an increase in overall education leads to a fall in corruption via this monitoring term. The third term which turns out to be positive captures the increase in corruption due to the fall in the probability of being caught that is caused by a (more educated) bureaucrat's increasing level of sophistication. The fourth term describes the fall in corruption linked to the increase in the probability of being caught due to the fact that better educated bureaucrats go for higher bribe rates. The sign of the fifth term depends on the sign of P_{bh} . This cross derivative shows us how changes in the overall education level impact on a bureaucrat's incentives to change his bribe rate. When P_{bh} is positive this implies that increases in human capital, for a given increase in a bureaucrat's corruptness, increase his risk of detection. If on the contrary P_{bh} is negative, increases in human capital, again for a given increase in a bureaucrat's corruptness, will decrease his risk of detection. The cross derivative P_{bh} is thus a kind of measurement for whether the positive or negative aspects of education dominate bureaucrats' incentives to go for corruption. Term 6 finally depicts how changes in monitoring impact on the detection probability of bureaucrats via their effect on the level of the optimal bribe rates of a bureaucrat.

The essential information provided by this equation is that an increase in education can increase corruption through the impact of terms 1 and 3, unless it is counterbalanced by a sufficient increase in the terms 2, 4, 6 and eventually 5. As term 4 is of a more technical nature, our interpretation focuses on terms 2, 6 and 5. Education is more likely to decrease corruption when terms 2, 6 and 5 are large and negative. For term 5 to be negative, the cross derivative P_{bh} has to be positive,

which means that those aspects of education that lead to decreased incentives for bureaucrats to go for corruption must dominate. This is the case when education increases mainly the capacity of the monitoring institutions to detect corruption. Such an effect should be more pronounced if monitoring institutions are efficient, including in particular their independence. The size of both term 2 and 6 depends on M_h ⁽⁺⁾. Making the reasonable and undemanding assumption that the capacity of the monitoring agency depends (positively) in some multiplicative way on both the human capital of the monitors and their degree of independence, which we will refer to as "press freedom", it follows that M_h depends positively on the level of press freedom. It results that under fairly minimal assumptions both the size of term 2 and 6 depend directly on the level of press freedom in a country, which implies that education is more likely to decrease corruption in a country where the level of press freedom is high. Finally, note also that for P_{bh} positive (or at least $P_{bh} + P_{Mb}M_h$ positive) both higher wages for bureaucrats and fines for detected corruption will increase the likelihood of education to decrease corruption.

A3 Corruption and Trade Openness

While this is obviously not the focus of our paper we would like to comment briefly on our results on the relationship between corruption and trade openness. So far most empirical studies have found a positive cross-section correlation between trade openness and low corruption levels, and so these studies have been advising opening up the economy as a means of decreasing corruption. For example Ades/DiTella (1997b,1999) argue that the existence of rents in a country leads to corruption, and therefore that competition from foreign firms, by reducing rents in a local market, decreases corruption. Using different corruption indexes, they use cross-sections of approximately 30 and 50 countries, as well as a panel with observations for two years in roughly 50 countries to show that a larger share of imports in a country's GDP decreases corruption. To avoid problems of endogeneity (namely that corruption acts as a barrier to imports and thus decreases trade openness) they use population and size of a country as instruments, and find results to be robust in these varying specifications. Larrain/Tavares (2004), in a more careful econometric study on openness and corruption, significantly improve the instrumenting by constructing a measure of how much a country should trade given a large number of characteristics uncorrelated with its degree of corruption. They find that cross-country, both an increase in a country's import or export share decreases corruption. Treisman (1999) using different corruption indexes in cross-sections of varying size¹⁵ finds that higher import shares decrease corruption, though this effect would be extremely small and its significance of low robustness. Brunetti and Weder (2003), in a cross-section regression of roughly 80-100 countries, find that the positive effect of trade openness on corruption defined in the standard way (namely imports plus exports as share of GDP) becomes insignificant when controlling for other variables

¹⁵Between 36-64 countries.

of economic development¹⁶.

Our study seems to indicate that even if there was a cross-section correlation with more open countries being on average less corrupt, within the time dimension this is not the case. While econometric estimates are significant only in part of the specifications, estimators are consistently negative which points to the conclusion that opening up an economy - at least in the short and medium-term - does not contribute to decreasing corruption, and might actually increase it. We hypothesize that more trade could, in the short-run, simply mean more scope for bribe extraction (at customs, to obtain permits or lower tariffs, etc.) and so lead to increases in corruption. Only in the very long-term might the beneficial impact of "good practice" or increased competition become relevant and lead to lower corruption levels. Increasing corruption levels in a given country could also result from increasing trade with relatively more corrupt countries, which would be consistent with Gokcekus and Knoerich (2006) who find that the "quality of openness" as measured by a weighted index of the corruptness of trading partners matters, in the sense that "low quality openness" increases corruption. However, a closer inspection of this interesting but preliminary empirical finding is beyond the scope of this paper and has to be left open for further research. This said, while we think that in general opening up an economy to international trade has merits in itself, for the time being we would ask for extreme caution in advocating opening up for the sake of fighting corruption.

¹⁶The two latter papers do, however, not control for possible endogeneity, Treisman because he finds existing instruments unconvincing, Brunetti/Weder as trade openness is not the main focus of their paper.

Chapter 5

Russian Regions' Economic Performance: How Much Can Differences in the Politico-Institutional Setting or Reform Efforts Explain?

The aim of this chapter is to investigate the main causes behind the widely differing growth rates of Russian regions during transition, and to find out to what degree political economy explanations can account for the observed differences. Using data for 77 Russian regions for 1993-2004, we study the impact of three groups of variables¹ on regional economic performance. First, we consider politico-institutional features, among them governors' political orientations, and proxies for the risk of violent conflict. Second, we look at indicators of economic reform, such as the degree of privatisation and price liberalisation. Third, we consider initial conditions²,

¹This classification is to a certain degree arbitrary, but we find it helpful for expositional clarity.

²We use this term in a somewhat unconventionally large sense.

including economic, geographic and structural features. Our main findings are the following: up to the 1998 crisis - which was mainly a period of economic decline - differences in regional growth were almost entirely driven by initial conditions, with resource and human capital endowments, industrial structure, and geographical location playing the dominant roles. However, since the crisis the importance of initial conditions has declined significantly, and is now basically reduced to hydrocarbon wealth and advantageous geographical location. More reform-oriented policies, as well as better regional leadership are also found to have come to make a significant difference.

This work is related to the large empirical literature on the determinants of growth (early and influential examples are Barro 1991 and Mankiw/Romer/Weil 1992) that developed following the availability of the Summer-Heston data and the renewed interest of economists in growth following the seminal paper by Romer (1986). This empirical growth literature can roughly be divided into two strands. The first is mainly focused on estimating a form of theoretical growth model (often Mankiw/Romer/Weil, or the Solow/Swan model), and thus usually ultimately estimates an equation that is based on some form of augmented and dynamised production function. Apart from the advantage of being economically better founded, this approach generally has the advantage of making it possible to study how different economic variables have an impact on growth, either via factor accumulation or by improving total factor productivity of the economy.

The second strand of econometric work is somewhat more lax, in the sense that it is little interested in *how* variables have an impact on growth, but rather on *which* variables are important for growth performance (as e.g. Barro 1991). While we think that the first approach is in principle preferable, in this study we use an approach that is closer to the second. The justification for this is twofold. First, we think Russian regional capital stock (and investment) data to be of particularly low quality. Economists have been sceptical about the relevance of capital stock

measurements for the early years of transition in all transition countries, and the quality of regional capital stock data is even worse than national data. Moreover, for a large part of the period under consideration output has been falling at tremendous speed, and under such circumstances capital stock data (derived from accounting) do not seem to reflect properly the size of the capital stock that is actually in use in the economy. Hence, as a more theoretically based approach relies crucially on some form of data regarding capital stock or changes to it, it seems very problematic to adopt such an approach in our case. Second, even if these problems could be overcome, it would not help us much in answering the question that we are really interested in. If we were able to obtain reasonable yearly estimates of capital stock used in regional production, and if, for example, we found that a large part of the differences in economic growth were due to changes in effectively used capital stock, this would only change our question. Instead of explaining to what degree different variables might account for differences in growth performance, we would be left with the question as to what degree these variables can explain whether capital stock (or the labour force in a region) continued to be productive. While this is not an uninteresting question in itself, it would be even harder to answer given the available data, and we thus take a short-cut by looking at the determinants of growth performance directly, while neglecting the role factor accumulation (or destruction) may have played.

This work is to some degree related to the research about whether initial conditions or the amplitude of economic reform explain more convincingly the different economic performances of transition countries³. The main difference with respect to this debate is, however, that our focus on Russian regions only captures the part of reform that has (or has not) been initiated in regions, and thus does not take into account the large - and arguably more important part - of the changes that have

³See for example World Bank (1996), Popov (1999a), and EBRD (1999) for differing early views on this issue, as well as Falcetti et al. (2002) and Radulescu/Barlow (2002) for more recent contributions.

been undertaken at the national level. It is, however, interesting that the results we obtain from Russian regions are fairly similar to what is obtained when looking at transition countries as a whole. Falcetti et al. (2002) show that initial conditions have a strong initial effect on growth in transition economies, but that the importance of this effect wanes over time. Falcetti et al. also show that while reforms have exerted a positive overall impact on growth, this effect comes with a lag and is smaller and less robust than previously thought⁴. These findings correspond well with our results for Russia, where we find little initial effect from reform during the pre-crisis , but a significant positive effect for the post-crisis period, and generally a declining importance of initial conditions over time.

There have been several attempts at studying Russian regional growth performance. Berkowitz/DeJong (2003) claim that for the 1994-96 period the Russian regions that advanced faster on reforms had a larger share of private small enterprises, which in turn led to higher income growth or, at least, lower declines. Their finding, however, is not particularly robust and probably mainly driven by a peculiarity in the way the Russian statistical agency calculates income⁵. Ahrend (2000), based on data from 1990 to 1998, finds that neither differences in the depth of economic reform, nor politico-institutional variables explain much of the variation in regional performance, but that the principal determinants have been the initial structure and competitiveness of a region's industry, or a region's human capital and natural resource endowments. He also reports that more urban places experienced higher growth rates. Popov (1999b) also argues that initial conditions, measured by resource advantages, played a significant positive role in determining changes in

⁴Looking specifically at the robustness of the link from reform to growth, Radulescu/Barlow (2002) obtain roughly similar findings.

⁵More precisely the Russian national statistical agency GosKomStat, in an attempt to account for undeclared income, corrects reported regional income using regional retail trade data. A large share of private small enterprises are actually enterprises active in trade. One would expect retail trade to be correlated with the numerical importance of enterprises that have their main business in trade. Hence it is unsurprising to find a correlation between income data and the share of private small enterprises.

output and income, whereas Mikheeva (1999) finds initial export shares to be highly important in explaining differing regional performance. Yudaeva et al. (2004) also find little impact of economic reform on pre-crisis regional growth performance, but looking at 1999 data provide some tentative evidence that this may have changed post-crisis.

Almost all of these studies, however, suffer from a well-known problem of growth regressions.⁶ There usually are a large number of right hand side variables (often highly correlated with one another) which have been found to be significantly related to growth performance in some studies, but not in others with different specifications. In short, the robustness of any link between those variables and growth is an issue here, and the fact that a variable comes out significant in a specific growth regression is no longer considered by many economists as sufficient proof for the relevance of this link. This problem can be overcome by using some sort of "extreme bound" analysis, the approach we take in this chapter.

In section one we describe the methodology used and present tables with econometric results, whereas section two sets up hypotheses concerning the influences on economic growth in Russian regions, explains our choices of variables of interest, and discusses in detail the empirical results.

1 Methodology and Econometric Result Tables

Russia's federal structure provides an interesting opportunity for econometric research, as it allows us to investigate the consequences of different politico-institutional settings, as well as those of varying economic policies, in entities with an almost identical judicial and cultural framework. Studies on Russian regions can thus avoid the main criticism of cross-country studies, namely their failure to account properly

⁶With the exception of Yudaeva et al., which aggregates potentially correlated right hand variables into common factors. While this solves the problem of collinearity, it comes at the price of making the interpretation of results more difficult.

for large differences in attitudes and cultures.

In this study we use data of 77 Russian regions from 1993 through 2004. Our data-set includes all Oblasts, Krajs, Republics and the two independent Cities (Moscow, Petersburg), with the exception of Chechnya and Ingushetia for which data are only sporadically available⁷. Reliable data on GRP (Gross Regional Product) growth is available from 1995 to 2004. Descriptive statistics of the data are shown in Table 1.

⁷The data of the ten Autonomous Okrugs are included in their surrounding region, as sufficient separate data is unavailable.

Table 1 Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
Real GRP growth 1995-98 (cumulated)	76	0.89	0.17	0.53	1.51
Real GRP growth 1999-2004 (cumulated)	77	1.46	0.21	0.91	2.08
Initial GRP per capita 1994	77	3393	1572	955	10573
Initial GRP per capita 1997	77	13821	8466	4397	65460
Share of regional population with secondary education (1994)	77	64.4	6.0	53.3	84.8
Share of 1994-98 period region under Governor supported by "Party of Power"	77	0.55	0.46	0	1
Share of 1994-98 period region under Governor supported by communist party	77	0.18	0.32	0	1
Quality of regional leadership (1998)	77	2.9	1.3	1	5
Duma elections score (1995)	77	2.3	0.4	1.7	3.5
Presidential elections score (1996)	77	2.9	0.5	2.1	4.0
Control of criminal groups over the economy (1996)	77	2.4	1.2	1.0	5.0
Potential for violent conflict	77	95.1	13.4	40	100
Potential for ethnic conflict	77	9.3	18.9	0	80.2
Dummy for regions that have the status of a republic	77	0.23	0.43	0	1
Degree of food price regulation (1995)	76	18.9	17.8	1.0	85.0
Proportion of goods and services with regulated prices (1996)	76	15.4	8.8	3.2	69.1
Share of priv. enterpr. in trade, catering and HH services (1996,GKS)	77	82.8	4.9	67.0	95.0
Proxy for small-scale privatisation (1996, as used in the literature)	77	82.4	31.9	20.3	305.6
Number of small businesses per capita (1995)	77	5.3	2.5	1.2	19.6
Number of small businesses per capita (1998)	77	4.6	3.2	1.7	21.6
Output share of regional monopolies (1996)	70	14.5	13.9	0	60.8
Foreign Direct Investment per capita (1995)	74	8.1	17.5	0	117.5
Foreign Direct Investment per capita (1998)	77	17.5	37.1	0	212.8
Initial Oil production (per capita, 1995)	77	1.4	7.3	0	63.5
Initial Gas production (per capita, 1995)	77	2.5	18.9	0	165.7
Initial Coal production (per capita, 1995)	77	1.7	4.6	0	30.5
Natural Resource Endowment	77	1.0	0.5	0	2.7
Proxy for the initial share of agriculture in total output (1993)	76	0.19	0.08	0	0.50
Proxy for the initial share of industry in total output (1993)	76	0.69	0.10	0.31	0.90
Initial share of exports to foreign countries (1994)	76	0.08	0.08	0	0.39
Initial share of power sector (1993)	77	10.3	5.0	0.3	24.2
Initial share of fuel sector (1993)	77	9.3	14.9	0	80.9
Initial share of ferrous- and non-ferrous metal sector (1993)	77	13.3	18.9	0	70.6
Initial share of machine building sector (1993)	77	20.3	13.5	0.2	56.5
Initial share of chemical sector (1993)	77	6.0	6.8	0	25.6
Initial share of food sector (1993)	77	18.1	13.0	2.2	72.4
Dummy for border with CIS	77	0.30	0.46	0	1
Dummy for border with EU	77	0.06	0.25	0	1
Dummy for border with China	77	0.08	0.27	0	1
Dummy for the presence of a major port in the region	77	0.23	0.43	0	1
Region located in "Red Belt"	77	0.26	0.44	0	1
Dummy for all "European" Russian regions	77	0.64	0.48	0	1
Degree of latitude on which the regional capital is situated	77	54.6	5.5	43	68
Degree of longitude on which regional capital is situated	77	61.8	36.9	21	174
Dummy for regions with an unfavourable climate	77	0.10	0.31	0	1
Population density	77	30.4	31.1	0.2	191.6
Index proxying a region's degree of urbanisation	77	2.7	0.6	1.2	5
Railway Density	70	168.3	116.3	0.5	583

In order to avoid the above-mentioned problem of collinearity of right hand side variables, which risks making the link between right hand side variables and growth specification dependent, we are using Extreme Bound Analysis (EBA) based on Levine and Renelt (1992) and Sala-I-Martin (1997). EBA analysis, however, is not the only potential way around the problem of collinearity. Another possibility would be the aggregation of groups of right hand side variables into common factors, but this

approach comes at the price of making the interpretation of results more difficult, and does not allow determining which variables exactly are driving growth performance. A predefined selection rule to narrow down the right hand side variables, as e.g. Hendry's general to specific procedure⁸, is another way to tackle the problem. However, in cases with a fairly large number of potential right hand side variables, the ultimate outcome risks being strongly path dependent even under a quite sophisticated selection procedure. All in all, EBA seems therefore the most appropriate approach for our purpose.

Simplifying somewhat, the general idea of EBA is to run a large number of regressions where one looks at one specific RHS "variable of interest", while using permutations of variables from a rather large pool of variables that are also thought to be related to the LHS variable as control variables. One then looks at all the coefficient estimates for the "variable of interest", and if a sufficiently large part of these values are "robustly" in positive territory (or alternatively if a sufficiently large part is "robustly" in negative territory) it is concluded that there is a robust relationship between the RHS "variable of interest" and the LHS variable. The same exercise is then repeated for another variable of interest, progressively treating all variables in the aforementioned pool of variables in this fashion.

More precisely, EBA basically means running cross-sectional regressions of the form

$$Y = \alpha + \beta_{SV} * SV + \beta_X * X + \delta_{AV} * AV + \varepsilon$$

where Y is the LHS variable, SV , the Standard Variables, is a vector of standard explanatory variables that are included in each regression, X is the "variable of interest", AV a vector of additional variables thought to be related to the left-hand-side variable, and ε is the error term. (In our case Y is the cumulative growth rate of Russian GRP for a given period.)

⁸See e.g. Hendry(1980). See also Radulescu/Barlow (2002) for an application of both general to specific testing and extreme bound analysis to growth in transition countries.

The lower (respectively higher) bound for each regression is defined as $\hat{\beta}_X$ minus (respectively plus) two standard deviations. The extreme bounds for a variable of interest are the lowest value for the lower bound, and the highest value for the higher bound which is obtained in the numerous regressions done for a given variable of interest X. A variable X passes the Leamer (see Leamer 1985) extreme bounds test and following Leamer is said to be robustly related to Y if the extreme bounds (i.e. the lowest value for the lower bound, and the highest value for the higher bound) do not have opposing signs. Following Sala-i- Martin (1997), this test is, however, too restrictive. If the distribution of the parameter of interest has both negative and positive support, one will eventually have coefficients with opposing signs if one runs a sufficiently large numbers of regressions. Sala-i-Martin therefore proposes looking rather at the whole distribution of the estimate of the parameter in question, and declaring X to be robustly related to Y if more than 95 % of the distribution is respectively above or below zero (which is equivalent to the 90% confidence interval around the parameter in question being entirely on one side of zero). Sala-i Martin considers both cases where the distribution of the estimates of the variable of interest over models is normal, and where it is not, and finds that results are virtually identical⁹.

We will base this chapter and our discussion of results on the method suggested by Sala-i-Martin, as we basically think that his critique of the overrestrictiveness of the original Leamer extreme bounds test is well founded. However, for completeness we also report Leamer's extreme bounds.

As "standard variables" we use a proxy for human capital, namely the share of individuals with secondary education, as well as the initial level of GRP. Both variables are used in the same fashion in Levine/Renelt, and are generally considered important and relatively robust determinants of economic growth¹⁰. We do not

⁹We therefore simply assume the distribution of the estimates of the variable of interest over models to be normal, which greatly simplifies the evaluation of the CDFs at zero.

¹⁰At least for groups of countries that are similar, or for provinces within one country.

include data on capital stocks or changes in them for the reasons we outlined in the introduction¹¹. In each regression we are using three additional variables (as is common practice), in addition to the two standard variables and the variable of interest.

As, in addition to investigating what have been the drivers of Russian regional growth, we are also strongly interested in the question of whether and to what degree growth drivers in the early and later stages of transition have been different, it is useful to split our sample into different periods. Given that the economic situation in Russia pre- and post-crisis has been fundamentally different, with a declining economy for most of the nineties, and strong economic growth starting in 1999, it is natural to use the crisis for splitting our sample. We therefore look at the pre- and post-crisis periods separately, using first the average annual growth performance for the 1995-1998 and then for the 1999-2004 period as LHS variables in our regressions.

The econometric results are explained and discussed extensively in section 2, but we beforehand present the detailed results of the EBA analysis in Tables 1 and 2. In each table, variables are ordered by the value of the cumulative density function (CDF) evaluated at 0¹². In addition to the CDF evaluated at 0 we report the fraction of regressions where the variable of interest has been significant at respectively 5 and 10% significance levels, the extreme bounds, and the unweighted parameter

¹¹Furthermore we do not include investment data for a number of reasons : first, according to standard economic theory, the relevant variable influencing growth should be changes in the capital stock, and not investment. This said, one might argue that investment, or rather the share of investment in the economy, could be used as a proxy for capital accumulation. In a situation like Russia's during the nineties, however, where the dominant factor was obviously a large drop in the use of the existing capital stock, taking investment as a proxy for changes in the capital stock is clearly inappropriate. Second, empirically, according to Easterly (1999), in the short-term investment does not cause growth. Third, we believe Russian data on regional private investment to be of particularly poor quality. Finally, in spite of all the arguments against its use, we tentatively tried investment data in some regressions, and -unsurprisingly- found it generally to be insignificant.

¹²More precisely, as the area under the density is divided in two by zero, following standard notation we will define as CDF(0) the larger of the two areas, irrespective of this being the one above or below zero.

estimates of β_X , as well as the unweighted standard deviation¹³. Unsurprisingly, the extreme bounds of all variables under consideration have opposing signs, which - in spite of the fact that some variables of interest are highly significant in more than 95 percent of the regressions - means that they would not pass the Leamer extreme bounds test as used e.g. in Levine and Renelt (1992), which confirms our choice of using a test based on the cumulative density function as suggested by Sala-i-Martin. However, the test proposed by Sala-i-Martin is basically a one-sided test. Therefore Sturm/de Haan (2005) suggest that, to confirm to traditional significance levels, the 95% confidence interval around the parameter in question should be entirely on one side of zero (and not only the 90% confidence interval), which means that the CDF(0) should be larger than 0.975. However, as even those variables with a CDF(0) between 0.95 and 0.975 turn out significant in a very large fraction of our regressions, we call a variable X robustly related to Y if the 90% confidence interval condition is fulfilled, i.e. when the CDF(0) is above 0.95. Those "robustly related" variables are bolded in the following tables. We find close to ten variables to be robustly related to Russian regional growth in either sub-period. It may be worth noting that the results of the following two tables are based on close to 1 million regressions.

¹³Following Sturm/de Haan (2005) the use of such unweighted measures is preferable.

Table 2 - Determinants of Pre-Crisis Growth

Variable under Review	CDF(0)	Fraction Regress. sign. 5%	Fraction Regress. sign. 10%	Beta	Standard Deviation	Lower Bound	Upper Bound
Degree of longitude on which regional capital is situated	1.00	0.96	0.98	-0.00053	0.00016	-0.0015	0.0003
Initial Oil production (per capita)	1.00	0.97	0.98	0.00312	0.00110	-0.0043	0.0183
Initial share of chemical sector	0.99	1.00	1.00	0.00179	0.00064	-0.0002	0.0035
Dummy for the presence of a major port in the region	0.98	0.85	0.89	0.02780	0.01149	-0.0137	0.0640
Population density	0.98	0.76	0.82	0.00050	0.00022	-0.0004	0.0013
Initial share of exports to foreign countries	0.97	0.61	0.76	0.14400	0.06565	-0.0976	0.3820
Initial share of fuel sector	0.96	0.66	0.76	0.00075	0.00036	-0.0007	0.0021
Initial Gas production (per capita)	0.95	0.92	0.92	0.00082	0.00042	-0.0055	0.0027
Initial share of power sector	0.91	0.26	0.42	-0.00160	0.00095	-0.0043	0.0016
Share of priv. enterpr. in trade, catering and HH services [GKS]	0.91	0.33	0.43	0.00158	0.00094	-0.0018	0.0050
Proxy for the initial share of industry in total output	0.91	0.48	0.56	0.10400	0.06237	-0.3490	0.5240
Index proxying a region's degree of urbanisation	0.90	0.30	0.41	0.01730	0.01044	-0.0279	0.0560
Dummy for border with CIS	0.90	0.30	0.43	0.01680	0.01025	-0.0243	0.0529
Dummy for regions with an unfavourable climate	0.89	0.28	0.41	-0.02920	0.01849	-0.1020	0.0536
Control of criminal groups over the economy	0.86	0.08	0.17	-0.00625	0.00425	-0.0196	0.0077
Proportion of goods and services with regulated prices	0.84	0.04	0.09	0.00075	0.00053	-0.0009	0.0027
Output share of regional monopolies	0.79	0.11	0.15	0.00042	0.00033	-0.0009	0.0015
Governor supported by "Party of Power"	0.78	0.08	0.13	0.01290	0.01054	-0.0292	0.0508
Dummy for regions that have the status of a republic	0.77	0.06	0.11	-0.01500	0.01261	-0.0931	0.0473
Governor supported by communist party	0.74	0.00	0.02	-0.01730	0.01546	-0.0661	0.0450
Dummy for all "European" Russian regions	0.73	0.14	0.23	0.01190	0.01086	-0.0635	0.0542
Initial Coal production (per capita)	0.72	0.01	0.04	-0.00112	0.00105	-0.0048	0.0027
Initial share of food sector	0.71	0.05	0.10	-0.00044	0.00042	-0.0020	0.0016
Dummy for border with China	0.69	0.02	0.06	-0.01790	0.01780	-0.0857	0.0738
Railway Density	0.68	0.01	0.03	0.00004	0.00004	-0.0002	0.0002
Natural Resource Endowment	0.66	0.06	0.08	0.01050	0.01095	-0.0300	0.0564
Foreign Direct Investment per capita (1995)	0.60	0.00	0.01	0.00037	0.00044	-0.0010	0.0020
Initial share of machine building sector	0.59	0.01	0.03	0.00031	0.00038	-0.0011	0.0019
Initial share of ferrous- and non-ferrous metal sector	0.55	0.04	0.05	-0.00022	0.00029	-0.0015	0.0013
Potential for ethnic conflict	0.54	0.05	0.07	-0.00023	0.00031	-0.0016	0.0019
Proxy for the initial share of agriculture in total output	0.51	0.10	0.14	-0.06000	0.08637	-0.4950	0.6450
Duma elections score (1995)	0.51	0.03	0.05	0.01180	0.01715	-0.0799	0.1180
Region located in "Red Belt"	0.51	0.00	0.00	0.00777	0.01131	-0.0383	0.0490
Presidential elections score (1996)	0.31	0.03	0.04	0.00579	0.01449	-0.0910	0.0727
Degree of food price regulation	0.28	0.00	0.00	0.00010	0.00027	-0.0010	0.0010
Potential for violent conflict	0.28	0.01	0.03	0.00015	0.00041	-0.0016	0.0017
Dummy for border with EU	0.24	0.00	0.00	0.00562	0.01841	-0.0605	0.0720
Proxy for small-scale privatisation (as used in the literature)	0.18	0.00	0.00	0.00003	0.00014	-0.0005	0.0005
Number of small businesses per capita (1995)	0.06	0.00	0.00	-0.00022	0.00319	-0.0114	0.0118
Degree of latitude on which the regional capital is situated	0.04	0.00	0.01	-0.00005	0.00120	-0.0057	0.0061

Total number of regressions: 9139 for each variable under review

Note: Dependent Variable is average 1995-98 GRP growth

Table 3 - Determinants of Post-Crisis Growth

Variable under Review	CDF(0)	Fraction Regress. sign. 5%	Fraction Regress. sign. 10%	Beta	Standard Deviation	Lower Bound	Upper Bound
Initial share of fuel sector	1.00	1.00	1.00	0.000722	0.00024	-0.00022	0.00151
Dummy for the presence of a major port in the region	1.00	1.00	1.00	0.02262	0.00655	-0.0028	0.0433
Dummy for border with CIS	0.99	0.94	0.98	0.01540	0.00595	-0.0078	0.0343
Quality of regional leadership	0.98	0.85	0.94	0.00503	0.00217	-0.0013	0.0111
Number of small businesses per capita (1995)	0.98	0.79	0.88	0.00306	0.00134	-0.0015	0.0106
Share of priv. enterpr. in trade, catering & HH services [GKS]	0.97	0.72	0.82	0.00126	0.00056	-0.0009	0.0029
Potential for violent conflict	0.96	0.63	0.72	-0.00048	0.00023	-0.0014	0.0005
Degree of longitude on which the regional capital is situated	0.93	0.44	0.53	-0.00018	0.00010	-0.0010	0.0004
Initial Oil production (per capita)	0.93	0.66	0.74	0.00161	0.00090	-0.0043	0.0086
Degree of latitude on which the regional capital is situated	0.93	0.43	0.55	-0.00117	0.00065	-0.0043	0.0019
Initial share of power sector	0.91	0.25	0.45	-0.00097	0.00057	-0.0027	0.0007
Initial Gas production (per capita)	0.85	0.53	0.63	0.00047	0.00032	-0.0023	0.0022
Proxy for the initial share of agriculture in total output	0.81	0.13	0.21	0.06513	0.05002	-0.1533	0.4551
Initial Coal production (per capita)	0.80	0.09	0.14	-0.00080	0.00062	-0.0031	0.0013
Dummy for all "European" Russian regions	0.79	0.15	0.19	-0.00818	0.00651	-0.0503	0.0188
Population density	0.75	0.06	0.12	0.00014	0.00013	-0.0005	0.0006
Dummy for regions with an unfavourable climate	0.71	0.01	0.03	-0.01131	0.01077	-0.0470	0.0386
Proxy for small-scale privatisation (as used in the literature)	0.70	0.01	0.03	0.00009	0.00009	-0.0002	0.0004
Output share of regional monopolies	0.66	0.01	0.01	0.00018	0.00019	-0.0004	0.0009
Initial share of ferrous- and non-ferrous metal sector	0.65	0.01	0.03	-0.00016	0.00017	-0.0009	0.0006
Duma elections score (1995)	0.60	0.03	0.07	0.00865	0.01017	-0.0458	0.0709
Initial share of machine building sector	0.60	0.01	0.02	-0.00019	0.00023	-0.0011	0.0006
Potential for ethnic conflict	0.59	0.07	0.08	0.00015	0.00018	-0.0007	0.0015
Dummy for regions that have the status of a republic	0.59	0.09	0.12	-0.00615	0.00749	-0.0677	0.0200
Foreign Direct Investment per capita (1995)	0.59	0.04	0.06	0.00007	0.00009	-0.0002	0.0004
Initial share of food sector	0.58	0.05	0.09	-0.00020	0.00025	-0.0013	0.0012
Railway Density	0.45	0.00	0.01	0.00002	0.00003	-0.0001	0.0001
Dummy for border with EU	0.42	0.00	0.00	-0.00618	0.01107	-0.0454	0.0362
Degree of food price regulation	0.35	0.00	0.00	-0.00007	0.00016	-0.0006	0.0005
Proportion of goods and services with regulated prices	0.27	0.00	0.00	-0.00011	0.00032	-0.0011	0.0010
Proxy for the initial share of industry in total output	0.26	0.01	0.03	-0.01247	0.03725	-0.1867	0.2766
Control of criminal groups over the economy	0.22	0.00	0.00	-0.00047	0.00260	-0.0078	0.0081
Dummy for border with China	0.22	0.01	0.02	0.00195	0.01079	-0.0435	0.0574
Region located in "Red Belt"	0.21	0.00	0.00	-0.00173	0.00676	-0.0277	0.0267
Presidential elections score (1996)	0.21	0.00	0.02	0.00220	0.00845	-0.0551	0.0439
Index proxying a region's degree of urbanisation	0.15	0.01	0.01	-0.00119	0.00641	-0.0315	0.0304
Natural Resource Endowment	0.12	0.00	0.00	0.00102	0.00679	-0.0246	0.0319
Initial share of exports to foreign countries	0.04	0.00	0.00	-0.00200	0.03973	-0.1744	0.1369
Initial share of chemical sector	0.03	0.00	0.00	0.00001	0.00041	-0.0013	0.0012

Total number of regressions: 8436 for each variable under review

Note: Dependent Variable is average 1999-2004 GRP growth

2 Hypotheses and results

In the following we shortly discuss the "standard variables". We then set up hypotheses concerning the influences on economic growth in Russian regions, explain our choice of variables of interest, and discuss in detail the empirical results we obtain. We do so by structuring our variables in three groups: politico-institutional features, measurements of economic reform, and initial conditions.

2.1 The "Standard Variables"

This decade's developments in endogenous growth theory and the related econometric work have highlighted the importance of human capital for economic development¹⁴. During the process of transition, enterprises and economic agents were (and are) forced to change their economic behaviour substantially, and to acquire a large amount of new skills. It seems reasonable to expect agents with a higher level of education to find these changes easier to accomplish, and so regions with a higher human capital level to do relatively better during transition. However, for the variable that usually delivers the best results in cross-country regressions, secondary education, there is less variation within Russia than in cross-country studies, due to the high standard of the Soviet education system.

We include initial levels of GRP mainly to conform to comparable econometric studies. Proponents of this approach have interpreted it as testing for β -convergence¹⁵, or in a case like ours where we include other variables that control for the general efficiency of an economy or region, as testing for conditional β -convergence (see e.g. Barro/Sala-I-Martin 1995). Opponents have criticised the whole approach as flawed (Quah 1993, 1997). Where both have finally come to agree is that simple

¹⁴For a somewhat relativising discussion see Benhabib/Spiegel 1994.

¹⁵Where a negative sign of the β coefficient would indicate convergence or conditional convergence, depending on the framework. Solanko (2003) reports both relatively strong beta and conditional beta convergence for Russian regions.

β -convergence has clearly not been observed on a global level, however certain economies that were similar in some aspects, part of a “club” (e.g. the EU), or regions within a country have often seen GDP respectively GRP converge over the last decades

As our software routine does not report statistics for the standard variables, we also undertook an EBA analysis where we used our standard variables (Initial GRP per capita levels and Secondary Education) as variables of interest, not using any standard variables (results not reported in the result tables, as not directly comparable). We found that Secondary Education was strongly positively and robustly related to regional growth performance in the pre-crisis period, but that this effect basically disappeared post-crisis. We did not find any robust relationship between initial GRP levels and GRP growth, though coefficients were significant in roughly one regression out of four (slightly less pre-, and slightly more post-crisis), and the average coefficient was marginally negative, which could be interpreted as - albeit very weak - evidence for some convergence.

2.2 Politico-institutional features

H1: Regions with less reform-oriented political leaders will experience less economic growth.

One recurring theme of the early transition literature (see e.g. World Bank 1996) has been that faster and more profound economic reform should be rewarded by higher economic growth. Assuming that the political attitude of the regional political leadership has an impact on the speed and intensity with which regional reforms are implemented, or more generally on the quality of economic policy in a region, one would expect regions with a more pro-reform leadership to attain higher economic growth. For 1998 we have a variable, being based on two independent ratings of governors, that directly measures the "quality" of local governors, quality being defined as their perceived capacities to deliver reform and improve the

economic situation of their regions. This variable is strongly correlated with the political orientation of governors (that is, higher when supported by more reform oriented parties, lower if supported by anti-reform parties), but is superior to those as it takes not only into account the ideological orientation of a governor but also his actual capacity to deliver. It is hence very well suited to assess to what degree better economic policy at the regional level has resulted in better regional growth performance in subsequent years, i.e. the 1999-2004 period. For the earlier period such a variable is unfortunately unavailable, and we therefore have to rely on variables of political orientation of governors. As in the mid-nineties not even half of the governors in our sample were actually official members of a political party, we rather consider by which party a governor was supported during his election campaign as a proxy for his political orientation. Governors close to the Communist Party are generally considered to be more hostile to economic reform, hence common wisdom would expect their regions to underperform substantially.

H2: Regions with a less reform-oriented population will experience less economic growth.

The political preferences of a region's population might have an impact on the political feasibility of reform. If this is the case, regions that have an "anti-reform" voting track record, for example by voting "more communist" in the past, should underperform. We use a "Duma election score" - a variable that increases with the electoral success of reform minded parties in the 1995 parliament elections, as well as a "presidential election score" (increasing with the first round performance of reform oriented candidates in the 1996 presidential election) to proxy the reform orientation of a region's population¹⁶.

H3: Regions with stronger institutions will experience higher economic growth

¹⁶However, if those variables were found to be significantly related to growth this could be driven by a potential problem of endogeneity, as it might be that in regions with bad growth performance, voters show their protest by voting anti-reform.

Currently, one of the main lessons the economic profession has drawn from the experience of transition is that institutions matter for economic development (see e.g. World Bank 2002, as well as Eicher/Schreiber 2005). We thus want to test to what degree regional economic performance has been influenced by the quality of regional institutions. Finding a good indicator for institutional quality in Russian regions is, however, extremely difficult. We think that (high) control of criminal groups over the local economy is a good proxy for (low) quality and strength of regional institutions, but must caution that there is a risk that our choice might not capture the feature we are interested in very well.¹⁷ We also look whether regions with the status of Republic attained a higher growth performance. This is motivated by the fact that regions that have the status of Republic generally enjoy a larger degree of freedom from Moscow. Based on the main idea that the more a region is responsible for its own fate, the better its incentive to work on improving its situation (including its institutions), it is interesting to see whether Republics have been able to use their freedom to improve their economic performance.

H4: Regions that suffer from -even potential- violent conflict will experience lower economic growth.

Violent conflict, whether economically, ethnically or otherwise motivated, is generally perceived as detrimental to growth (Alesina/Perotti 1994). Even if violence never actually breaks out, potential violent conflict creates high levels of uncertainty that might be detrimental to investment (Pyndick/Solimano 1993).

We first use an index of a region's potential for violent conflict compiled by an investment bank. As violent conflict unfortunately often arises from ethnic or religious tensions, we proxy violent conflict potential also by a measure of ethnic diversity. More precisely we take the population share of the "original" (non-Slavic) ethnic group of the region as a proxy for ethnic diversity¹⁸.

¹⁷The variable is supposed to measure control of criminal groups over the economy in a given region, and was compiled by the weekly newspaper "Argumenti i Fakti" in 1996

¹⁸Given that most of the time non-Slavic ethnic groups have a religion that differs from the

Results H1-H4

The reform willingness of regional leaders does not seem to have mattered in the pre-crisis period, when the economy was in decline, as our variable measuring political orientation of governors - which we see as a proxy for their willingness to reform - comes out largely insignificant. However, we find strong evidence that reform willingness of regional leaders began to matter once the economy started to grow robustly post-crisis (H1). Our variable that proxies the quality of governors is robustly related to regional post-crisis growth, indicating that with a normalising economic situation, reform efforts (probably both undertaken pre- and post-crisis) finally paid off. We find, however, no evidence that the general attitude of a region's population towards reform (H2) made any difference to economic growth. Neither a proxy for the degree of pro-reform votes in the 1995 parliamentary elections, nor in the 1996 presidential elections shows a robust relation with economic growth.

Potential violent conflict (H4) seems not to have significantly influenced regional growth performance pre-crisis, but becomes a robust determinant of economic performance post-crisis. It should be noted that, as both Chechnia and Ingushetia are excluded from our sample due to lack of reliable data, this finding does not directly reflect on events in Chechnia. It also does not seem to be driven by ethnic questions, as our proxy for ethnic conflict potential has no robust impact on regional growth whatsoever. Our proxy for (lack of) institutional quality, namely the control of criminal groups over the economy, is also far from any robust relation with economic growth (H3). This, however, does not necessarily imply that institutions did not matter, but could simply reflect either measurement problems, or that the variable used is a poor proxy.

Summarising, while we do not find any evidence that regional differences along political and party lines had any impact on pre-crisis growth performance, the reform

dominant Russian-Orthodox, this is equally an - albeit less precise - measurement of religious diversity.

orientation of governors seems to have born fruit in the post-crisis context. In addition, large uncertainty, as reflected in the potential for violent conflict, became an obstacle to growth post-crisis.

2.3 Measurements of economic reform

H5: Regions with a higher share of regulated prices will experience lower growth.

We use two variables, one that reflects the degree of food price regulation, another that reflects the degree of price regulation in goods and services. A higher degree of food price regulation should be a disincentive for agricultural production, and a higher proportion of regulated prices of goods and services should lead to distortions in the allocation of resources to production. Thus both types of price regulation should be detrimental to a region's growth performance.

H6: Regions with a higher share of privatised and/or private economic activity will experience higher growth.

While according to standard economics, under most circumstances privately owned enterprises will be more efficient than those owned by the state (see e.g. Megginson/Netter 2000), it is still somewhat controversial whether this holds under any circumstances¹⁹. It seems however relatively uncontroversial that under efficient private ownership outcomes are better than under state ownership. While the emergence of efficient private ownership structures depends in part on how privatisation is conducted and is nothing that should be taken for granted, it has generally been argued (e.g. Berkovitz/DeJong 1998) that regions that privatised more act-

¹⁹Sabirianova et al. (2005) e.g. show that in Russia and the Czech Republic in the 1990s privatisation to domestic owners did not markedly improve efficiency. Djankov and Murell (2002) also find that in transition countries commercialised state ownership was superior to some forms of private ownership, though generally remained inferior to relatively concentrated private ownership by outsiders. Bennet et al. (2004), based on a sample of transition countries during the 1990s, report that mass privatisation was the only privatisation method to have had a significant positive effect on growth.

ively should have become more economically efficient, and hence enjoyed a superior economic growth performance to those dragging their feet on this issue. Or, from a somewhat more general perspective, regions that profit from a larger share of private economic activity, should experience faster economic growth. We use two proxies for the private sector share. First, we look at the share of small enterprises (in trade, catering and household services) that are privately owned, expecting that more private ownership should have a positive impact on a region's economic performance. Second, we look at the number of small enterprises (per capita)²⁰, assuming that a relatively elevated number of small companies should reflect dynamic private business creation, and hence a relatively sound business climate. Small companies have been the driving force behind growth in other transition countries (e.g. for Poland see Konings et al 1996), so one would expect regions with a larger number of small enterprises per capita to show a better growth performance.

H7: Regions with a higher degree of monopolisation will experience lower growth.

Economic theory is ambiguous about the impact of increased competition on growth. In simple Schumpeterian models, more competition leads to lower monopoly rents, which by decreasing incentives to innovate diminishes economic growth. In more sophisticated Schumpeterian models where workers are sufficiently "adaptable" (which basically means that they can switch sufficiently fast from old to new sectors), competition increases growth (see Aghion/Howitt 1998). The empirical evidence seems to indicate that, in general, competition is beneficial both for innovation and for growth (see Carlin et al. 2004 and Dutz/Hayri 2000). Hence regions with a higher share of regional monopolies should experience lower growth. We use the output of market controlling enterprises in a region as share of total industrial production as a proxy for regional monopolisation.

²⁰As Goskomstat has repeatedly changed the definition of small, we compare the level of small businesses in a region with the national average.

H8: Regions with higher FDI inflows will experience higher growth.

Foreign direct investment (FDI) is generally regarded as an important factor in economic development (see e.g. Bergsman et al 2000), and is growth enhancing (Borenzstein et al. 1995). We would thus expect FDI inflows into a region to have a beneficial impact on growth performance. We therefore use FDI inflows per capita for a given region as variable in our regressions.

Results H5-H8

Looking at variables of economic reform (H5-H8) we find no robust relations with growth in the 95-98 period. However, more small scale privatisation as well as a better developed small business sector (both highly likely to depend on no small measure on regional economic policy) are very strongly and robustly related to regional growth performance in the post-crisis period (H6).²¹

There is no evidence that a region's larger reliance on price regulation (H5) had the expected negative effect on economic growth²². A higher degree of monopolisation in a region (H7) had also no robust effect on regional performance (and if anything may have had a positive relation with growth - though this relation fails the robustness test by a wide margin). The reason for this, arguing based on Schumpeterian economic theory, could be the low level of "adaptability" of Russian workers. Guriev/Friebel (2000), for example, emphasise that the mobility of Russian workers is particularly low. Surprisingly, there is also no econometric proof whatsoever of a positive impact of foreign direct investment (H8). We hypothesise that the absence

²¹It is noteworthy in this respect that we have been using two different compilations of the variable measuring the share of private small business. Interestingly, for the first variation of the variable, which has been fairly widely used in the literature, we actually find no robust relation with regional growth. The second variation, taken from GosKomStat, covers a larger number of regions and presumably is more precise. Using this variation, we do find a robust relation between the share of the private sector and economic growth in the post-crisis period.

²²Though this is not the focus of this paper, it seems interesting to note that agricultural subsidies and food price regulation were -contrary to common economic wisdom- not a pet policy of governors close to the communist party. Correlation coefficients show that they were used at least as extensively by governors who were supported by President Yeltsin's official "reform" camp as by communist supported governors.

of a robust and strong positive effect of FDI on regional growth is probably due to the extremely low level of those investments. In spite of the fact that FDI had a strong positive effect on enterprises' productivity (Yudaeva et al. 2003), the amount of FDI that Russia received during the nineties probably was simply not substantial enough to make a significant contribution to economic activity on more than the local level.

Summarizing briefly, our econometric analysis seems to indicate that the degree to which a region implemented economic reform had little impact on its growth performance in a situation of widespread economic decline before the crisis, but started to make a significant difference after 1998 when the economy started to grow strongly. In this respect it is worth noting that our results do not mean that reform undertaken before the crisis would have been wasted -but rather that its main fruits were only reaped once growth reappeared after 1998 (as also indicated by the fact that the size of the private small business sector as measured *in 1996* impacted on post-crisis growth).

2.4 Initial conditions

We consider a total of six hypotheses, the first half of them dealing with initial *economic* conditions, the second half with more general initial features.

H9: Regions with a larger natural resource endowment have experienced higher economic growth.

Natural resource endowments are often considered a mixed blessing. While natural resources are valuable export items, they can easily lead to "Dutch disease" problems, and hence can have an overall negative impact on an economy (Sachs/Warner 2001, 1997). However, with regard to Russian regions, natural resource endowments should have played a positive role. In a situation where both Russian demand and industrial production were collapsing, the production of commodities that could easily be diverted for export should have been an advantage.

Second, world market prices for most commodities are much higher than internal prices in Soviet times. Hence resource rich regions should have experienced a positive “terms of trade” shock allowing them to cushion themselves at least partially from the general collapse in GRP. To measure resource endowments we use variables on oil production, gas production and coal production (all measured per capita). We also use an aggregate index for natural resource endowment.

H10: Regions with a larger agricultural sector have experienced lower economic growth.

A region’s initial structure of output (agriculture, industry, etc.) should have played a role. At least, as Soviet agriculture was particularly heavily subsidised, regions with large agricultural sectors should have been more affected by the end (or at least strong reduction) of the soviet subsidisation regime. We use proxies for the initial (1993) share of agriculture, as well as of industry in total output²³.

H11: Regions with a larger share of more competitive industries at the start of transition experienced higher economic growth.

As growth has varied widely between different industrial sectors, we include initial industrial structure variables to control to what degree a region’s performance has been influenced by “nation-wide” developments in its main industries. More precisely we use variables that indicate the initial share (as of 1993) of various key industries in total industrial production in a region²⁴. Given that during Soviet times different industries worked at different levels of competitiveness compared to international standards (Senik-Leygonie/Hughes 1992), this indirectly tests to what extent regional economic performance has been driven by the initial competitiveness of its industrial sector.

Furthermore, we regard a region’s initial share of exports abroad (as % of GRP).

²³As regional sectoral value added data are not available, these proxies are calculated by adding up Services, Agriculture, Construction and Industrial Production in a region, and by taking the share of the relevant sector (e.g. agriculture) with respect to this sum.

²⁴We use the initial shares of the power sector, the fuel sector, the ferrous- and non-ferrous metals sector, the chemical sector, and the food sector.

If a region was, already in the early stages of transition, able to export a larger share of its industrial production abroad, this indicates that a larger part of its production was at least not too far away from international competitiveness. Hence a higher export share roughly equates with a region having “better” enterprises, and we can expect such a region to show signs of superior growth performance.

H12: Regions that have an advantageous geographical position will experience higher economic growth

H12-a: Regions with neighbours that are either high income countries or grow strongly experienced higher growth

H12-b: Regions with easy access to major routes for international transport experienced higher growth

H12-c: Regions that are geographically closer to Western Europe experienced higher growth.

H12-d: Regions with a particularly unfavourable climate experienced lower growth

H12-e: Regions in the “Red Belt” experienced lower growth

Initial geographic conditions are mainly supposed to catch effects from location in more or less favourable areas. It is generally assumed that countries profit from the good economic performance of neighbouring countries, and that countries with easy access to major routes for international transport perform better (Sachs/Warner 1997). We can expect regions with permanent sea access or major ports to outperform. We can equally expect regions that have a border with a rich or well performing neighbour state to profit from its location, and this effect should increase with more developed trade links. Thus, regions bordering EU countries, as well as China, should have done relatively well, as these countries are either wealthy and/or experienced high growth. Location on the border of CIS countries would seem more of a double edged sword. The far from inspiring economic performance of most CIS countries during the nineties should have had a negative effect on bordering regions, but the strong growth in the CIS since 1999 may have been advantageous for those

border regions. The influences should have been amplified by the historically well-developed trade links with CIS countries. We therefore use dummy variables for bordering with China, for bordering a CIS country, for bordering an EU country, for the presence of a major port (sea or river).

We equally consider “pure” geographical location, that is the line of longitude (and latitude) that a region’s capital is placed on. The longitude variable is very close to the ‘distance from some Western European Capital’ variable, that has been popular in regressions on growth performance of transition economies (e.g. EBRD 1999). Using dummy variables, we also test whether regions situated in the European part of Russia had a better growth performance, as well as whether a particularly unfavourable climate has been an obstacle to growth (on the latter see e.g. Hill/Gaddy 2003). Finally we test whether being a region located in what political scientists call the “red belt” has led to a particularly poor growth performance. The “red belt” is a part of south-western Russia, often ruled by communist governors, that western economists generally consider to have been dragging behind on reform, and to have experienced a particularly uninspired growth performance since the start of transition (see e.g. Berkovitz/De Jong 1999).

H13: More urban regions will experience stronger growth.

Though economic theory tells little about the relationship between population structure and growth, casual empirical evidence from various countries seems to suggest that large cities generally have been growing faster during recent years than rural areas, and we would expect the same effect to hold for Russia. We use an urbanisation index and population density as proxies for how urban a region is.

H14: Regions with better infrastructure will experience higher growth.

In development and growth literature it has long been argued that good infrastructure is a prerequisite for high growth (see Easterly/Levine (1997) for econometric evidence). We would thus expect regions with a better-developed infrastructure

to experience higher growth. We proxy infrastructure by railway density²⁵.

Results H9-H14

Production of oil and gas explain better economic performance robustly pre-crisis, and borderline robustly post-crisis (H9). Interestingly, natural resource endowment more generally has no explanatory power for economic growth at all, which probably reflects that there has so far been relatively little new production of natural resources from areas which had not already been producing them initially. It is somewhat surprising to see that coal mining regions did not robustly underperform the general average, at least pre-crisis, taking into account all the negative media coverage of these places at the time. The share of agriculture did not have any robust relation with economic growth (H10), though pre-crisis the initial share of industrial production was related positively with economic growth (though this relation is only borderline robust).

The initial share of exports in GRP (H11), comes out robustly and positively related with growth in the pre-crisis period, but this effect vanished post-crisis. We thus deduce that the initial competitiveness of a region's industry has been an important factor behind a region's pre-crisis economic performance. This finding is corroborated by the results concerning industrial structure. We see that regions with larger shares in fuel, metal or chemical production did robustly better pre-crisis, though - excepting the fuel industry - this effect wanes post-crisis. In short, pre-crisis, a large part of differing regional performance in Russia can simply be explained by the "initial quality", that is the initial competitiveness of its industrial sector. Some regions were simply more fortunate, insofar as their heritage from Soviet times included larger shares of "better" industries.

With respect to geographic location (H12), we find it to have an important impact both pre- and post crisis, nevertheless not exactly always the way we would have expected. Regions with a port (H12-b) fared robustly better in both periods.

²⁵Railway density as measured by the km of rail per 10.000 sqkm as of 1990.

With regard to borders (H12-a), we find that they have had less significance than could have been expected. Moreover, where they have had some effect, it has often taken an unexpected form. Both regions neighbouring China or the EU do not seem to have profited from their location, but, surprisingly, regions that have a border with CIS countries seem to have had better GRP growth, especially post-crisis (though pre-crisis this relation is also borderline robust). However, while neither having borders with the EU nor being in the European part of Russia seems to have mattered, being more to the west clearly did help (H12-c). The degree of longitude of a region's capital is robustly and negatively related to growth performance (though only borderline so post-crisis). It is, however, unclear whether this effect is due to the closeness of Western Europe, as it may simply reflect a post-soviet normalisation. It could have been driven by a progressive decline in non-resource extraction activity in Far Eastern regions with often unfavourable climate, where under Soviet planning industrialisation had been pushed for mainly political reasons²⁶. Unfavourable climate, as such, seems however not have been terribly important for growth. Pre-crisis it may have played some (negative) role, as the variable is significant in a fair share of regressions, but it fails the standards for being called robustly related by quite some margin. Post-crisis, a more southern location is negatively, and borderline robustly related with economic growth, though this could be a reflection of stronger growth in the informal sector in Russia's south during this period. Finally, there is not the slightest evidence that location in the infamous "red belt" (H12-d) impacted on growth performance.

Population structure (H13) seems to have played some role in the expected sense.

²⁶As natural resources are abundant in many far east regions, even though meteorological conditions there are often extreme, their economic development was always a priority for Soviet planning. Stalin, during his rule of terror simply deported billions of innocent people to camps in these areas where most of them were effectively worked to death. Fortunately, later Soviet planners decided to replace terror with more human incentives, and started to offer highly attractive wages for those who were willing to go and work in the far east. Amid the general chaos of transition Russia's interest to further develop these far east regions came to a halt, and so a substantial decrease in the far east wage premium followed.

Pre-crisis, both more densely populated and more urbanised regions have done robustly better (though more urbanised regions only borderline so), but this effect vanished post-crisis. Finally, it is somewhat more surprising that infrastructure measurements (H 14) are not robustly significant. As various infrastructure measurements (which are not reported here) are highly correlated among themselves and equally so with population density, this should, perhaps, be interpreted as some kind of post-mortem praise of Soviet planners, in the sense that they at least achieved an equally adequate (or inadequate) level of infrastructure for all parts of Russia.

Conclusion

In this work we have thoroughly investigated the impact of a large number of potential factors on Russian regions' economic performance using extreme bound analysis, which should make our results particularly robust. We find that there has been a clear break in the determinants of Russian regional growth. Pre-crisis, the initial competitiveness of a region's industry, as measured by the share of exports in regional production or industrial structure mattered strongly, as did initial conditions such as abundance of natural resources and human capital, or geographic location. Neither political variables, as for example governor's political orientation, nor economic reform seems to have played a prominent role in explaining pre-crisis regional economic performance. This, however, changed drastically post-crisis. While a limited set of initial conditions (as e.g. hydrocarbon wealth, or benign geographical location) remained growth drivers, political and economic reform variables now also came into play. Regions with more reform oriented governors clearly outperformed, as did those which had pursued reform policies leading to a larger private share in economic activity. In this respect it is seems worth stressing that pre-crisis reforms should not be seen as a waste - they were probably crucial in many respects. Their positive impact, however, took some time to materialise, and only started to bear

measurable fruit once the economy had ended its prolonged phase of decline and started growing again.

Appendix

Data sources

- Ia "Russian Regions" in 2 vol., Moscow, Goskomstat, various issues.
- Ib "Russian Statistical Yearbook", Moscow, Goskomstat, various issues.
- Ic "Russian Social Economic Situation 1999" monthly issues, Moscow, Goskomstat, January and February 1999.
- Id "Education Level of Population in Russia (from Micro-census 1994), Moscow, Goskomstat, 1995
- IIa "Executives' Election in the Russian Regions 1995-1997. Electoral Statistics", Moscow, "Ves Mir", 1997.
- IIb "Elections in the Russian Federation 1991-1998. Electoral guide for monitoring, analysis and forecast", CD-Rom, Moscow, Federal Center of Information and Mercator Group, 1999.
- III "Analysis of Tendencies of Russian Regions' Development in 1992-1995", Moscow, TACIS, Contract BIS/95/321/057, March 1996.
- IV "Russian Regions After Elections 1996", Moscow, "Yuridicheskaya literatura", 1997.
- V "Entrepreneur's Climate of the Russian Regions. Geography for Investors and Entrepreneurs", Moscow, "Nachala-Press", 1997.
- VI "Political Almanac" in 3 vol, Moscow, 1998.

Description of variables

Data sources are indicated in brackets []

Left Hand Side

- Cumulated growth of real Gross Regional Product (GRP) (1995-1998)²⁷ -[Ia]
- Cumulated growth of real Gross Regional Product (GRP) (1999-2004) -[Ia]

Standard Variables

- Initial GRP per capita (1994/1997)-[Ia]
- Share of Population with completed Secondary Education²⁸, as of 1994-[Id]

Politico-Institutional Variables : H1-H2

- Dummy for governor supported by the communist party-[V]
- Dummy for governor supported by “party of power”, that is by the inner circle of power in Moscow (i. e. mainly “Our Home is Russia”)-[V]
- Duma elections score (1995), as compiled by MFK Renaissance. This score increases with the electoral performance of reform-minded political parties or candidates.

²⁷For 1995-96 data are constructed from nominal annual GRP data in the following way: we first constructed value added of the main economy sectors (industry, agriculture, construction, and services) by region. Value added of a sector in the region was calculated from regional sectoral output using the Russian average share of value added in total output of this sector. We then transformed the value added of each sector in the region into 1994 constant prices by using the national sectoral deflators. Finally we added up the results obtained for each region, thus obtaining a measure for GRP in 1994 constant prices.

²⁸Including both secondary and special secondary education.

- Presidential elections score (1996), as compiled by MFK Renaissance. This score increases with the 1st round electoral performance of reform minded candidates
- Quality of regional leadership, scoring each regional Governor with regard to his overall economic reformism - compiled by MFK Renaissance as of 1998 on the basis of various expert ratings.

Politico-Institutional Variables : H3-H4

- Control of criminal groups over the economy - as compiled from weekly newspaper "Argumenti i Fakti" in 1996
- Dummy for regions that have the status of a republic
- Potential for violent conflict, as compiled by MFK Renaissance 1998
- Potential for ethnic conflict proxied by the population share of the original (non-Slavic) ethnic of the region (e.g. percentage of Tatar nationals in Tatarstan), as of 1989-[Ib]

Measurements of Economic Reform : H5-H8

- Degree of food price regulation (higher score means more regulated), as of 1996-[IV]
- Proportion of goods and services with regulated prices, as of 1996-[IV]
- Share of private enterprises in trade, catering and household services (% of total enterprises in these sectors) as of 1996. This variable has been used in the literature as a proxy for small scale privatisation-[IV]

- Share of private enterprises in trade, catering and household services (% of total enterprises in these sectors) as of 1996. As compiled by GosKomStat -[Ia]
- Number of small businesses per capita (compared to the average of the Russian Federation, RF=1), 1995/98-[Ia]
- Output of Market Controlling Enterprises (Regional Monopolies) as share of total industrial production (as of 1996)-[Ia]
- Foreign Direct Investment per capita, 1995/98-[Ia]

Initial Conditions : H9-H11

- Oil production (per capita), as of 1995-[Ia]
- Gas production (per capita), as of 1995-[Ia]
- Coal production (per capita), as of 1995-[Ia]
- Natural Resource Potential Index, compiled by [V], 1997
- Proxy for the initial (1993) share of agriculture in total output²⁹
- Proxy for the initial (1993) share of industry in total output
- Initial (1994) share of exports to foreign countries, % of GRP-[Ib, Ia]
- Initial (1993) share of power sector (as % of total industrial output)-[Ib]
- Initial (1993) share of fuel sector (as % of total industrial output)-[Ib]

²⁹As regional sectoral value added data are not available, these proxies are calculated by adding up Services, Agriculture, Construction and Industrial Production in a region, and by taking the share of the relevant sector (e.g. agriculture) with respect to this sum.

- Initial (1993) share of ferrous and non-ferrous metals sector (as % of total industrial output)-[Ib]
- Initial (1993) share of chemical sector (as % of total industrial output)-[Ib]
- Initial (1993) share of food sector (as % of total industrial output)-[Ib]

Initial Conditions : H12

- Dummy for border with China
- Dummy for border with CIS
- Dummy for border with EU
- Dummy for the presence of a major port (sea or river) in the region
- Dummy for all “European” Russian regions, i.e. excluding regions in the Caucasus and East of the Ural
- Degree of longitude on which the regional capital is situated
- Degree of latitude on which the regional capital is situated
- Dummy for “Red Belt” regions, as compiled by Political Scientists Alexei Sitnikov and Andrei Kounov for this study
- Dummy for regions with an unfavourable climate

Initial Conditions : H13-H14

- Index proxying a region’s degree of urbanisation, compiled by MFK Renaissance 1998
- Population density, as of 1990-[Ib]
- Railway density (km per 10.000 sqkm), as of 1990-[Ia]

General Conclusion

In this thesis we have used a political economy approach to study macro-economic stability and structural reform. The choice of this framework was prompted by the fact that a number of economic policies in emerging and transition economies are hard to understand when comparing actually outcomes to what could optimally have been achieved. Hyperinflations and delayed stabilisation are prime examples of situations where economic policies led to obviously sub-optimal policy outcomes that imposed huge efficiency costs on all economic agents. But it is not only deficiencies in macro-economic management that remain hard to understand if one fails to take account of political economy considerations. Structural reform that would clearly have improved economic efficiency has also often not been implemented or has been implemented with huge delays. Many policies were hard to reconcile with an approach that sees all policies simply orientated towards achieving economic efficiency.

Many developing countries, for example, kept large enterprises under state-ownership long after it had become clear that for economic efficiency private ownership would have been preferable by far. Some transition countries privatised their state-owned economies in a fairly swift manner, but in a large number of them privatisation took far longer than what would have been optimal, in a significant number it is still to be finished, and in some this process - even 15 years after the beginning of transition - has not really begun in earnest. Moreover, when countries privatised, privatisation often was not carried out in fashions that would have been

considered efficient or just.

Another area where structural reform has been slow in a large number of emerging economies is the reform of institutions. Lack of institutions of sufficient quality has been a drain on long-term growth potential. For example a low quality judicial system and - as we have shown in this thesis - the lack of press freedom have furthered corruption, with all its negative implications for economic development. While most of the above-mentioned inefficiencies are hard to understand in a conventional "pure" economic framework, we have shown that a formal political-economy approach allows us to gain valuable understanding of why these inefficiencies occur.

To put this thesis in context we have first surveyed the existing literature on subjects related to the political economy of economic crises and structural reform. We have then applied a formal political economy framework to investigate the problem of high inflation and macro-economic stabilisation, as well as problems connected with the implementation of highly important structural reforms. Notably, by endogenising the choice of economic policies into economic models with heterogeneous agents (that we regroup in different economic classes - the rich, the middle class and the poor) - we have shown how suboptimal policies as high inflation or stalled privatisation can be the political outcome, even in a situation where all agents in an economy optimise their actions.

More precisely we have shown how in a model with heterogeneous agents distributive conflict and public finance constraints can cause inflation. Different governing coalitions - favouring different levels of inflation- can arise, and will lead to different distributional outcomes - squeezing the poor, a populist coalition (i.e. squeezing the middle class) or squeezing the rich. When strong demonetisation results from chronic inflation, external shocks or budget adjustment traps may lead to hyperinflation. Permanent price stability can be achieved when extreme currency substitution makes inflation-financed redistribution useless, thus ending distributive struggle - and in this respect hyperinflation episodes may help to end monetary

disorder.

In a similar political economy setting with three classes we have investigated under which conditions privatisation will proceed, and who will be the political supporters as well as the main winners of the privatisation process. We show that - depending on circumstances - governments of all political shades may privatise, and often at a substantial discount to the net value of the assets on offer. Left wing governments (representing the poor) are less likely to privatise, and if so will generally do so at smaller "discounts". As in the case of inflation, different coalitions can form to further or block privatisation, leading to different distributional outcomes. We have also shown that inefficient taxation decreases the likelihood of privatisation being politically feasible. This is because the possibilities of compensating the losers from the discounted asset sale may be insufficient, a feature that may explain the general lack of enthusiasm for privatisation especially among the poor in less developed countries.

In an application of the political economy approach, we have then investigated to what degree institutional and political differences had an impact on short-term economic performance in Russian regions.

While our focus has been on emerging economies, we feel strongly that some of the insights gained in this thesis are more broadly applicable. In this context we would especially mention the link between press freedom and low levels of corruption. Strengthening press freedom will not only improve the situation in emerging economies, but is also an important safeguard against a deterioration of existing standards in the developed world.

In a more general sense, we think that studying issues of macro-economic stability and structural reform in emerging economies is not only of interest for those that are specialising in these countries. These countries expose many links between economics and politics that exist everywhere. These links, however, are usually less visible in developed countries, where changes both in the economic and political framework

are rarely as radical as those that can typically be observed in emerging economies.

As a concluding remark, we would thus recommend those interested in how politics and economics interact to take a closer look at emerging economies.

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