The London School of Economics and Political Science

The Legacy of 1969?
Essays on the Historical Roots of Italy's Economic Decline: Human Capital, Internal Migration and Manufacturing Firms, 1960s-2000s

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A thesis submitted to the Department of Economic History of the London School of Economics and Political Science for the degree of Doctor of Philosophy, London, March 2023

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Abstract

Italy's relative decline for the past three decades has prompted a growing literature aiming to identify structural weaknesses and historical causes. The thesis focuses on the influence of wage-setting institutions on human capital accumulation, internal migration and manufacturing establishments since the 1960s. The overarching argument of the thesis identifies a critical juncture around the 'Hot Autumn' of 1969, when labour unions first adopted an egalitarian stance in collective bargaining. The effects on industrial wages fundamentally altered incentives for households and firms, with long-lasting consequences. The first chapter of the thesis positions the argument with respect to the historical background and within the relevant literature. The following substantive chapters test each a different self-contained hypothesis, following the paper-style format. One chapter explores the impact of the wage hike on post-compulsory education, identifying a temporary increase in early school leaving and a shift in the composition of school choices. The following chapter studies the effect of equalizing nominal minimum wages between geographical areas on internal migration, which contributed to originate today's spatial misallocation and excessive unemployment in low-income areas. A third chapter explores the impact on firms' creation in the manufacturing sector, providing evidence that the wage hike influenced the number of establishments and their size distribution. Throughout the thesis, arguments are supported by newly digitized and/or harmonized data from a range of primary sources, extending coverage further back in time than previously possible and opening opportunities for further historical research.

Acknowledgements

I wish to thank my supervisors, Gerben Bakker and Natacha Postel-Vinay, for their support throughout this research journey. I also thank, for discussing aspects of this project at different stages, Brian A'Hearn, David Escamilla-Guerrero, Giacomo Gabbuti, Amedeo Lepore, Chris Minns, Stefano Palermo, Albrecht Ritschl, Joan Rosés, Felix Schaff, Eric Schneider, Max Schulze, Hillary Vipond and participants to the Economic History Society Annual Conference, the Economic and Business History Society Conference, the EHS PhD Thesis Workshop, the ECHEWeb Workshop, the SSHA Annual Conference, the XIX World Economic History Congress, and seminars at the London School of Economics and at the University of Oxford. I am grateful for bibliographic guidance to the staff of the LSE Library, Biblioteca Istat, Biblioteca Centrale Nazionale Roma, Biblioteca del Ministero del Lavoro, and of Biblioteca 'Federico Caffè', Biblioteca 'Ferdinando Milone' and Biblioteca 'E. Barone' of the Economics Department at Università degli Studi di Roma 'La Sapienza'. I also wish to thank the staff of Istat's online Contact Centre for providing technical support on multiple occasions, and to Fondazione Ing. Rodolfo Debenedetti for granting access to the database 'INPS Data: Veneto Workers Histories (VWH).' I acknowledge generous funding from the Economic and Social Research Council and the London School of Economics.

I express the greatest gratitude to my parents and Giorgia for their unflinching support and to Arianna for her patience and confidence.

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Chapter 1

Introduction

1.1 Aim of the thesis and research hypotheses

This thesis explores the association between a unique institutional shift in Italy's wage-setting institutions around 1969 and some of the proximate causes of the country's relative economic decline in the past three decades. The institutional shift concerns the industrial labour unions' adoption of egalitarianism as a driving principle of collective bargaining, which happened during the 'Hot Autumn' of 1969—the period of most heightened labour conflict in Italy since the Second World War. The proximate causes of Italy's economic decline explored in the thesis are the low level of secondary school attainment, the spatial misallocation of labour due to scarce internal migration, and the skewed firm-size distribution in favour of small establishments within the manufacturing sector.

Since the early 1950s, wages in Italy's manufacturing sector were regulated by collective agreements between labour unions and the employers' association at the industry level. The agreements established minimum wage scales according to the workers' skill level and were effectively applied to all workers in each industry, irrespective of union membership. Between the 1950s and most of the 1960s, labour unions adopted wage moderation and maintained stable wage differentials between workers' skill categories. However, the strategy was unpopular with low-skill workers, who represented a growing share of the industrial employees. During the 1960s membership decreased and workers started to organize outside the unions, with growing success between 1968 and 1969. Labour conflict exploded in the 'Hot Autumn' of 1969 and, in order to avoid losing control of the movement, labour unions changed their bargaining strategy, adopting egalitarianism as their driving principle. With respect to wage setting, this shift provoked three immediate consequences across Italy's industrial sector: it caused a steep increase in contractual minimum wages for blue-collar workers, it reduced the skill premium for skilled blue-collar workers, and was accompanied by the spatial equalization of wages between high- and low-productivity areas. The thesis explores how these changes modified incentives for individuals and firms, and how reactions in the past might continue to affect the Italian economy to this day.

With respect to individuals' reaction, the thesis hypothesizes that the steep hike in minimum contractual wages in the 1970s increased the opportunity cost of attending post-compulsory school, in general, and that the compression of the skill premium reduced the *ex ante* returns to vocational education for manufacturing jobs, in particular. Using new disaggregated estimates of school enrolment at the province level, the analysis finds that places that experienced a steeper increase in the average minimum industrial wage showed a greater number of early school leavers after the shock, but the reaction is found only in the short term, possibly because of contrasting disemployment effects. However, the wage shock is associated with a permanent shift in the composition of the demand for school in the long term, with lower enrolment in technical schools preparing for high-skill blue-collar jobs and higher enrolment in schools preparing for white-collar jobs. These results are connected to aggregate trends in educational attainment, which show a temporary compression in enrolment for male teenagers after 1969, especially among vocational schools. The thesis estimates that this compression can explain between one-fourth and over one-third of Italy's current lag in upper secondary educational attainment with respect to the OECD average.

The second reaction to egalitarianism that the thesis explores concerns the effect of spatial wage equalization on internal migration. High rates of internal migration were characteristic of the Italian economy from the 1950s through the 1960s, but they dropped suddenly in the early 1970s and have remained at relatively low levels since then, despite a contemporaneous increase in income and unemployment differentials between regions. This puzzling evolution has attracted research ever since, but a consensus on its causes is yet to be reached. This chapter provides a historical test for one prominent hypothesis, that the drop in internal migration was provoked by the spatial equalization of nominal wages set by collective bargaining, in 1968/72. I test this hypothesis using an original dataset of binary migration flows, contractual and effective wages, local price differentials and unemployment, which I have digitized from a range of printed primary sources, with annual frequency from the 1960s to early 1980s. The chapter presents an augmented gravity model of internal migration showing that spatial differentials in nominal minimum wages were a strong pull factor for both short- and long-distance migration through the 1960s, but not afterwards. Discussing potential mechanism, the chapter shows that the decrease in internal migration during the 1970s was associated with the inception of the spatial mismatches that characterize Italy's labour markets to this day.

Finally, the thesis explores the effect of raising contractual minimum wages on the number of manufacturing establishments and their size distribution (measured as the number of employees) in the long run, from the 1970s to the early 2000s. The motivation for this research question originates from the observation that Italy's firm-size distribution is extraordinarily skewed towards small establishments, in comparison to other European countries—which is commonly recognized as a source of productivity disadvantage. Even though the prevalence of small manufacturing is a long-term characteristic of the Italian economy, economic historians agree that the current distribution was exacerbated between the 1970s and the 1980s, which marked the crisis of large manufacturing companies and the efflorescence of small businesses. Among the possible causes, contemporary observers included the increase in labour costs which would incentivize the adoption of labour-saving, flexible production technologies and the outsourcing of production processes to small specialized shops—which could more easily escape collective bargaining and were favoured by labour employment legislation. The thesis explores this hypothesis using data from industrial censuses for 8,000 municipalities and fifteen manufacturing sectors in six benchmark years, between 1951 and 2001. It finds that, contrary to the traditional hypothesis, municipalities that experienced a steeper increase in labour costs registered relatively fewer manufacturing establishments after the shock, an effect that persisted in the medium-to-long run. However, the negative impact appears to be stronger for establishments of medium size, which might have contributed to the polarization of the size distribution in the following decades.

Taken together, the results of the thesis support the argument that the Hot Autumn of 1969 was a critical juncture for Italy's contemporary history. They show that the egalitarian wage push that was initiated by the Hot Autumn altered relative wages, which affected the behaviour of individuals and firms, with long-term consequences. These effects might have contributed to several of the proximate causes of Italy's economic decline, including the low level of secondary school attainment among the working-age population, factor misallocation between local labour markets, and possibly the skewed size distribution of manufacturing firms.

1.2 Contribution

The thesis contributes to the literature in four ways: First, the individual substantive chapters draw their research hypotheses from Italy's economic and historiographical literature, to which they contribute with original analyses and discussions; Second, the thesis connects the main results from the substantive chapters to the debate on the historical causes of Italy's relative economic decline in the past three decades, offering an original discussion that complements the prevailing interpretations; Third, the substantive chapters are situated within the broader literature in labour and education economics, with special reference to the influence of wage-setting institutions on economic outcomes that go beyond short-term labour market effects; Fourth, the thesis develops new historical evidence on the Italian economy between the 1960s and the 1980s, which has been extracted from primary and secondary sources.

With respect to the individual contribution of the substantive chapters, the one on enrolment and school choices explores the causes of Italy's low educational attainment at the upper secondary level, proposing an original hypothesis for its slow expansion in the 1970s-1980s. Historical research has shown that comparatively low human capital investment has been a constant characteristic of the Italian economy and a drag on the national innovation system throughout the last 150 years. A growing stream of research has focused on supply side factors, demonstrating the efficacy of reforms and increase in public spending to contrast this tendency, with special reference to primary schools in the late 19th century and lower secondary school in the 1960s. However, economic historians note that the expansion of upper secondary education since the post-war period has been 'painfully slow' with respect to comparable economies, causing Italy to lag significantly behind the OECD average. Research in education economics has shown that several factors determined this outcome. Among possible causes, it is often highlighted that the return to education has been consistently lower than comparable countries at least since the 1970s, which would reduce incentives to acquire formal education. Considering that in Italy the wage distribution between workers of different skill levels is heavily influenced by collective agreements (Devicienti, Fanfani, and Maida, 2019), the thesis argues that the increase in entry-level minimum wages across the industrial sector and the compression of wage differentials after 1969 contributed to delaying the expansion of upper secondary education.

The chapter on internal migration, instead, provides an original historical test for the hypothesis—often proposed in the economics literature—that the application of the same collective agreements in both high- and low-productivity regions causes spatial misallocation of labour. It is often argued that the current spatial equilibrium of Italian labour markets—which are characterized by high unemployment in the South—is not compensated by internal migration because sectoral collective agreements establish the same nominal minimum wage rates across the whole country (Attanasio and Padoa Schioppa, 1991). This is deemed to cause real wages to be higher in low-productivity areas and to incentivize local residents to queue for local jobs rather than move to areas with lower unemployment (Boeri, Ichino, et al., 2021). According to this view, reforming the system by allowing nominal minimum wages to adjust to local productivity would improve the efficiency of the labour markets, reducing total unemployment and increasing labour income. In fact, a wage-setting system that allowed some degree of differentiation in nominal minimum wages at the local level was in place until 1969, when the current principle of spatial equalization was introduced (Poy, 2017).[1] The thesis tests whether this reform reduced internal migration, and explores whether the current indicators of spatial labour misallocation effectively emerged after the equalization of nominal wages or where already present beforehand.

The chapter on the effect of the wage hike on the number establishments in the manufacturing sector contributes to the debate on Italy's firm size distribution by testing the hypotheses that the distribution swung decisively towards the small size in the 1970s due to the increase in labour costs. This hypothesis, which was highly debated during the 1970s, became less relevant as the literature on industrial districts developed in the following two decades,

[1]Note that proponents of reforming the current system typically do not argue in favour of returning to the old mechanism but rather support opting-out clauses that would allow plant-level bargaining, which is deemed more flexible. On the other hand, opponents often claim that the proposed reforms would effectively recreate the old system, which they describe as iniquitous—see for instance the discussion in AREL (2019). For a summary of the debate on the Italian case and a test on the effect of opting-out clauses see (Damiani, Pompei, and Ricci, 2020).

positing that the efflorescence of small manufacturing in Italy was largely an independent phenomenon. Economic and business historians have often expressed skepticism towards this view, maintaining that some reorganization of manufacturing from large to small establishments was connected to the transformations on the labour market (Colli, 2002, pp. 7-14) This debate appears relevant again as the lukewarm performance of industrial districts in the past decades has cast doubts on their unique characters, whilst the decline of large manufacturing in the 1970s is now considered a contributing factor for Italy's loss of competitiveness in the long run.

Besides the individual contributions of each substantive chapter to the relevant literature, the thesis overall speaks to the debate on Italy's stagnation and relative economic decline in the past three decades. Since the 1990s, the Italian economy has diverged from comparable European countries, and understanding the causes of this concerning evolution has quickly become one of the main issues for economists and economic historians. Interpretations, however, differ between and within the two groups. Economists typically focus on the issues of the Italian economy today, with special attention to the proximate causes of low productivity growth in the past thirty years. Economic historians, instead, take a long-term view and strive to explain why a country that had managed to slowly converge to the European core, is now slipping behind. This thesis takes an intermediate approach: it focuses on three factors (educational attainment, migration and firm-size distribution) that are commonly identified by economists as proximate causes of inefficiency or low productivity today and traces their evolution in the past. The thesis argues that, for the three of them, the 1970s represented a turning point (slowdown in the expansion of upper secondary education, drop in internal migration, changes to the firm-size distribution). Finally, it proposes that the shift in collective bargaining following the Hot Autumn of 1969 could have influenced their evolution, and tests each respective hypothesis individually.

Hence, the thesis provides historical perspective to the economics literature while maintaining complementarity with the long-term views expressed by economic historians. In particular, the thesis acknowledges the historiographical consensus that Italy's convergence to the European core during the Golden Age was supported by wage-setting institutions that kept industrial wage growth in check (with respect to productivity improvements) and stable (between skill groups and geographical areas). These elements not only compensated for missing structural factors—such as a strong innovation system—and provided the necessary macroeconomic stability to achieve fast capital accumulation and international competitiveness, but they also underpinned a beneficial system of incentives for individuals and firms—which supported, respectively, human capital accumulation, the efficient spatial allocation of labour, and firm growth. The revolutionary transformations in collective bargaining after 1969—a decade of egalitarianism during which unions treated wages as an 'independent variable'—weakened this economic model and altered the existing system of incentives.

The thesis, however, has no intention to argue that labour unions in 1969 were directly or solely 'responsible' for the recent decline of the Italian economy. First, it does not contest the historiographical consensus that the unions' claims during the Hot Autumn were motivated by the failure of the Italian society to evolve with its economy during the 1960s (Rossi and Toniolo, 1996, pp. 442-45; Magnani, 2017). In particular, the post-1969 wage hike was part of a wider response from the labour unions to the Italian governments' inability to reform labour market institutions and create a modern welfare state following the fast growth of the economy in the previous decade (Ciocca, 2007, pp. 279-84; Bologna, 2017, pp. 116-17). Secondly, the argument does not negate in any way the key role of the labour movement in forcing some of these reforms during the 1970s—supporting the modernization of the Italian society (Colarizi, 2020). Rather, the findings are consistent with the recent historiographical trend of treating the Hot Autumn as a complex socio-economic phenomenon with distinct effects on the country's historical trajectory which should be objectively evaluated for their short- and long-term influences (Causarano and Giovannini, 2010; Maione, 2019, pp. 7-11). This thesis represents a contribution in this direction, focusing on one specific channel (collectively bargained minimum wages) and three distinct outcomes (human capital, migration, and firm count and size in manufacturing). Future research will be able to expand on this approach by exploring other areas of influence.

Besides contributing directly to the literature on Italy's economic history, the thesis also speaks to broader topics in labour and education economics, from the perspective of applied economics. Each substantive chapter addresses a research question that has wider implications, particularly on the impact of collectively-bargained minimum wages on schooling, migration and firm creation. Whilst the external validity of historical analyses is necessarily limited by institutional idiosyncrasies and contextual factors, the chapters adopt identification strategies that are in line with current applied economic research to retrieve, where possible, the underlying causal relations, and they situate the analyses within the literature on similar wage setting institutions—with special reference to minimum wage studies. This approach makes the Italian experience an interesting reference study, especially with respect to countries that share similar labour market institutions or might plan to adopt them in the future.

1.3 Data and primary sources

The quantitative analyses rest preeminently on original data that have been collected, digitized and/or harmonized from a range of statistical sources at different levels of spatial and sectoral disaggregation. In particular, throughout the chapters the thesis makes consistent use of a new series of collectively-bargained minimum wage scales for blue-collar workers in circa fifteen manufacturing sectors, between the 1960s and the 1980s. The series adds to previous aggregate statistics, providing greater spatial and sectoral disaggregation.

In addition, each chapter presents new longitudinal series at annual frequency for 92 provinces from circa 1960 to circa 1980 on a rage of topics which include: estimates of gross enrolment rates for different tracks of upper secondary schools, complete matrices of bilateral migration flows, estimates of the local cost of living, reconstructions of the effective average wages of blue-collar workers, and proxies of total and youth unemployment. Other data has been collected and harmonized from secondary sources or electronic repositories, including municipal-level data on the number of manufacturing establishments and their size distribution at benchmark years, and estimates of value added by macrosector at the province level.

The printed sources have been primarily retrieved from the LSE Library (mostly to reconstruct minimum and effective wages, job centre registrations, surveys by the Ministry of Labour) and from the library of Istat, the Italian National statistical institute (foremost, statistics on school enrolment and province-level controls). The latter also provides an extensive digital collection of publications available in scanned format (e.g. change of residence registrations, labour force surveys, indexes of the cost of living, original volumes of population censuses).[2] Whenever I found discontinuities in the sources held at either library, I could rely on the libraries of the Department of Economics at La Sapienza University, Rome, which also provided access to secondary sources (e.g. the estimates of province-level value added published by Guglielmo Tagliacarne and the namesake Institute), as well as extensive bibliographic material. Some volumes of the Ministry of Labour surveys which were missing from the LSE Library could be found at the library of the Ministry itself, in Rome. Additional bibliographic material was obtained from the *Biblioteca Centrale Nazionale* in Rome.

I also made use of electronic repositories maintained by Istat, including industrial census data from the *Datawarehouse CIS* website and the application *Atlante Statistico dei Comuni* (2013 edition), the population census data from the *8milaCensus* website, demographic data from http://demo.istat.it/

[2] Istat's digital library (*Biblioteca digitale Istat*) is available at the web address https://ebiblio.istat.it/SebinaOpac/.do?locale=eng (last retrieved February 2023).

(previously known as GeoDEMO Istat) and historical shapefiles of administrative borders. Information on how to access these repositories, as well as references to other electronic sources used for descriptive statistics and secondary parts of the analyses are provided in the relevant passages of each chapter and in the data appendix.

1.4 Limitations

To make the research question tractable, the thesis delimits the scope of the analysis to a subset of economic sectors and restricts the relevant time period. The analysis focuses largely on the manufacturing sector, because of the centrality of industrial unions for the egalitarian shift, the structural transformations this sector underwent during the period under consideration, and its continued relevance for the Italian economy. Nonetheless, the changing weight of manufacturing within the economic structure will be discussed during the presentation of the historical background and controlled for throughout the empirical analyses. Further research will benefit from directly incorporating other sectors in the analyses, and I have planned to extend the data collection strategy in this direction in the near future.

A second limitation of the thesis is that it will mostly discuss domestic factors. However, relevant changes in the international context (e.g. regarding trade, technology, institutions) will be accounted for in the historical background. A third limitation of the thesis consists in focusing on the response of workers and firms to the wage push organized by the labour unions. Hence, more limited attention is given to the government's response, because this has been more widely assessed by the historiography. This, however, does not imply that interactions between these different levels should not be considered for further research. Finally, the analyses mainly concern the years from the 1960s to the 1980s, although contextual reference will be given also to the 1950s and to the 1990s. The decision to focus on these three decades is motivated by the research questions but is also required by data limitations and institutional discontinuities.

1.5 Structure

The thesis is organized in ‘paper format,’ meaning that it is composed of three thematically-connected substantive papers (chapters 3, 4 and 5), a critical discussion (chapter 2), the present introduction and general conclusions. The thesis also contains a data appendix which provides detailed information on the main primary sources used through the chapters and the relevant harmonization procedures that have been followed.

Care has been taken to avoid unnecessary repetition between chapters whenever possible. However, it is important to note that the papers are meant to be readable independently of each other, whilst remaining thematically connected. This implies that some elements of the historical background and/or institutional framework are discussed in multiple occasions, accentuating different aspects depending on the individual aims of each chapter.

More specifically, chapter 2 serves as a critical discussion to the three substantive papers by connecting them to contemporary issues in the Italian economy, link the them under a common overarching argument, and place them within the relevant historiographical context and historical background. Chapter 3 studies the effect of raising blue-collar minimum wages and compressing the skill premium on school choices. Chapter 4 explores the impact of the wage equalization between high- and low-productivity regions on internal migration flows and the misallocation of labour. Chapter 5 tests whether the minimum wage hike influenced the creation of manufacturing establishments, distinguishing by size, sector and location. Chapter 6 presents the general conclusions of the thesis and indicates areas for further research. Additionally, the Appendix A provides further information on sources and harmonization methods.

Chapter 2

Italy's economic decline and the legacy of the Hot Autumn

Historical background and historiographical debate

2.1 Introduction

This chapter serves as a critical discussion to the three substantive papers that will follow. It aims to motivate their research questions by connecting them to contemporary issues in the Italian economy, link the them under a common overarching argument, and place them within the relevant historiographical context and historical background.

The overarching argument of the thesis proposes that the Hot Autumn of 1969—the period of most heightened labour conflict in Italy since the Second World War—provoked a shift in the wage bargaining strategy of the labour unions, from wage moderation to egalitarianism, and that this shift modified the behaviour of individuals and firms, with long-lasting consequences for the trajectory of the Italian economy. In particular, the consequences of the egalitarian shift are linked to three proximate causes of the productivity stagnation shown by the Italian economy in the past three decades. These proximate causes are: 1) a low level of formal human capital, as measured by the share of working age population with a diploma of upper-secondary education; 2) a spatial misallocation of labour, which is represented by limited internal migration despite high unemployment in low-income areas (especially in the South); 3) an excessive prevalence of small firms across the economy and particularly within the manufacturing sector.

The chapter is connected to recent trends in the Italian historiography that address the issue of the Italian economic decline. In particular, the chapter distinguishes between the interpretative view that the recent decline is a 'tail' in an otherwise successful secular trajectory, and a more pessimistic view that the country always followed a sub-optimal growth path. The chapter takes a complementary approach to the discussion, arguing that some of the proximate causes of the decline observed today might have been influenced by the reform of the wage-setting institutions after the Hot Autumn.

This discussion is relevant not only with respect to the economic history of Italy but also for other countries, both directly and indirectly. For the past three decades, the Italian economy has experienced sluggish income growth and stagnant productivity which have inverted a secular trend of development and set the country on a diverging path with respect to comparable European economies. National and international observers have for a long time expressed worries that, if left unchecked, these trends could severely prejudice the sustainability of the country's finances and general long-term prospects. The size of the Italian economy, its significant trade relations and its institutional role within the European Union, the Eurozone and the Western world mean that these concerns are not limited only to Italy's policymakers and businessmen, but are shared also by global actors. Consequently, research on both the origins and implications of the Italian decline garner continued attention at home and abroad.

If understanding the causes of Italy's relative economic decline is a precondition to implementing effective solutions for the country's own sake, it can also provide a valuable reference for other economies at risk of falling into a similar steady state (Calligaris et al., 2018). Slow productivity improvements and stagnant real wages are becoming common features across developed countries.[1] Studying the Italian case can help disentangle local factors from global influences, and contingent circumstances from structural elements. Separating these different types of causes can help establish the external validity of the Italian experience and prioritize policy interventions. Economic history, in particular, provides a useful interpretative lens to connect recent developments to deeper historical causes.

The chapter is organized in five sections, including this introduction. Section 2.2 establishes the main stylized facts on Italy's relative decline in comparative perspective and presents three of the proximate causes that are discussed in the mainstream economics literature—firm size, human capital, and spatial misallocation of labour. Section 2.3 turns to the historical origins of the decline, summarizing recent trends in historiography and their outlook on the three proximate causes discussed previously. The section then discusses how Italy achieved convergence during the Golden Age, despite the country's structural weaknesses, with special reference to capital accumulation and technical change, educational attainment and internal migration, and the role of wage-setting institutions.

Section 2.4 proposes that the 'Hot Autumn' of 1969 represented a critical juncture in Italy's economic history because of the labour unions' adoption of egalitarianism in collective bargaining, which impacted the wage-setting institutions described previously. The section then discusses the possible influence of this egalitarian turn on the three proximate causes of Italy's decline. In particular, the section hypothesizes that the steep growth of minimum wages for low-skill blue-collar workers delayed the expansion of secondary schooling, that the spatial equalization of contractual wages reduced incentives to internal migration—exacerbating the spatial misallocation of workers—, and that the associated increase in labour costs influenced the creation of manufacturing establishments and their size distribution. These hypotheses will then be individually tested by each of the substantive chapters in the thesis. Section

[1] For different perspectives and evidence on this see Crafts and O'Rourke (2014), OECD (2018a), Valero and Van Reenen (2019), Goldin et al. (2021).

2.5 concludes.

2.2 Italy's decline in comparative perspective

2.2.1 Stylized facts of economic growth since the 1990s

Over the past two decades, many Western countries—particularly in continental Europe—have experienced the most persistent slowdown in economic growth since the Second World War (Figure 2.1). Between 2005 and 2018, the real GDP per capita of European economies (excluding Eastern Europe) increased on average by 1% per year, down from an average of 2.6% in 1973-2005, and much lower than the rates experienced during the Golden Age (4.2% on average between 1950 and 1973).[2] The American economy, whilst performing relatively better than the European group, has also shown signs of a slowdown in productivity growth, especially in contrast to its relatively strong performance in the 1990s (Baily and Montalbano, 2016; Bergeaud, Cette, and Lecat, 2016; Gordon and Sayed, 2019).

Within this generalized slowdown, however, Italy represents an extreme case. In 2019, Italy's real GDP per capita was only 10% larger than in 1995. In contrast, the same figure was 45% for the United States, 40% for the United Kingdom and Spain, 37% for Germany, 31% for France and 20% for Japan.[3] This is not explained by some idiosyncratic shock, but rather by consistently slower growth for a longer period of time: throughout the past twenty-five years, the Italian economy has grown at an average annual rate of 0.4%, against the OECD average of 1.5%. This lukewarm performance has caused a divergence from the European core.

Understanding the proximate causes and the deep historical determinants

[2] Unweighted average of annual growth rates for Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the UK. Own computations on data from 'Maddison Project Database 2020', available for download at https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2020?lang=en. For sources see Bolt and Zanden (2020) and note Figure 2.1.

[3] Here and in the next sentence, own computations on data from World Bank, Constant GDP per capita at 2010 US dollars, retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/, January 15, 2023.

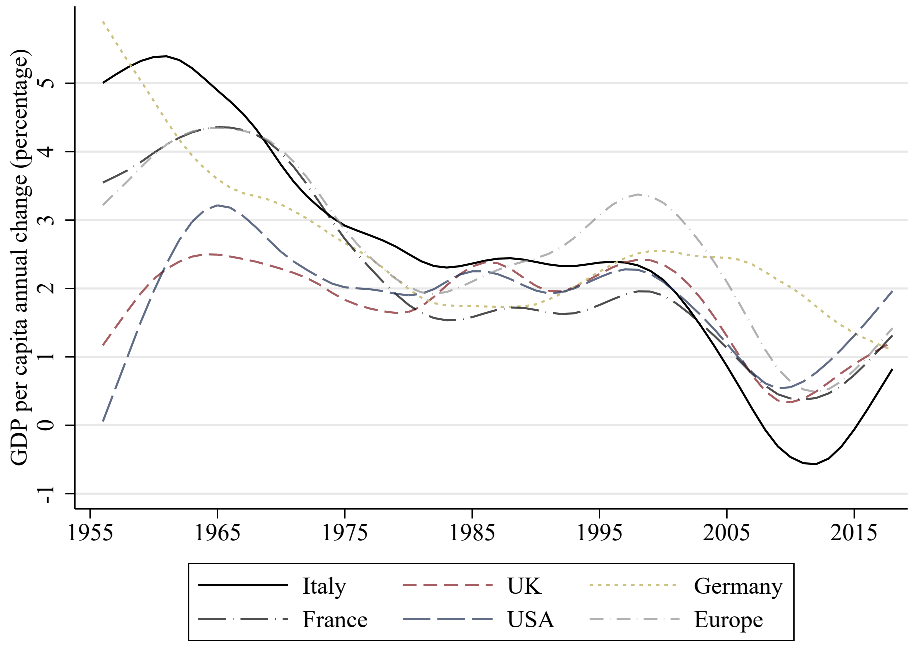


Figure 2.1: GDP growth trends in Europe and the USA, 1955-2018

Annual growth rates of real GDP per capita, in percentage. Trend component from the HP filter using a smoothing parameter 100. The choice of a smoothing parameter of 100, instead of the 6.25 recommended by Ravn and Uhlig (2002) in order to simplify the comparison between macroperiods. The 'Europe' series includes Western, Northern and Southern Europe and is obtained as the unweighted average of fourteen countries for which GDP data is continuously available: UK, Germany, Switzerland, Austria, France, Belgium, Netherlands, Denmark, Sweden, Finland, Norway, Spain, Portugal, and Greece. Own computations on data from 'Maddison Project Database 2020', available for download at `https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2020?lang=en`. For sources see Bolt and Zanden (2020). For additional underlying data sources are: for Italy, Malanima (2011) for years 1861-1870 and Baffigi (2011) thereafter; for the UK, Broadberry et al. (2015); for Spain, Prados de la Escosura (2017); for Sweden, Schön and Krantz (2015); for Japan, Fukao et al. (2015); for Switzerland, Stohr (2016); for the Netherlands, Smits, Horlings, and Van Zanden (2000); for Norway, Grytten (2015) and Maddison (2006); for Greece, Kostelenos et al. (2007).

of this evolution has been a principal focus of economic research since the early 2000s.[4]. In particular, studies that perform growth accounting decomposition allow to understand whether Italy's divergence is driven by the same factors that affect the rest of western Europe, or other dynamics are at play. In

[4]It would be impossible to list all contributions that have addressed Italy's economic decline in the past two decades. For some early examples see De Cecco (2000, pp. 107-19); D'Adda (2004) and articles published in the same issue; Boeri, Faini, et al. (2005); De Cecco (2007). Recent contributions in economics and economic history will be discussed in the relevant sections

the former case, the Italian experience would represent an extreme case on the spectrum of Europe's slackening economic performance; in the latter case, instead, Italy would present some peculiar characteristics which further penalize its performance.[5]

Italy does seem to have experienced some of Western countries' structural issues to a greater degree and for a longer time period than most. A notable example is aging:[6] the working age population (the share of people between 15 and 64 over total residents) has decreased by 8.6% between the early 1990s and 2021, which is slightly larger than Germany (-7.9%), but significantly more than France (-6.7%) and both the EU and the OECD average (respectively, -5% and -4%), where the decrease started no earlier than the mid-2000s.[7] These demographic changes, however, have been compensated by rising participation rates, from 64% in 1995 to 73% in 2021.[8] Hence, it appears that trends in the quantity of labour do not explain away Italy's divergence (Bugamelli et al., 2018, p. 80).[9]

The Italian peculiarity lies instead in the evolution of productivity. Figure 2.2a shows that GDP per hour worked has experienced no substantial improvement after 1995, and the same result is obtained with any other measure of labour productivity (De Santis and Ferroni, 2019, pp. 6-9). This stagnation has created a productivity gulf between Italy and the leading Western economies: starting from comparable levels in the early 1990s, productivity is now 27%

[5]For an overview of the stylized facts on the recent performance see Bugamelli et al. (2018) and Krahé (2023, pp. 10-15). However, for a critique of the comparability of national accounts see Romano and Trau (2020).

[6]On the effect of aging on productivity growth in the US since the 1980s see Maestas, Mullen, and Powell (2022). For aging in Italy see Barbiellini Amidei, Gomellini, and Piselli (2018) and Visco (2019, pp. 12-15).

[7]Own computations on OECD (2023), Working age population (indicator). doi:10.1787/d339918b-en (Accessed on 18 January 2023)

[8]Note, however, that a gap in participation remains with respect to the OECD average, and the positive effect of greater participation has been diluted since the Great Recession by higher unemployment and a decrease in the number of hours worked per person (Krahé, 2023, pp. 10-15).

[9]Note, however, that these dynamics partly explain the convergence in GDP per capita between Italy and Spain: between 1995 and 2007 Spain's growth was based on factor accumulation, whilst Total Factor Productivity decreased by 0.7% per year (García-Santana et al., 2020).

lower than in the United States, and between 18% and 20% lower than in France and Germany. Italy was overtaken by the UK after 2000, and the gap between the two countries has continued to widen despite the British comparatively sluggish productivity performance in the past two decades. Moreover, Spain has caught up to Italy over the past ten years, closing a 15% gap since 2000.

With respect to the determinants of productivity stagnation, growth decomposition exercises find a nil contribution contribution of capital investment since 1995, which turned negative after the Great Recession (De Santis and Ferroni, 2019, pp. 6-9). However, comparative assessments suggest that this trend is not enough to justify the extent of Italy's divergence from other major European countries: in Germany, capital deepening has also given no contribution to productivity growth since 2007, and since the Great Recession it has had a more negative effect in Spain than in Italy (Banca d'Italia, 2016, p. 176).

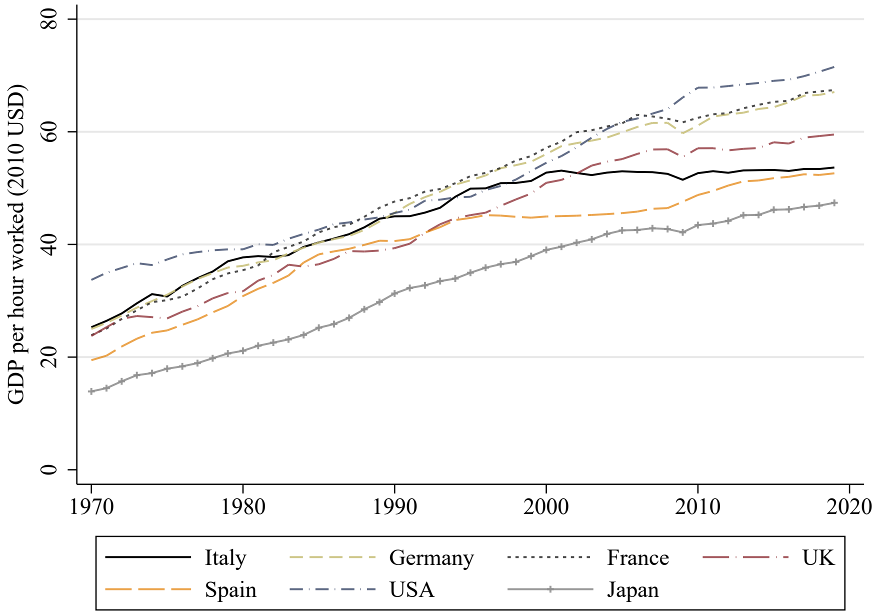
Instead, the specificity behind Italy's divergence appears to be a prolonged decline in total factor productivity growth since the 1990s (see Figure 2.2b). Giordano and Zollino (2021, p. 743) write that 'since 1993, Italy's meagre Total Factory Productivity (TFP) dynamics, which even turned negative during the recent double recessionary phase, have largely contributed to explain the country's overall dismal growth performance.'[10]. This is a significant shift in historical perspective because reconstructions of growth accounting in the long-run show that Italy's convergence to the Western core during the Golden Age was driven exactly by fast TFP growth (Giordano and Zollino, 2021, pp. 762).

Research also finds that the productivity problem is widespread across the Italian economy. Even though the decline in TFP growth is driven by services, productivity in manufacturing has increased at a significantly slower pace than in comparable Western countries (Bugamelli et al., 2018, pp. 15-17, 88). This is a worrying performance considering that the industrial sector continues

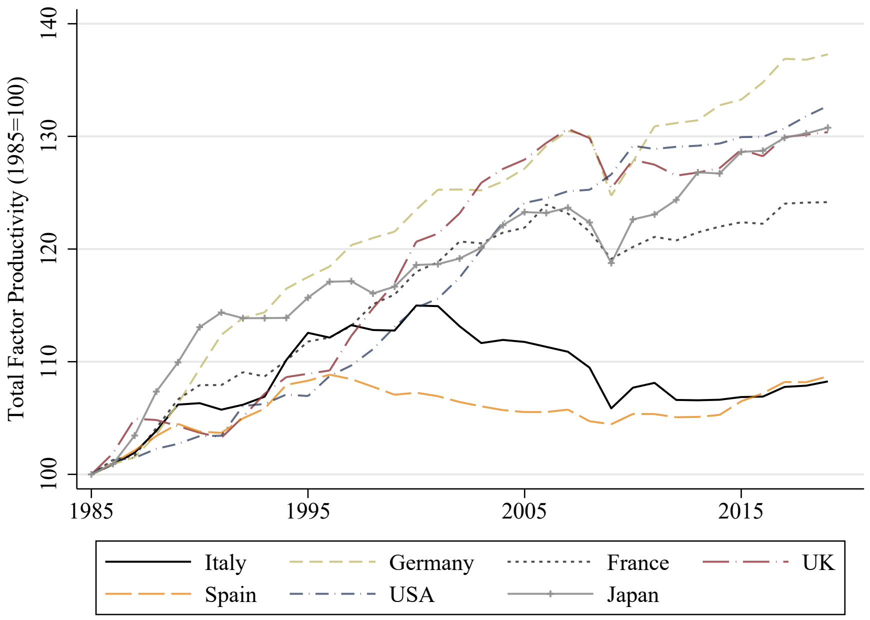
[10]Note that the length of this decline and its extent is sometimes debated as estimates can vary depending on measurements (see for instance Mistretta and Zolli, 2018)

to account for circa 25% of both Italy's GDP and employment. Moreover, Giordano and Zollino (2021, p. 758) find that industry was the first driver of productivity growth in the Italian economy between the Second World War and the 1980s, accounting for one third of Italy's growth in 1951-73 and for half in 1974-93. Hence, the sluggish productivity performance of Italian manufacturers since the 1990s has removed a major source of growth for the Italian economy.

What can explain this prolonged stagnation? The next section will review some of the possible proximate causes of Italy's productivity puzzle, focusing in particular on the prevalence of small firms, low levels of human capital, and spatial misallocation in labour markets.



(a) GDP per hour worked



(b) Total Factor Productivity

Figure 2.2: ITALY'S PRODUCTIVITY PUZZLE

Panel a: Gross Domestic Product per hour worked, expressed in US dollars at 2010 prices and PPPs. Hours worked include all persons engaged in production. Source: OECD (2023), GDP per hour worked. doi: https://doi.org/10.1787/1439e590-en (Accessed on 18 January 2023). Panel b: OECD (2023), Multifactor productivity (indicator). doi: https://doi.org/10.1787/a40c5025-en (Accessed on 18 January 2023)

2.2.2 Three proximate causes of productivity stagnation

While researchers broadly agree on the stylized facts of growth described in the previous section, the debate on the proximate causes of the 'productivity puzzle' remains unsettled. It is outside the scope of this chapter to provide a complete overview of all explanations that have been proposed by the literature.[11] Instead, this section will present three proximate causes—prevalence of small firms, low levels of human capital, and spatial mismatch—that have been considered particularly significant since the early stages of the debate (Felice and Pagano, 2019).

2.2.2.1 The prevalence of small firms

The first proximate cause of Italy's productivity puzzle to play a recurrent role in mainstream analyses is the prevalence of small firms. In Italy, average firm size is significantly smaller than in comparable European countries, and the share of workers in SMEs is higher.[12] In 2016, more than 70% of Italian employees worked in a firm with fewer than 250 workers (Figure 2.3a). This share was about 50% in Britain and France, and 45% in Germany. Spain was closer to the Italian percentage (66%), but in Italy a higher share of employees worked in firms with fewer than twenty workers (30% versus 23% in Spain).[13]

It is important to note that Italy's skewed firm-size distribution in favour of small size is not driven by the country's specialization in 'traditional' industrial

[11] For recent reviews of the debate see Bugamelli et al. (2018), De Santis and Ferroni (2019), and Krahé (2023).

[12] Throughout the thesis, firm size will be defined by the number of employees. This is one of the main criteria that the European Commission, Eurostat and other international agencies use to define business size. In fact, number of employees is probably the simplest parameter for defining firm size and, in contrast to alternative ones like firm turnover and assets, it is more easily comparable between countries. Moreover, number of employees by firm size has been recorded by Italy's statistical institutes for a long period of time with little methodological changes. This allows to study the evolution of firm size over time and space with only minor adjustments. Following definitions by European Commission (2003), firms employing less than 10 persons are considered micro enterprises; firms employing between 10 and 49 persons are considered small enterprises; firms with 50 to 249 persons employed are considered medium-sized enterprises; and firms employing 249 or more persons are considered large enterprises. Whenever possible, I provide additional size brackets, and when available I also consider other defining parameters.

[13] For sources see note Figure 2.3a.

sectors.[14] Rather, as Figure 2.3b illustrates, it is a common characteristic across all industries.

The prevalence of small firms is considered both a cause and a symptom of low productivity. At the macro level, cross-sectional comparisons between countries show that there is a strong correlation between the share of workers in small firms and GDP per capita (Bento and Restuccia, 2021). Even though this observation might be driven by reverse causality—for instance, because an environment with weaker fundamentals stifles firm growth (Kumar, Rajan, and Zingales, 1999)—, the relationship between firm size and productivity holds also when researchers use firm-level data.

Hence, Italy's lower productivity with respect to comparable European countries can be partly attributed to its larger share of small firms. In addition, comparative studies using firm-level data show that Italian small firms are systematically less productive than small firms in other European countries, while this is not the case for medium and large firms: Bugamelli et al. (2018, p. 91) show that labour productivity is the same as in France and Germany for firms employing 250 workers or more, but it is 40% lower than either country in firms with fewer than ten employees.

In order to understand the prevalence of small size across Italian manufacturing firms, one stream of research focuses on institutional factors that distort incentives to grow, such as employment protection legislation,[15] 'red tape' regulations (Amici et al., 2016), inefficiencies of the judicial system (Giacomelli and Menon, 2016). These factors, by stifling firms' growth aspirations, would help explain why Italy's firm-size distribution does not converge to that of other European countries.

Another stream of research explores instead the reasons why Italian SMEs show such low productivity, in comparison to other countries. Among the most

[14]Italy's specialization in traditional light sectors (e.g. textiles, apparel, furniture) is sometimes considered a drag on competitiveness by itself (Faini and Sapir, 2005). However this sectoral composition is not the main explanation for Italy's low productivity.

[15]See Schivardi and Torrini (2004), Basile and De Nardis (2004), Boeri and Garibaldi (2007), Kugler and Pica, 2008; but see also M. Mancini and Pappalardo (2006) for a contrarian view.

common views, particular attention is given to firms' capacity to innovate and to the quality of management. With respect to the former channel, Italy is notorious for under-investing in research and development: as a percentage of GDP, R&D expenditure has increased from 0.9% in 1995 to 1.5% in 2020, but it is still significantly below the OECD average of 2.7% and the levels of France (2.4%) and Germany (3.1%).[16]

Moreover, the private sector has grown to account for the majority of R&D investment in the past decade, but on average in 2012-2020 67% of in-house expenditures came from firms employing over 250 employees; during the same period, firms under 50 employees accounted for less than 15%.[17] This heterogeneity is particularly relevant for international comparisons: Bugamelli et al. (2018, p. 26) report that 'almost 30 per cent of the difference between Italy and Germany in the share of manufacturing firms with positive R&D expenditure can be attributed to the different size structure, three times the contribution coming from the different sectoral specialization.'

The consensus view maintains that R&D figures underestimate SMEs' innovative capability because small firms tend to focus on incremental innovations that cannot be easily quantified (Santarelli and Sterlacchini, 1990; B. H. Hall, Lotti, and Mairesse, 2009). This would be particularly relevant for the Italian case, where a significant share of small manufacturing is concentrated within industrial districts—specialized communities of producers where tacit knowledge exchanges can generate invisible spillover effects (Belussi and Pilotti, 2003, pp. 144-64). However, even more generous estimates of innovative activities identify a fracture between small and large firms: between 2018 and 2020, 88% of industrial firms with over 250 employees had undertaken either product or process innovations, *vis-à-vis* 55% of those employing between 10

[16]See OECD (2023), Gross domestic spending on R&D (indicator). https://doi:10.1787/d8b068b4-en (Accessed on 19 January 2023).

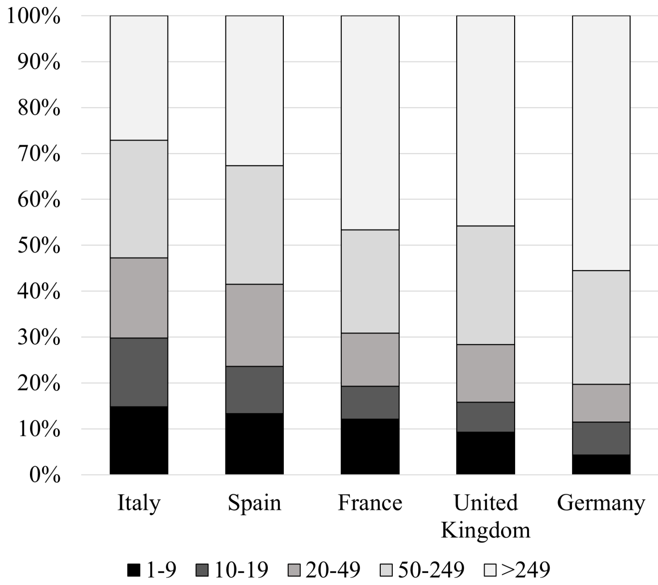
[17]Own computations on Istat, Research & Development: Domestic research and development expenditure in-house (thousands of euro in current values), private businesses (excluding universities), downloaded from http://dati.istat.it/Index.aspx (last retrieved January 2023).

and 49 workers.[18]

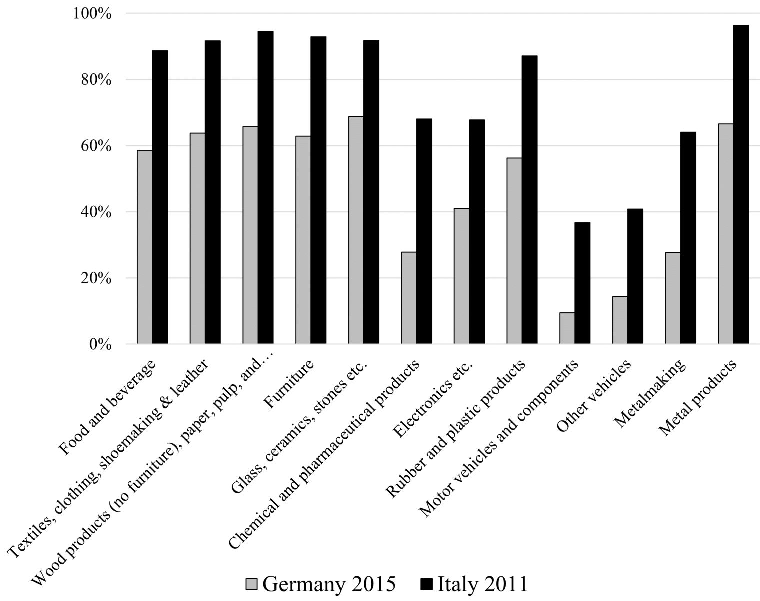
An exemplary case of SMEs' difficulties in adopting innovation is represented by information technology. Schivardi and Schmitz (2020, p. 2442) show that, between 1995 and 2014, the stock of IT capital increased by 4.6 times in the United States, 4 in Germany, 3.7 in Spain, 2.6 in France and Portugal, but only 1.5 in Italy. The authors argue that the lower adoption of IT—and management efficiency in adopting it—can explain over one third of Italy's divergence in productivity with respect to Germany. Pellegrino and Zingales (2017) also show that the failed adoption of ICT is a major cause of Italy's productivity divergence since the 1990s, and they present supporting evidence that this was largely due to the lack of meritocracy in Italian firms. Firm owners in Italy are shown to appoint managers based on loyalty rather than ability, and this affects the management capabilities of the firms to adopt new technologies.

In summary, the prevalence of SMEs is a key contributing factor to Italy's stagnant productivity. Thus, understanding the historical origins for Italy's skewed firm-size distribution and the prevalence of SMEs is an essential step towards identifying the deep causes of the economic decline.

[18] Istat, Rilevazione sull'innovazione nelle imprese. Anni 2018-2020, Table 1.1, available for download at https://www.istat.it/it/archivio/270186, last retrieved (18 January 2023).



(a) Distribution of employees by firm size



(b) Workers in establishments with fewer than 250 employees

Figure 2.3: THE PREVALENCE OF SMALL FIRMS

Panel a: Share of total employees by firm size in 2016, Italy and European countries. Firm size expressed as brackets of workers employed. Data from OECD (2019), Employees by business size (indicator). https://doi.org/10.1787/ceaf53c9-en (Accessed on 15 April 2019). Panel b: Share of manufacturing workers in establishments with fewer than 250 employees, Italy and Germany. Elaborations on data from Statistisches Bundesamt (Destatis), Beschäftigte und Umsatz der Betriebe im Verarbeitenden Gewerbe, https://www-genesis.destatis.de/genesis/online/ (17/04/2019), and Istat, Censimento IndustriaServizi, http://dati-censimentoindustriaeservizi.istat.it (17/04/2019).

2.2.2.2 Low levels of human capital

Another peculiarity of the Italian economy that is commonly considered among the proximate causes of stagnant productivity is the low level of human capital (Bugamelli et al., 2018, pp. 27-29; Visco, 2020).

With respect to its stock, a comparatively small share of Italians have completed either upper secondary or tertiary education. In 2008, only 50% of Italians between the age of 25 and 64 had a diploma of upper-secondary school, against an OECD average of 72.7%.[19] Even though the gap has been closing for the younger generations—66% of those aged 25-34 had a diploma, against a 76% average (Visco, 2008, pp. 5-6)—, Italy continues to rank third among OECD countries (after Turkey and Colombia) and first in the European Union in the percentage of population between the age of 15 and 29 that are not in employment, education, or training (NEET).[20] The low level of upper-secondary school attainment then translates into lower tertiary education: in 2008, only 14.4% of Italians aged 25-34 had at least an undergraduate degree,[21] against an average of 28.6% in OECD countries.

Furthermore, the low levels of formal educational attainment are not compensated by other forms of investment in human capital, such as on-the-job training and continuing education. International surveys show that 'only 20.1% of the adult population participate in job-related training, half the OECD average (40.4%)' and the value drops to 9.5% for low-skill workers (OECD average 20%), largely due to too few firms offering continuous education to its employees (OECD, 2019a, pp. 28-29). This is particularly the case of small firms: in 2020 (but figures were similar before the COVID-19 pandemic), 96% of firms employing over 250 employees provided some form of training in contrast

[19] The year 2008 is chosen here as a midpoint between 1995 and 2020. In 1995, the share of Italians between 25 and 64 with at least an upper-secondary school diploma was 35%, whilst in 2019 it was 62.6%. All education data in this section are own computations from OECD (2023), Adult education level (indicator). doi: 10.1787/36bce3fe-en (Accessed on 20 Janury 2023), unless otherwise specified.

[20] Own computations on data from OECD (2023), Youth not in employment, education or training (NEET) (indicator). doi:10.1787/72d1033a-en (Accessed on 20 January 2023). See also De Luca et al. (2019).

[21] In 1995, the share was 7.9%.

to 66% of those under 50 employees, and the former trained also a higher share of the employees: 58% versus 30.4% (Istat, 2022, p. 2).

Several interacting factors are proposed by the literature to explain Italy's low level of human capital. To simplify the exposition, it is useful to distinguish between the low stock of formal education in the adult population—which will be the main focus of our work—, and the subpar investment observed in younger generations, even though the two phenomena are connected.

The former is the product of historical accumulation. In Italy the expansion of secondary schools made little improvements before the 1950s: in 1951, only 31.6% of Italians between the age of 11 and 13 were enrolled in lower secondary schools and 20% of 14-year-olds graduated.[22] Enrolment rates were even lower in upper secondary education, which was attended by only 10.2% of those between the age of 14 and 18 (9.2% of 19-year-olds graduated). Lower secondary education expanded quickly in the next two decades, but not upper secondary education: in 1985, only 58% of teenagers between 14 and 18 were enrolled and fewer than 42% of 19-years-olds graduated. This slow accumulation explains the small stock of human capital which continues to affect the majority of the working age population.

However, the low educational attainment of older generations matters not only because it determines the current stock of human capital in the workforce, but also because it indirectly affects the younger generations' investment in education. First, there is ample evidence that parents' education plays a major role in children's decision to enroll in and complete upper secondary and tertiary education, and which school track they choose (among others see Checchi and Flabbi, 2007; Panichella, 2014; D. Contini, Cugnata, and Scagni, 2018; Ballarino, Meraviglia, and Panichella, 2021). This means that parents' low educational status can curb school attainment in children. Moreover, Odoardi (2020) finds that places in Italy were the adult population has higher levels of educational attainment have a lower likelihood of young people becoming

[22]In this section, school data are from Istat (2011, pp. 369, 377), unless otherwise indicated.

NEETs, and suggests that this is caused by educated adults encouraging young people to stay longer in school or to participate in the labour market. Hence, low educational attainment in the older generations continues to indirectly influence schooling decisions today.

Secondly, the educational level of the adult population can also influence younger generations' schooling decisions through economic incentives, in particular by influencing wage premiums and employment opportunities for educated workers. Empirical evidence shows that, for each additional year of education an entrepreneur completes, the employees' average number of years in education increases by 1.3 months (ISTAT, 2018, pp. 85-88). Considering that, of the entrepreneurs employing fewer than 49 workers, only 14% have completed tertiary education, and 37.7% of them have only a diploma of lower-secondary education, the low level of human capital of adult entrepreneurs might be one factor that depresses incentives for young people to invest in education.

There is abundant evidence, in general, that more education does not significantly improve labour market outcomes for young Italians. Individuals that complete upper secondary and tertiary education have a lower probability of unemployment than less educated workers, but the difference was considerably smaller than in countries such as France, Germany and the UK in the 1990s (Reyneri, 1996, pp. 205-9) and this has not changed significantly in the past two decades (Leonardi and Pica, 2015, p. 92). Furthermore, returns to education in the 1990s were similar to the European average, despite Italy's lower stock of human capital (Lucifora, Comi, and Brunello, 2001), and they have been declining since then (Naticchioni, Ricci, and Rustichelli, 2010).

Among possible causes besides the legacy effect of previous generations, particular attention has been given to labour market institutions, with special reference to employment protection legislation and two-tier labour markets that penalize younger workers (Bertola and Garibaldi, 2003, pp. 7-9; Leonardi and Pica, 2013). The literature has also pointed to supply-side issue, in particular the apparent low quality of the Italian education in comparison to other European countries as measured by standardized international tests (OECD, 2018b). Finally, attention has been given to the mismatch between the skills required by the labour market and those produced by the educational system (Adda et al., 2017).

Whatever the causes, being stuck in this 'low-equilibrium trap' might have influenced the Italian productivity in different ways. At the macro level, Nuvolari and Vasta (2015, p. 274) note that 'the human capital endowment of a country [. . .] directly affects its ability to use, adapt and develop new technologies,' and thus Italy's low stock is a crucial drag to the country's innovation capability. In addition, the local availability of workers with higher levels of education seems to facilitate the restructuring of economic activities, which include the introduction of new products, firms' propensity to export and international outsourcing, and the openness to foreign direct investments (Schivardi and Torrini, 2010). These associations appear also to be confirmed at the micro-level: human capital intensity is found to be complementary to organizational innovations and to ICT investment within the firm (Lucchetti and Sterlacchini, 2004; F. Biagi and Parisi, 2012), and the employees' level of education increases firms' propensity to export (Cerrato and Piva, 2012).

In summary, the interaction between historically low levels of school attainment and contemporary institutional factors cause a 'vicious cycle' whereby human capital is not rewarded enough for young people to invest sufficiently in education, and this in turns depresses the productivity dynamics that could increase the demand for more skilled workers (Raitano and Supino, 2005; Cipollone and Sestito, 2010, ch. 5). Tracing back in time the the origins of the low stock of human capital in the working age population is thus another essential step to understanding the historical roots of the Italian decline.

2.2.2.3 Spatial misallocation of labour

A notorious characteristic of the Italian economy is the high regional variation in income levels, particularly along the North-South divide.[23] GDP per capita

[23] For a review of the evolution of regional divides since 1861 see Felice (2019a).

in the *Mezzogiorno* (continental South and Islands) has been hovering at around 55% of that in the Centre-North for the past three decades. Felice (2019b, p. 500) notes that in five of the Southern regions GDP per capita is equal to or less than 75% of the EU average (at PPP) and in the remaining three it is below 90%, which makes the *Mezzogiorno* 'the biggest underdeveloped area inside the European Union [after Eastern Europe]'. GDP per capita in the Mezzogiorno has also decreased slightly more than in the Centre-North since the Great Recession, directly contributing to the national divergence from the European core.[24]

The recent evolution of the North-South divide appears not to be driven by productivity differentials: GDP per hour worked in the *Mezzogiorno* is only 25% lower than in the Centre-North (De Philippis et al., 2022, pp. 9-16). Furthermore, Felice (2019b, p. 522) shows that the greatest part of this productivity differential is explained by the industry mix. Within sectors, Southern productivity was around 7% smaller than the national average in 2011. Instead, the North-South divide in the past forty years has been driven by differences in activity rates (Cappelli, Felice, et al., 2019, p. 25).In particular, De Philippis et al. (2022, p. 9) show that an increasing share of the North-South divide (almost 60% in 2019) in the past decades has been explained by the difference in the number of hours worked (ages 15-64).

This evolution can be attributed to the difference in participation and unemployment rates. The former is a recent phenomenon: with respect to the population between the age of 25 and 64, in 1990 the participation rate in the continental South was 2% lower than in the North-West (8% for the Islands), but by 2015 the difference had increased to 24% (for both the South and Islands). The increase can be foremost attributed to participation raising from 64% to 77% in the North-West and decreasing from 63% to 59% in the South (while it stagnated around 60% in the Islands).[25]

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[24] However, Krahé (2023, p. 10) shows that the evolution of the North-South divide is not responsible for Italy's divergence from the Eurozone. Productivity has in fact stagnated or declined in all of the country's macroareas since the early 2000s.

[25] All own computations on data from Istat, *Serie storiche*, Tavola 10.8.1 – Tassi di

In contrast to participation rates, the North-South difference in unemployment was already large in 1990 (5.4% in the North-West versus 18.7% in the South) and has remained roughly constant since then, even though rates in the *Mezzogiorno* have swung more over the past two decades, especially in reaction to the Great Recession.[26] The widening of unemployment differences between the North and the South can be dated to the mid 1980s when, according to Brunello, Lupi, and Ordine (2001, pp. 106-111), labour force growth was faster in the South than in the rest of the country, and employment creation was slower.

The consequence of the comparatively low levels of economic activity among the Southern population is a vast under-utilisation of productive resources and a waste of human capital which—if activated—could substantially reduce the North-South divide. Thus, a significant amount of research has been focused on identifying the causes. For simplicity, one can distinguish between factors that depress labour demand in Southern Italy, factors that keep the labour supply down, and factors that prevent internal migration from equalizing the difference in unemployment between the North and the South. Common explanations, however, often touch on all three groups of factors.

For instance, particular attention has been given to sector-level collective agreements (Italy's prevalent wage-setting institution) which establish the same nominal minimum wage rates for the whole national territory. Brunello, Lupi, and Ordine (2000) and Manacorda and Petrongolo (2006) argue that such collective agreements are bargained by labour unions and the employers' associations according to the labour market conditions in the core regions (i.e. the North-West), where employment (especially in manufacturing) is more concentrated, productivity is higher, and the labour market is tighter. As a consequence, the nominal wage rates are set too high for the Southern economy, which depresses employment creation and firm growth.

occupazione, di disoccupazione e di attività per classe di età, sesso, regione e ripartizione geografica - Sud - Anni 1977-2015 (a) (valori percentuali), available for download at `https://seriestoriche.istat.it/` (last retrieved January 2023).

[26] *Ibid.*.

Comparing the case of Italy with Germany, where opt-out clauses from sectoral collective agreements are allowed and plant-level bargaining is more prevalent, Boeri, Ichino, et al. (2021) show that in the latter nominal wages are positively correlated with local productivity, while there is no such relation in Italy. In contrast, Italy shows a strong negative correlation between non-employment and productivity, which is absent in Germany. The authors interpret this associations as supporting evidence that, in Italy, collective agreements set wages too high for the local labour market.

Furthermore, given that the cost of living tends to be inferior in low-productivity regions, the minimum wages established by collective agreement are higher in the South of Italy than in the Centre-North, in real terms.[27] Boeri, Ichino, et al. (2021) argue that this asymmetry reduces the compensating effect of internal migration by incentivizing Southerners to stay unemployed for longer and search for a high real wage job rather than move to the North. Hence, it is sometimes argued that more flexible labour-market institutions would incentivize greater geographical mobility, which would further reduce the spatial misallocation of labour (Adda, 2018).[28]

In conclusion, the mainstream view maintains that a large part of the North-South divide today is explained by the difference in employment rates, rather than firm productivity. The difference in employment rates has been attributed to labour market institutions—including high real wages minimum wages—that depress job creation in the South while at the same time they incentivize people to queue for local jobs rather than migrate to the North. This

[27]Note, however, that is controversial whether the higher real wages in the South translate into greater quality of life, because local amenities (e.g. hospital services, infrastructure) tend to be of lower quality in the South. According to some, the higher real wages need to compensate for this (Accetturo, Dalmazzo, and Blasio, 2010). See also the recent analysis by Daniele (2021).

[28]Note, however, that there are strong contrarian views to these interpretations. Fanti, Pereira, and Virgillito (2022), for instance, argue that the greater use of flexible contracts in the South already creates differences in effective labour market institutions between the two areas, and that these weaker and more informal labour markets are the cause for lower employment rates. Using predictions from an agent-based model, they suggest that further flexibility in labour market institutions would aggravate the divide, and propose instead a targeted investment policy.

equilibrium causes under-utilisation of labour and misallocation in its spatial distribution.[29] Tracing back in time the origins of these spatial mismatches can help understand the root causes of yet another crucial component to Italy's productivity puzzle.

2.3 The historical origins of the decline

The previous section has summarized some stylized facts of Italy's economic growth in the past three decades, singling out the country's productivity stagnation as the main driver of the divergence from Western economies. Then, the chapter has reviewed three factors that are considered proximate causes by the mainstream literature. The chapter now takes a historical turn: when and how did these proximate causes start, and what are their ultimate causes?

The section begins from recent historiographical discussions of Italy's decline. The historiographical review has no ambition to cover the whole literature on Italy's economic trajectory in the past 150 years, but it will rather sketch some of the recent interpretative trends, with reference to the three proximate causes described previously. The discussion will highlight in particular the exceptional circumstances of the Golden Age, including the role played by wage-setting institutions to support convergence. Then, the section will discuss the role played by the Hot Autumn of 1969—the period of strongest labour conflict since the Second World War—in modifying these wage-setting institutions.

2.3.1 Historiographical interpretations of Italy's decline

Whilst mainstream approaches in economics have focused on identifying which contemporary factors might explain Italy's productivity stagnation, economic historians have taken a long-run view, discussing what might be the deeper causes of the decline and at which point in time they originated.

Thanks to collaborative efforts leading to new reconstructions of national

[29] Note that migration flows from the South to the North have been increasing in the past two decades from the virtual stagnation of the 1980s but, as Appendix 4 will discuss, they are not comparable in size and composition to those observed during the Golden Age.

historical accounting, economic historians have now achieved a broad consensus about the main stylized facts of Italy's development over the past one-hundred and fifty years (Felice and Vecchi, 2015b).[30] Following the influential periodisation proposed by Toniolo (2013, pp. 16-26), the history of Italy's economic development can be divided into three main phases: slow absolute improvements between the 1860s and the 1880s, sustained growth between the 1890s and the 1980s (with a strong acceleration in the Golden Age), and stagnation since the 1990s. Growth, however, did not always translate into convergence: only in two periods (1890-1914 and 1950-1973) Italy managed to substantially reduce the gap with the leading economies of the time and improve its standing with respect to comparable European countries. Moreover, only the growth spurt of the Golden Age was prolonged and fast enough to complete the convergence (see Figure 2.4).

The historiographical debate has thus focused on the issue of interpreting this evolution. Until the Great Recession it was still contentious whether the decline even existed or whether instead the recent performance should be considered a cyclical setback (De Cecco, 2000, pp. 107-19). Over the past decade, however, the historiography has converged on a pessimistic view which largely acknowledges the severity of the decline, but variation persists in the interpretation of the underlying causes and their timing. In particular, opinions differ on whether the recent 'tail' of the Italian trajectory should be considered an exception in an otherwise successful secular performance, or rather the inescapable outcome of deep structural flaws (Felice, 2017).

The proponents of the first thesis maintain that the decline originated in the 1990s from the interaction between a changing external environment—in particular, the acceleration of globalization, the ICT revolution, and the institutional development of the European Union—and the country's inability to restructure accordingly (Toniolo, 2013, pp. 28-36). This view has argued that the Italian economic model is the product of 'selective imitation' of different

[30] For an overview of the development of national historical accounting and recent advances see Baffigi (2013), Baffigi (2015) and, for the period 1950-1970, Rey et al. (2012).

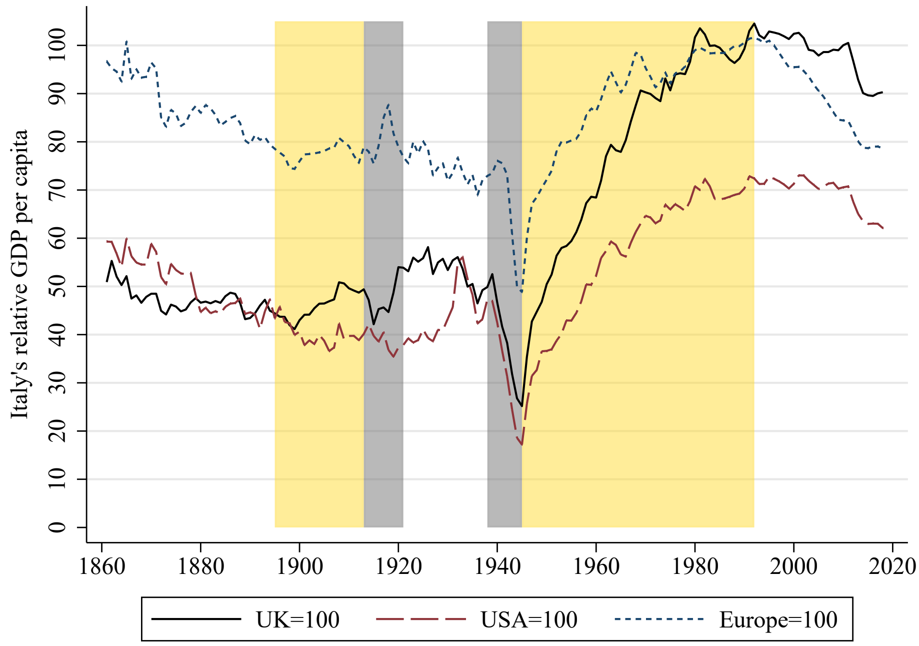


Figure 2.4: ITALY'S CONVERGENCE AND DIVERGENCE IN THE LONG RUN

Italy's GPD per capita relative to the UK, USA and European level, at constant 2011 international dollars. Areas shaded in yellow indicate periods of broad convergence between Italy and the leading economy of the time (UK before 1922, USA afterwards), while areas in white indicate periods of divergence. Areas shaded in grey indicate World Wars. For data and sources Bolt and Zanden (2020) and see footnote at Figure 2.1.

varieties of capitalism,[31] which allowed the country to converge to the European core while preserving its traditional socioeconomic structures (Zamagni, 2018, pp. 7-10). According to Toniolo (2013, pp. 29-32), this system worked as long as Italy had room for convergence to the technological frontier and could exploit its backwardness. Once the gap was closed, in the 1980s, the underlying structural deficiencies emerged at the same time as external factors became more binding.

For instance, a common view identifies the high prevalence of small and medium sized enterprises and their localization within industrial districts—networks of small entrepreneurs sharing a common culture and deeply embedded in civil society (Becattini, 1991)—as source of stability for local communities

[31] On the definition of varieties of capitalism see the classic P. A. Hall and Soskice (2001). For a review of the Italian business history from the perspective of varieties of capitalism see Colli and Vasta (2010).

and inclusive growth, which allowed an industrialization 'without fractures' in the postwar period (Fuà, 1983, pp. 7-46; Zamagni, 2018, pp. 97-111). However, the industrial districts have been largely unable to respond to the challenges of globalization—in particular, competition from low-wage developing countries in the traditional sectors where most districts had built a competitive advantage (Viesti, 2017, pp. 200-205; Ottati, 2018). The emergence of medium-sized companies with multinational aspirations—which for some time had seemed like an adequate response (Colli, 2005)—has proved insufficient to compensate for the loss of competitiveness and even a cause of destabilization for the districts' internal cohesion (Ramazzotti, 2010).

The same interpretative approach can be applied to the other two proximate causes of stagnation that have been discussed in the previous section. With respect to the investment in human capital, Toniolo (2013, pp. 32-33) argues that the low levels of educational attainment recorded throughout the 20th century were not a hindrance to economic growth during the Golden Age because the 'kind of skills required in the catch-up phase derived from practical and informal know-how passed on tacitly on the job, rather than acquired by formal education.' Similarly, Castronovo (2013, p. 3) writes that employment in small manufacturing firms at young age traditionally represented a valuable learning experience that met the demand of larger employers. According to Toniolo (2013, p. 33), the human capital issue only arose once Italy reached the technological frontier, especially as the ICT revolution required more advanced skills from the workforce. Toniolo then notes that significant improvements have been made in this area since the 1990s, suggesting that the response of the educational system has been adequate to the new requirements.

Finally, with respect to the North-South divide, the early 1990s marked the end of the 'extraordinary intervention'—a special programme of public investments, subsidies to local firms, and incentives for large companies to localize production in the *Mezzogiorno*. The programme was started in 1950 with the creation of the *Cassa per il Mezzogiorno*, a public authority tasked with its implementation (Lepore, 2011). The effectiveness of the programme remains hotly debated, even though the recent historiography tends to agree that it was successful in the first two decades before deteriorating in the 1970s, when resources were increasingly captured by politicians and directed to unproductive expenditures (Felice and Lepore, 2017; Papagni et al., 2021). Nonetheless, it is plausible that the conclusion of the programme in 1984 deprived local firms of additional resources that used to compensate for the higher cost of labour caused by national collective agreements, and thus aggravated the gulf between labour demand and labour supply in the area (Paniccià, Piacentini, and Prezioso, 2011; Prezioso and Servidio, 2018).

In summary, this first interpretative view maintains that Italy was endowed with the necessary social capabilities to complete the conditional convergence to the leading economies during the Golden Age, but it failed to restructure once it reached the technological frontier. This failure can be attributed to the interaction between the country's structural deficiencies and the changing international environment, which became more competitive and reduced room to manoeuvre for the Italian government.

A contrasting and more pessimistic view proposes instead an opposite argument, which suggests that the Italian economy always evolved along a sub-optimal trajectory. Its limitations were compensated during the Golden Age by the opportunities for catch-up growth provided by Italy's backwardness, but they re-emerged as soon the room for convergence was exhausted. Hence, the experience of the Golden Age should be seen as a fortuitous 'accident' of history, rather than a representative example of the country's capabilities (Di Martino and Vasta, 2015b). The proponents of this view focus in particular on the role of institutions in preventing congruence with the technological regime at the frontier.

With respect to the issue of firm size, for instance, Di Martino and Vasta (2015a, pp. 296-300) argue that the excessive share of small firms has always been a drag on Italy's capacity to innovate. The authors argue that the prevalence of small firms was caused by a combination of institutions which either increased firms' fragility (e.g. a harsh bankruptcy law that penalized firms during downturns) or incentivized them to remain small (such as laws that gave special protection to artisanal firms). Remaining small could thus be a voluntary choice, given that very few entrepreneurs showed a 'Schumpeterian' attitude (Toninelli and Vasta, 2014), but could also be influenced by external figures, such as business accountants who hold sway on the entrepreneurs decisions and benefited from their their clients' firms remaining small (Di Martino and Vasta, 2018).

With respect to human capital investment, Nuvolari and Vasta (2015) argue that Italy's National Innovation System was structurally weak at all times, even during the Golden Age: educational attainment was consistently below that of comparable countries from 1870 to 2010; the patenting system facilitated the adoption of new technologies but failed to stimulate domestic inventions; there was a consistent mismatch between scientific and technological activities, due to the lack of bridging institutions.

Nuvolari and Vasta (2015, pp. 285-86) argue that these weaknesses were compensated by low real wages (in comparison to other European countries) which acted as 'a safety valve that Italian firms and entrepreneurs could activate to counterbalance their own ineffective innovation activities' but that, on the other hand, could also further de-incentivize the search for more efficient technologies.

With respect to the North-South divide, Di Martino, Felice, and Vasta (2020) attribute its causes to the fact that, despite sharing the same set of formal institutions, the two areas of the country developed different sets of informal institutions after the national unification. The state in the Centre-North had greater legitimacy and control over violence while the local society showed indications of a stronger social capital. Over time, these differences led to the development of an open-access order[32] in the Centre-North, and

[32] A social system whereby 'the economic and political opportunities are the same to each individual, creating sound competition that maximises economic and political welfare' (Di

the retention of a limited access order in the South, characterized by rents extraction, clientelism and familism. These different systems would explain both the differences in opportunities that are observed between the two areas (e.g. educational attainment, labour force participation), and the variation in the effectiveness of the policies that aim to address them.

In conclusion, this more pessimistic view proposes that the Italian decline has deep historical roots. The incapacity of reforming the institutional setting, investing in human capital and developing a strong National Innovation System would represent the historical weaknesses that re-emerged after the Golden Age (Felice, Nuvolari, and Vasta, 2019).

However, this discussion begs the question: what factors allowed the convergence in spite of these structural weaknesses, and could the disappearance of these factors explain the emergence of the proximate causes of stagnation discussed above? The next sections address these questions, focusing on the role of wage-setting institutions for Italy's convergence during the Golden Age and its end after the Hot Autumn of 1969.

During the 1950s through 1963, the Italian economy experienced the most prolonged period of fast growth in its history, recording an annualized growth rate of 5.9%. The rate of growth decreased to 3.9% per annum in 1963-1973, but this was mainly driven by two short breaks—in 1964-65 and 1970-1971—, which recorded annualized rates of growth of 3% and 1.7%, respectively.[33]

Italy's growth during the Golden Age was not only a singular performance in the country's history, but it was also strong in comparative perspective. Figure 2.5 shows the annualized rate of growth for a sample of 27 countries (twenty in Europe) between 1950 and 1973, with respect to their starting level. Italy is shown to outperform the rate of growth predicted from its initial level of GDP per capita, both with respect to the European and the global average. With an annual rate of growth averaging 4.8%, the Italian economy performed almost as well as Austria and Germany (which, however, started from higher

Martino, Felice, and Vasta, 2020, p. 2).

[33] My computations on data from Bolt and Zanden (2020), for sources see note at Figure 2.1.

income levels).

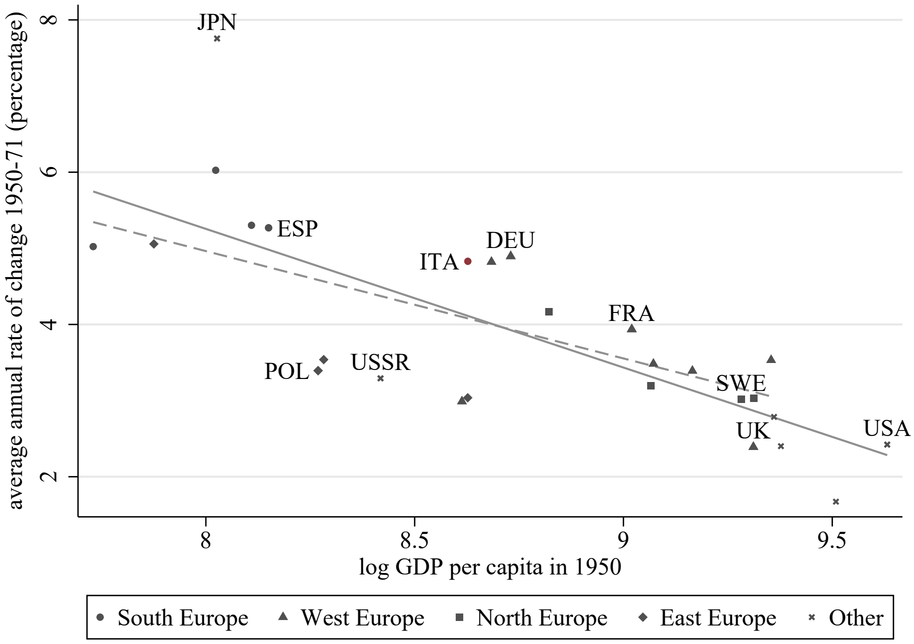


Figure 2.5: Convergence in the Golden Age, 1950-1973

Average annual rate of change of GDP per capita in 1950-73 with respect to the natural logarithm of the GDP per capita in 1950. South Europe includes Italy, Spain, Portugal, Greece and Yugoslavia; West Europe includes the United Kingdom, Ireland, France, Belgium, the Netherlands, Germany, Austria, and Switzerland; East Europe includes Poland, Bulgaria, Czechoslovakia, Hungary; North Europe includes Denmark, Sweden, Norway and Finland; other non-European countries include USA, Canada, USSR, Japan, Australia, New Zealand. Solid line represents the linear interpolation of the whole dataset, dashed line the interpolation for European countries only. For data and sources Bolt and Zanden (2020) and see note at Figure 2.1.

Italy's strong performance during the Golden Age, however, does not imply that the country's proximate sources of growth were unique with respect to the rest of Europe. Abramovitz (1986) influentially posited that Europe's convergence to the leading US economy during the Golden Age was due to the existence of a potential for catch-up growth combined with the 'social capability' (formal and informal institutions, favourable culture, level of human capital) to reap the advantages of starting from a backward position.

The potential for catch-up growth originated especially from the size of the technological backlog that had been accumulated between the United States and Europe during the interwar period (Abramovitz, 1986, pp. 395-396). A significant portion of the technological backlog was incorporated into machinery and more generally physical capital, which had developed more slowly in Europe during the interwar period (Eichengreen, 2007, pp. 20-22). Catching up to the optimal capital-labour ratio thus required extra investments, especially in the manufacturing sector, which would increase productivity and push growth rates up (O'Mahony, 1996, pp. 189-190).

Eichengreen and Iversen (1999) argue that the high rates of investment required in Europe during the Golden Age were allowed by wage moderation, which gave firms opportunity for profit retention. Wage moderation was underpinned by neocorporatist institutions (foremost centralized collective wage bargaining) which solved the coordination problem between firms and workers, ensuring that retained profits would be reinvested to support growth in the future in exchange for full employment and welfare today. In addition, postwar Europe enjoyed a set of social capabilities that created the preconditions to adopt the American technologies, such as an educated and technically competent labour force to maintain the machinery, and an abundant supply of semi-skilled workers that could operate them—often immigrants from rural areas or less developed countries.

The Italian experience after the reconstruction can be seen as a particular variation on this European model (Rossi and Toniolo, 1996; Crafts, Magnani, et al., 2013, pp. 75-82). The next paragraphs will detail three factors of convergence (capital accumulation, education and structural change) and will argue that for each of them wage-setting institutions played a supporting role.

2.3.1.1 Capital accumulation and wage moderation

With few and partial exceptions, before the war Italian manufacturers had not adopted the American mass production system, largely due to organizational bottlenecks and demand constraints which limited the possibility of exploiting scale economies (Giannetti, 1998, pp. 132-138). However, experimentation had been attempted and the expansion of the manufacturing base in the interwar period meant that enough technological capabilities had been accumulated to set the stage for fast adoption as soon as external (trade) and internal (demand) conditions allowed it (Petri, 2002, pp. 327-341).

Ciocca (2007, pp. 240-242) reports that the capital stock grew by 5% per annum between 1951 and 1963 and its share with respect to the country's GDP increased from 16% to 28%, the greatest ever in the country's history. A large part of these investments was represented by the import of foreign machinery, which allowed for fast catch-up to frontier productivity levels thanks to the technologies that they incorporated (Antonelli and Barbiellini Amidei, 2007, pp. 168-177) and sidestep the traditional structural weaknesses of Italy's innovation system (Nuvolari and Vasta, 2015). Capital-intensive sectors swelled, their employment share rising from 40% of all manufacturing employees in the interwar period to 60% in 1971 (Amatori, Bugamelli, and Colli, 2013a, p. 462).

Capital accumulation was especially concentrated in large companies, which experienced considerable growth during this period: Giannetti and Vasta (2010, p. 25) report that the assets of the top-200 firms increased from one-third of GDP in 1956 to almost two-thirds in 1971 and Bragoli et al. (2019) suggest that, throughout the economic miracle, Italy's firm-size distribution was converging to that of large European countries. State-owned enterprises in particular played a crucial role for industrial investment: between 1953 and 1963, their share over the national total rose from 17.4% to 26.5% (Colli, 2013; see also Giannetti and Pastorelli, 2007, pp. 719-81).

This rapid accumulation was made possible by a prolonged wage moderation (Graziani, 1998, pp. 65-68): in real terms, hourly wages in the manufacturing sector increased by around 2% per annum on average between 1951 and 1961, while output per hour worked and GDP per capita increased by 6% per annum.[34] However, in contrast to most other European countries, this

[34] For wages, own computations on data on hourly wages, total compensation, manufacturing sector proper, from Ministero del Lavoro e della Previdenza Sociale (1968, Tav. MA, pp. 178-79) deflated with Istat, *Il valore della moneta in Italia dal 1861 al 2021*, available for download at https://www.istat.it/it/archivio/269656 (last retrieved January 2023). For GDP, Baffigi (2015). For output per hour worked, U.S. Bureau of Labor Statistics, Output Per Hour in Manufacturing in Italy (DISCONTINUED) [ITAOPHI], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/ITAOPHI, Jan-

wage moderation was not much the outcome of a neocorporatist settlement, but rather the result of several structural and institutional factors that kept wage claims in check. In particular, two elements are commonly highlighted by the historiography: relatively high levels of unemployment and the ideological divisions between labour unions

First, the unemployment rate in Italy remained stable at over 8% between 1950 and 1957, an unusually high level for the time in international perspective. During the same period, France, the UK and Sweden oscillated around 2%, a level which was reached also by Germany at the end of the period, after a continuous drop from the high rates of the postwar period (Bernabé, 1982, p. 173). The Italian peculiarity can be attributed in part to the ongoing structural transformation: the agricultural sector expelled workers at a higher pace than the industrial sector was able to absorb, especially as the latter was adopting capital-intensive technologies.

A second cause of wage moderation during the 1950s was the political and ideological division between the labour unions, which were split into three federations: the Communist CGIL (counting 4,782,090 members in 1950), the Christian-Democrat CISL (1,489,682 members), and the Social-Democrat and Republican UIL (401,527 members).[35] The division was based not only on political affiliations, but also on ideological views on collective bargaining.

Through most of the 1950s, the CGIL favoured a strongly centralist approach which has been attributed to its mission to strengthen class solidarity by improving the conditions of all workers, not simply its members and not only industrial employees (Lange and Vannicelli, 1982, pp. 111-17). Hence, plant-level bargaining was actively resisted and the power of shop-floor representatives curtailed (Foa, 1975, p. 31). Seeking to shape a distinct identity, the Christian-Democrat CISL showed instead support for plant-level bargaining. Taking inspiration from the American model of industrial relations, CISL argued for wage claims to be directly linked to productivity improvements within the firm

uary 14, 2023.

[35]Membership data reported in Bedani (1995, p. 47).

(Bedani, 1995, pp. 69-73). Plant-level bargaining, however, was opposed by the federation of private employers who wanted to restrict unions' involvement within the firm (Turone, 1973, p. 335-338).

Unions' autonomy was also curtailed by the political context. First, both unions were influenced by their party of reference, which often used them to buttress political support, diverting their attention from labour relations. These relationships were exacerbated by the absence of alternation of parties in power which was due to the impossibility for the Communist party to ever been sworn into government, because of Italy's collocation in the NATO alliance (Bedani, 1995, pp. 73-78).

As a consequence of these different factors, collective bargaining played a minor role in advancing wage claims during the economic miracle, resulting in a significant wage drift: Ammassari (1963, p. 84) estimated that in 1954 wages effectively paid to industrial workers were, on average, 26.3% greater than the minima established through collective agreements, but by 1962 the difference had grown to 44%, a sign that firms enjoyed large room for discretionary pay.

2.3.1.2 Human capital and minimum-wage scales

High rates of investment alone, however, do not explain all of Italy's productivity growth during the Golden Age. Performing a growth accounting decomposition, Giordano and Zollino (2021, pp. 756-759) find that capital deepening explains only one-third of labour productivity growth in the private sector. The adoption of frontier technologies embedded in the machinery was also aided by the rising levels of education.

As was previously mentioned, Italy had traditionally recorded low levels of formal human capital, and until the Second World War improvements had been mostly concentrated on basic skills (Cappelli, 2016; A'Hearn and Vecchi, 2017, p. 185; Vasta and Cappelli, 2020). Post-war Italy inherited from the fascist regime a stratified school system, whose selectivity contributed to maintaining enrolment at low levels. Even though the compulsory leaving age had officially been 14 since 1923, in 1950 the gross enrolment rate[36] in lower secondary education (age 11-13) was only 28%, and in upper secondary education (age 14-18) it remained below 10%.[37] This means that educational attainment at higher levels remained subpar with respect to other European countries, which limited the relative quality of the Italian labour force and the possibility of adopting modern technologies that required a semi-skilled workforce (Vasta, 1999).

Industrial development and rising household income, however, spurred demand for education. The share of young Italians that completed lower secondary education increased from 20% in 1951-52 to 42.8% in 1961-62.[38] This expansion continued through the next decade and reached 80% in 1971, also thanks to a reform, in 1962, that created a comprehensive track and increased funding for schools, covering underserved areas and students from poorer backgrounds (Brunello and Checchi, 2005; Cappelli, Ridolfi, and Vasta, 2021).

The expansion of lower secondary education pushed enrolment also into upper secondary school, where attainment rates doubled between 1951 and 1961 (from 9.2% to 18%) and reached 40% in the next ten years. With respect to male teenagers, growth was particularly concentrated in vocational schools that prepared for high-skill blue-collar jobs in the manufacturing sector: by the end of the 1960s, over one in four male pupils was enrolled in a technical school preparing for manufacturing jobs.[39]

The attractiveness of the industrial curriculum for male students can

[36]Gross enrolment rates are computed as the ratio of the total number of students enrolled in the academic year over the total population in the theoretical age group of school attendance (11-13 for lower secondary school, 14-18 for upper secondary). For information on sources and computations, see appendix A.7.

[37]All values of enrolment rates at the national level are own computations on data from Checchi (1997), unless otherwise stated.

[38]Attainment rates are computed as the number of school-leavers over the size of the age cohort of reference, i.e. 14 years old for lower secondary school and 19 years old for upper secondary school. Source: Istat (2011, p. 377).

[39]Including technical and professional schools (*istituti tecnici* and *istituti professionali*), the share of male students enrolled in upper secondary education preparing for manufacturing jobs reached 40% in 1970. Own computations, for sources see appendix A.7. For a description of school tracks see chapter 3.

be attributed to the career opportunities and earnings premium that the leaving qualification offered within the industrial sector. With respect to career opportunities, the diffusion of new machinery stimulated demand for higher qualifications. In 1960, the National statistical institute carried out a survey on the hiring plans of over six thousand large firms, totalling 26% of all dependent workers. The survey found that for supervisory industrial jobs almost 60% of the firms required a post-secondary leaving qualification from technical or professional schools, and 40% of the surveyed firms applied the same requirement for high-skill blue-collar jobs (Istituto Centrale di Statistica, 1964b, p. 25). Furthermore, the demand was expected to rise: the firms expected to raise by 50% the number of employees with a diploma from technical schools with an industrial curriculum in the following five years, at a time when overall labour demand was expected to grow only by 15% (Istituto Centrale di Statistica, 1964b, p. 33).

These jobs carried also a significant skill premium: in 1967, the average hourly wage of a skilled blue-collar worker (*operario specializzato*) was about 60% higher than that of an entry-level worker (*manovale comune*) and 30% higher than common low-skill industrial jobs (*operaio comune*) (Ministero del Lavoro e della Previdenza Sociale, 1968, p. 430). A significant part of these differences was regulated by sectoral collective agreements which distinguished minimum wage rates according to the degree of complexity and skill-intensity of the task performed on the job. Tasks were bundled into a set of fixed classes (*qualifiche*) and workers were assigned to a class according to the most skill-intensive task they performed, even if the task was not the prevalent activity of the day; moreover, if a worker was assigned to a less skill-intensive task, he was still to be payed according to the class assigned at the time of employment (Guidi et al., 1971, p. 37).

Throughout the 1950s, the minimum wage rate for the highest class (*specializzato*) was circa 27% greater than the minimum wage for the lowest (*manovale*), and the difference between them tended to grow in the following decade, reaching over 40% in some sectors (Guidi, 1967, p. 5). This tendency to dispersion was attributed to a combination of factors that influenced the minimum wage rates, including the wage indexation system, which in some sectors favoured workers in higher classes.

2.3.1.3 Internal migration and wage zones

With respect to more advanced European countries, Italy had one additional advantage from backwardness that could contribute to fast growth during the Golden Age: the large room for structural change. Even though several other European economies were experiencing a shift of active population from agriculture to industry during the 1950s (Alvarez-Cuadrado and Poschke, 2011), Italy ranked among those with the largest gap: 45% of the active population was still employed in agriculture in 1951, in contrast to 24% in France an Germany, 23% in Sweden, 13% in the Netherlands and 6% in the UK (Ark, 1996, p. 117).[40] Moreover, it was estimated that 36% of rural workers were underemployed, 49% in the *Mezzogiorno* (Pugliese and Rebeggiani, 2004, p. 53).

The under-utilisation of labour in agriculture offered opportunities for productivity growth through factor reallocation, which was finally seized during the Golden Age. The share of employment in agriculture dropped to 33% in 1960 and 17% in 1973, when the share in industry reached 38% and that in services 46% (Ark, 1996, p. 117). Structural change was underpinned by a strong process of regional convergence between low- and high- income regions: the divide in GDP per capita between the *Mezzogiorno* and the North-West, which had widened continuously since 1861, decreased by almost 40% between 1951 and 1971 (Felice, 2019b, p. 502). This convergence can be attributed to both the spatial spread of modern manufacturing and high emigration out of rural areas. As was previously mentioned, industrialisation in the South was supported by public intervention that built modern transport and utilities

[40] Only Spain, among major European countries, maintained a larger share of employment in agriculture, at 47%.

infrastructure, accelerated the technological transformation of the agricultural sector, subsidised the growth of local enterprises and promoted the localisation of large manufacturing plants (Felice and Lepore, 2017; Lepore, 2017; Palermo, 2018).

Improvements in agricultural productivity and the focus of industrial investment in capital-intensive sectors also meant that not all Southern workers could be absorbed by manufacturing jobs in the South. Hence, substantial international emigration flows developed, especially towards European destinations (France, Germany, Switzerland, Belgium). However, the majority of relocations happened within national borders: between 1951 and 1961, an annual average of three hundred thousand Italians moved abroad (160,000 net of return emigration), *vis-à-vis* over 1.3 million who migrated every year within Italy.[41]

These internal migration flows contributed in different ways to productivity growth and structural change: first, the relocation of workers from rural to industrial areas almost automatically caused a modification of the economic structure, for the decision to migrate usually coincided with a change in the sector of occupation (Paci, 1973b, p. 51-70); second, the occupational move was typically from low- to high-productivity sectors (e.g. agriculture to industry) and from low- to high-productivity areas, which improved the efficient allocation of labour (Pugliese and Rebeggiani, 2004, pp. 69-73); third, internal migration ensured that the industrial core could run close to full employment without putting excessive pressure on wages (Mottura and Pugliese, 1973, pp. 235-42, 248–49): in 1960, the unemployment rate was recorded at 2.3% in the North-West and 4% in the *Mezzogiorno*.[42]

The flow of labour from low-income to high-income areas and that of capital in the opposite direction was plausibly supported by some degree of

[41]Own computations on data from Istat, *Serie storiche*, Tav. 2.10.1(External migration), Tav. 2.11.1(Internal migration), Tav. 2.3.2 (population), all available for download from https://seriestoriche.istat.it/ (last retrieved July 2022).

[42]Own computations on Istituto Centrale di Statistica (1961, p. 20). Here, *Mezzogiorno* includes also Southern Latium. The unemployment rate is obtained by dividing the total number of unemployed people (including first job seekers) on the size of the workforce)

flexibility in wage-setting institutions. Since the postwar period, the minimum wage rates established by collective agreement only applied directly to the province of Milan, the centre of Italy's industrial core. For all other provinces, the wage rates were scaled down, creating spatial differences in the nominal minimum wages for each industry and skill class. This system had originally been introduced as an indexation to local prices in order to address the spatial variation in inflation experienced during the Second World War, but it soon appeared that the system caused excessive spatial divergence in wage growth (Blasio and Poy, 2017, p. 71). A new system, that was agreed upon in 1950 and partially modified in 1954, assigned the Italian provinces to a number of 'wage zones,'[43] each with a corresponding scaling coefficient. The coefficient was meant to remain stable over time, while changes in the cost of living were addressed by a national-level indexation system that only allowed for small variation between the North and the South.[44]

Even though it was successful in stabilizing wage growth, the new system allowed substantial dispersion in nominal levels, which was partly addressed by another reform in 1961. The reform reduced the number of wage zones from thirteen to six and the maximum minimum wage differential from 32% to 20%, but it continued to preserve significant spatial variation, for over one-fourth of the provinces were assigned the lowest coefficient. Moreover, sectoral agreements and the interaction with the wage indexation system allowed deviations from the general norm, causing sometimes even larger spatial differences than the regular 20%: for instance, before 1961 a low-skill blue-collar worker in the chemical industry located in Milan received a minimum wage rate 22.8% higher than one located in the province with the lowest scaling coefficient (Guidi, 1967, pp. 3-4).

[43]Tehnically called 'zone salariali, they are commonly known as 'gabbie salariali' or wage cages.

[44]See *Accordo per il meccanismo di variazione della contingenza secondo l'indice nazionale del costo della vita*, 21 March 1951, available for download from the digital Historical Archive of the collective labour agreements maintained by CNEL (Italy's National Council of the Economy and Labour) at `https://www.cnel.it/Archivio-Contratti` (last retrieved July 2021).

2.4 The Hot Autumn as a critical juncture

The previous section has argued that, in spite of structural weaknesses, Italy achieved conditional convergence during the Golden Age thanks to catch-up growth, which was accompanied by wage moderation and wage-setting institutions that regulated wage differentials between skill levels and regions. This section will argue that the Hot Autumn of 1969—a season of heightened labour conflict which initiated a decade of labour mobilisation—marked a critical juncture for these wage-setting institutions, due to the labour unions' sudden adoption of egalitarianism as a bargaining principle.

It will not be possible to provide a complete review of the literature on the causes and the macroeconomic effects Hot Autumn, an event that has attracted attention from historians and social scientists for decades.For the purposes of this chapter, I will focus on the evolution of sectoral collective bargaining and the implications for the wage-setting institutions discussed in the previous section.

2.4.1 The Hot Autumn and egalitarianism

The years 1968 and 1969 were marked by heightened labour conflict across most Western countries, but the cycle of radical protests was unusually long in Italy, and its influence on politics and society stronger than elsewhere (Tarrow, 1989, pp. 1-7). The deep causes of the Hot Autumn are often attributed to the incapacity of the Italian governments to regulate social tensions that originated from the economic miracle (Magnani, 2017). Instead, compromises were sought with distinct interest groups, causing unjust inequalities (Barca, 1999, pp. 13-65). The international cycle of protest thus met with a built-up of tensions specific to Italy that exploded in 1969 (Tarrow, 1984). An extraordinary wave of labour conflict ensued which—in contrast to other European countries—would continue through most of the 1970s.

The nature of these tensions also explains why egalitarianism is widely considered the defining character of the Italian labour conflict after the Hot Autumn. One of the most influential students of Italian labour relations—

Accornero (1992, p. 30)—wrote that the labour unions' choice of egalitarianism as an ideological principle was an 'abrupt and even traumatic' event; not 'the outcome of long considerations, but rather a sudden turn charged with excitement [...] a historical turn without equivalent [in Europe].'[45] According to Accornero (1992, p. 31-32) The impact of this choice on collective bargaining was so deep that it could explain the whole trajectory of the labour movement during the 1970s, first as a unifying ideology that ensured continued mobilisation and then as a discomforting reality that stoked division among workers.

Similarly, Regini (1981, pp. 91-110) acknowledged that egalitarianism was the characterizing trait of the labour unions' behaviour throughout the 1970s, after they attempted to resist it. More recently, Bologna (2017, p. 119) has indicated egalitarianism as the foremost principle that influenced the conduct of the labour movement in 1968-69, despite the unions' original opposition. The role of egalitarianism in influencing collective bargaining is recognized also by economists: Erickson and Ichino (1995, p. 270) wrote that 'during the 1970s, the achievement of an egalitarian distribution of income was one of the focal objectives of unions, and, given their relative strength during this period, they were able to induce a strong compression of wage differentials.'

The next section will briefly discuss how the labour unions came to adopt egalitarianism after two decades of wage moderation and its effects on minimum contractual wages, the skill premium and the wage-zone system.

2.4.1.1 From wage moderation to egalitarianism

The 'postwar settlement' that supported Europe's growth during the Golden Age hinged on the preservation of the workers' willingness to accept it. According to Eichengreen (1996, pp. 58-65), the tightening of labour markets removed incentives to wage moderation, whilst the weakening of the Bretton Woods system created expectations of persistent inflation. The erosion of the pillars of the postwar settlement was accelerated by broader social tensions (e.g.

[45] My translation. Original version: 'L'egualitarismo sindacale si affermò in modo repentino e perfino traumatico. Non fu il frutto di una lunga maturazione bensì di una svolta improvvisa. Fu una sterzata storica che non ha riferimento in altre esperienze.'

the students' movement) and global events (the Vietnam war). The final deflagration is commonly identified with May of 1968, which started a wave of labour demonstrations leading to a wage push across most European economies: Eichengreen (2007, pp. 217) reports that average nominal wage growth in 1969-70 was between 1.5 and 2 times that of 1966-68 in France, Germany, Denmark, Ireland and the Netherlands. Similar forces developed in Italy, too, but with distinct characteristics and on a longer time span.

The labour unions started questioning their strategy of wage moderation in the late 1950s, when it began to transpire that they were losing workers' support.[46] In response to this crisis of representation, unions started experimenting with bargaining levels, opening up to plant-level bargaining while preserving the coordinating role of sector-level and inter-sector agreements. However, conflicting views remained between rank-and-file members and unions cadres, between some innovative sector unions (e.g. metalworkers) and their more traditional confederations, and between younger union members and their older leaders. In addition, the employers' associations were also split, with the federation of private employers (Confindustria) fixed on conservative positions and the managers of state-owned enterprises more open to new institutional arrangements.[47] Finally, many resources were spent on attempted coordination with the government, as the first centre-left coalition to be in power since the War promised more structural economic planning, which never came to fruition (Lange and Vannicelli, 1982, pp. 117-124). Hence, changes were often temporary, haphazard and limited in scope.

Partly because of these divisions, labour unions were not able to attract the growing mass of young industrial workers, usually assigned to low-skill jobs, who in many cases had migrated from Southern Italy to the North during the economic miracle. The rate of unionisation dropped from 50.8% in 1950

[46] Wake-up calls were, for CGIL, the 1955 union committee elections at Fiat, where support dropped to 36% in favour of CISL, which won 41% of votes (Turone, 1973, p. 255). The latter, on the other end, suffered a major secession in 1958, when the majority of its internal representative created pre-employer 'yellow' union (*Ibid.*, p. 295).

[47] On the separation between the association of private employers and state-owned enterprises see Turone (1973, pp. 228-34) and Berta (2013, pp. 173-180).

to 28.0% in 1966 (Garonna and Pisani, 1984, p. 32). Consequently, labour militants started to increasingly organize outside the control of the unions' leaders. Early examples were a series of metalworkers' demonstrations during the winter of 1960-61, which were led by young CISL activists despite their leaders' opposition.

These grassroots movements were fuelled by the tightening of the labour market: By 1961 the Italian economy was running closer to full employment than ever before and converging to the European average, which removed the downward pressure on wages. The unemployment rate dropped from over 8% in the 1950s to 3% in 1962, and stabilized at around 4% for the rest of the decade (Bernabé, 1982, p. 173). This situation provoked the largest wave of labour conflict in a decade and workers obtained the first significant wage increases since the Second World War (see Figure 2.6). However, the effect was short-lived, as authorities responded with a monetary squeeze, causing investment to drop by 20% both in 1964 and in 1965 (Graziani, 1998, pp. 86-88), and unemployment to bounce from under 3% back to over 4% (Bernabé, 1982, p. 173). Moreover, unions failed to capitalize on labour mobilization and the round of negotiations in 1966-67 was significantly less successful (Salvati, 1975, pp. 40-46).

Nonetheless, GDP per hour worked continued to increase at relatively fast pace through 1969 thanks to a widespread reorganisation of production that streamlined processes and intensified production rhythms, which exacerbated the conditions of young workers (Salvati, 1984, pp. 89-97). Union disputes continued through the 1960s and were progressively infiltrated by New Left groups who proposed radical egalitarian messages, such as the abolition of wage scales based on skill levels and same lump-sum wage increases for all, the elimination of piecework and productivity premia, as well as self-management and direct democracy in labour unions (Franzosi, 1995, pp. 283-89). These messages were particularly targeted to low-skill workers, who would most benefit from a shift towards egalitarianism. The cleavage between union leaders and radicalised workers peaked between 1968 and 1969. In FIAT factories, more than 32 different political groups propagandised their activities and of the 199 shop stewards active in July 1969, only 70 were members of labour unions. In September 1969 more than 35,000 workers participated to a spontaneous strike that was not participated by any labour union.[48]

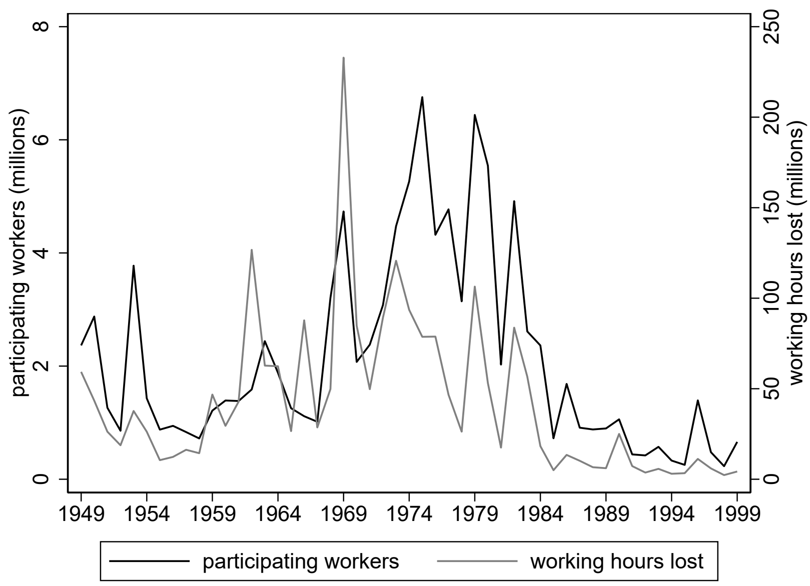
A more radical approach to collective bargaining was also favoured by young union leaders, especially at CISL, while CGIL was more skeptical not to alienate its traditional base of skilled and relatively older workers (Regini, 1981, pp. 98-102). For instance, Bruno Trentin—at the time, the secretary of FIOM, the metalworkers' branch of the communist CGIL—declared:

> The skill level [...] is an asset of ours, of the class, the working class, not an instrument of the owners; hence, I do not see why the owners should not pay for it. I do not believe that we help the youth's fight for promotions, for a modification of the wage scale system, for a battle to get qualifying training——all fights we need to intensify——if we further mystify, in the workers' conscience, this class asset: the skill level regulated by the [collective] agreement.[49]

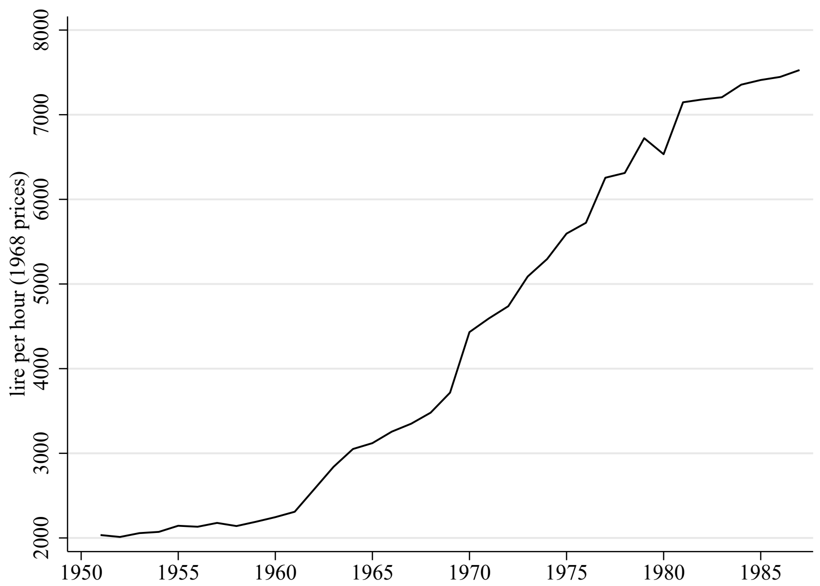
But strikes and demonstrations saw a wide participation of New Left groups pushing egalitarian messages. As an extraordinary wave of conflict mounted towards the Autumn of 1969 (see again Figure 2.6a), labour leaders faced the prospect of losing control of the labour movement to their more radical cadres and New Left groups. After a long series of assemblies and consultations, unions eventually turned around and adopted egalitarianism as a driving principle.

[48]Here and previous sentence, data from Damiano and Pessa (2003, pp. 121, 129, 135).

[49]Final comments by Bruno Trentin at the Fiom's consulting conference on the national collective agreement, Rimini, May 9-11, 1969, published in *Sindacato Moderno*, June 1969, pp. 11-12 and cited in Regini and Reyneri, 1971, p. 76-77 (my translation). The original version is the following: 'La qualifica [...] è un patrimonio nostro, di classe, della classe operaia, non è un'arma del padrone; non vedo perché il padrone quindi non la debba pagare. E io non credo che aiutiamo i giovani nella lotta, che dobbiamo intensificare, per i passaggi di categoria, per una modifica del sistema delle qualifiche, per una battaglia sulla formazione professionale, oscurando ulteriormente nella coscienza dei lavoratori questo patrimonio di classe che è la qualifica professionale sanzionata nel contratto.



(a) Labour conflicts in the manufacturing sector



(b) Average blue-collar wage

Figure 2.6: Labour conflict and wages

Panel a: Number of workers participating and working hours lost to labour conflict in the manufacturing sector, 1949–1999. Until 1974, conflicts include those unrelated to labour relations (e.g. political strikes); since 1975, only conflicts addressing labour relations are included. Source: Istat, *Serie Storiche, Tavola 10.22*, http://seriestoriche.istat.it/ (19/04/2019). Panel b: Average hourly blue-collar wage in the manufacturing sector at constant 1968 prices. Sources: own computations on data from Istituto Nazionale per l'Assicurazione contro gli infortuni sul lavoro, *Notizie statistiche* and *Notiziario statistico*, 1952-76; *Rassegna di statistiche del lavoro*, Anno XXX-XXXIV, nn. 5-6/6, 1978-1982; Inail, *Notiziario Statistico*, N. 1, 1985; *Rassegna di statistiche del lavoro* nn. 1-3/1989. Values deflated with Istat, *Il valore della moneta in Italia dal 1861 al 2021*, available for download at https://www.istat.it/it/archivio/269656 (last retrieved January 2023).

2.4.1.2 The effect of egalitarianism on wage-setting institutions

The shift was felt at all levels of bargaining and in all aspects of wage-setting institutions for the next decade. I will focus here on three effects that connect again to the issues of wage moderation, skill premiums and the spatial variation of nominal wages.

The first effect of the egalitarian turn was the disavowal of wage moderation and, instead, the promotion of the idea that wages could be an 'independent variable'. Wage rates established by collective agreements started increasing at a faster pace than productivity, and the profit share dropped from 34% in 1969 to 24% in 1975 (Rossi, 2020, pp. 14-18). Since the egalitarian turn driven by industrial unions, the steep rise in contractual wages was strongest for blue-collar workers in industry, but they pulled most of the other sectors (see Figure 2.7).

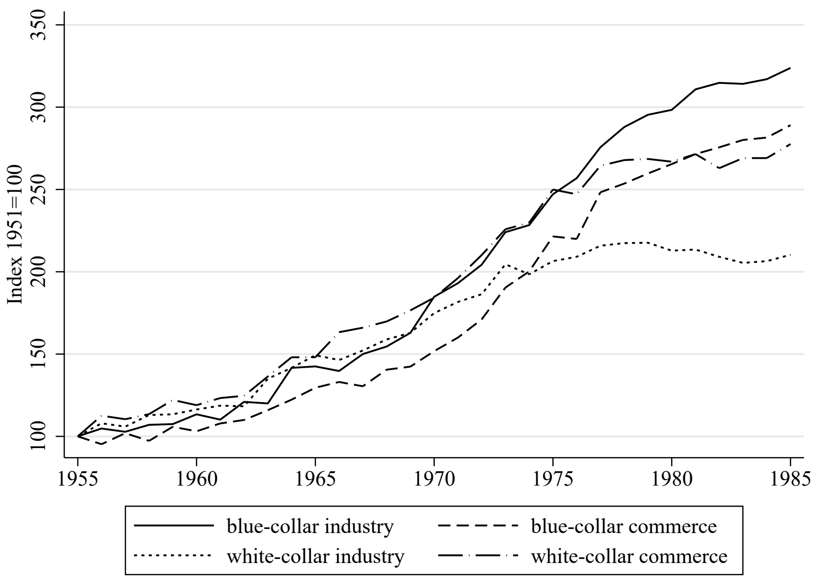


Figure 2.7: Changes in contractual wages by sector

Index of contractual hourly wages by economic macro-sector and worker category, rescaled with 1955 as base year. The 'industry' series includes mining, food, textile, metal and engineering, chemical, construction and electricity. Source: own elaborations on data from Istat, *Serie Storiche*, Tav. 10.21: 'Numeri indice delle retribuzioni contrattuali orarie lorde per alcuni settori di attività economica e qualifica professionale' deflated using Tav. 21.5: 'Indici dei prezzi al consumo per le famiglie di operai e impiegati,' both available at https://seriestoriche.istat.it/, last retrieved June 2022.

The second effect of the egalitarian turn was a strong compression of the wage distribution, particularly among blue-collar workers. Dell'Aringa (1976, pp. 72-73) estimated that, between 1969 and 1974, the minimum wage rates for low-skill workers (*manovale comune*) increased by over 38%, while those for high high-skill workers (*operaio specializzato*) increased ony by 22.4%, and the coefficient of variation among blue-collar workers decreased from 17.8 to 13.9. This compression was caused by different factors over time.

In the months after the Hot Autumn, unions bargained for proportionally greater wage increases for workers classified as low skilled by requesting lump-sum raises for all, irrespective of classifications. Additional strategies that reinforced the wage compression included the restructuring of wage scales to reduce pay dispersion, the easing of requirements for promotion from one level to another, the limitation of piecework, individual bonuses and overtime pay (Regini, 1981, pp. 94-98).

Another reform that is often listed as an early example of the egalitarian turn was the repeal of the wage-zone system, even though it preceded the Hot Autumn by over a year (Poy, 2015, p. 92). Calls for reforming the wage zones started in the South, with a series of strikes organized by local chambers of labour (which had limited bargaining power but could coordinate and relate issues to the central organizations) and with the signing of agreements in some large companies that equalized the pay of their employees in the South to those in the North (G. A. Bianchi, 1984, pp. 160-61). The opposition to the wage zone was partly inspired by egalitarian themes: it seemed unjust that workers that performed the same job tasks, in the same industry, sometimes for the same employer, would be paid less because they were located in low-income provinces (Guidi, 1967, pp. 24-25; Poy, 2015, p. 240-241).

In the Autumn of 1968 the fight was picked up by the national confederations. After a series of strikes, the labour relations representative for state-owned companies (Intersind) agreed to gradually remove the wage zone differentials. It was observed at the time that the state-owned companies were more amenable to the repeal because they were larger in size and often operated multiple plants in different areas of the country—which would allow to absorb some of the extra costs through restructuring (Revelli, 1968). The resulting interconfederal agreement signed on 21 December 1968 established that all minimum wages should converge to the respective nominal levels of Milan, in three installments. The first installment would remove 40% of the nominal difference on 1 January 1969, the second installment would remove 30% of the difference on 1 April 1970 and the 30% would be removed on 1 July 1971.[50]

The association of private employers originally opposed the repeal of the wage zones, highlighting productivity differentials between areas and arguing that the reform would lead to unsustainable increases in labour costs in the low-wage areas. The labour unions retorted that higher wages would increase demand and support growth in low-income areas (Revelli, 1969). After a prolonged contrast which was punctuated by a series of strikes and required the mediation of the Ministry of Labour, the employers' association caved in to the unions' requests. The resulting interconfederal agreement of 18 March 1969 established a similar convergence process to that previously reached with Intersind.[51]

2.4.1.3 The end of egalitarianism

Between 1969 and 1978, unions obtained institutional reforms to wage-setting institutions that further promoted wage growth and the compression of their differentials. For instance, in 1972 the wage scales of blue- and white-collar became regulated for the firs time according to common criteria (*inquadramento*

[50]See article two of the *Accordo Interconfederale 21 dicembre 1968 per il conglobamento dell'indennità di contingenza e per il graduale superamento delle differenze zonali delle retribuzioni* available on the digital Historical Archive of the collective labour agreements maintained by CNEL (Italy's National Council of the Economy and Labour) at https://www.cnel.it/Archivio-Contratti. On 8 March 1969, a similar agreement was reached with the association of small and medium-size industries: see article five of the *Accordo dell'8 marzo 1969 per il conglobamento dell'indennità di contingenza e per l'unificazione dei minimi di paga e di stipendio (aziende associate alla CONFAPI)* available at https://www.cnel.it/Archivio-Contratti.

[51]See article one of the *Accordo Interconfederale 18 marzo 1969 per il conglobamento della contingenza e per la revisione dell'assetto zonale delle retribuzioni* available at https://www.cnel.it/Archivio-Contratti

unico)[52]; more significantly, a 1975 reform of the wage indexation system (*punto unico di contingenza*) switched from differentiated pay rises to equal lump-sum increases for every increase in the index of the cost of living, effectively causing an automatic compression of the wage distribution during periods of high inflation (on the latter see Dell'Aringa and Lucifora, 1990, p. 392 and Manacorda, 2004).

Union leaders continued to support the egalitarian approach into the second half of the 1970s, when macroeconomic conditions worsened (see for instance Lama, 1976, pp. 83-97). The first reversal in the unions' approach came in 1978: facing a stagnant economy, high inflation and rising unemployment, union leaders shifted back in favour of wage moderation and cooperation with the entrepreneurs (Bevacqua and Turani, 1978). Collective agreements gradually incorporated the new approach, while high-skill workers started pushing for preferential treatment. The most extreme manifestation of differences between the interests of skilled and unskilled blue-collar workers came in 1980, when many among skilled blue-collar employees at Fiat joined the marcia dei quarantamila (march of forty-thousand), an anti-strike demonstration organised by white-collar workers and managers. Coming after twelve years of strong labour conflict and political terrorism, the march signed the beginning of the end of Italy's long '68.

The last achievement of egalitarianism to be cancelled was the 1975 reform of the wage indexation system, which the government rolled back to the old system on 14 February 1984. A national referendum called by the Communist Party to restore it was lost by 54.3% against 45.7% (with a participation rate of 77.9%). During the same years, labour conflict faded: the number of hours lost due to strikes fell from 114 million in 1982 to 9 million in 1985. In 1992 the *scala mobile* was abolished with the agreement of all three labour unions and a new phase of labour relations started.

[52] For a detailed discussion see Libertini, 1974.

2.4.2 The legacy of the Hot Autumn?

The previous section has argued that the Hot Autumn represented a critical juncture for Italy's wage-setting institutions. The labour unions' choice of egalitarianism interrupted a prolonged period of wage moderation, caused a significant compression of the wage distribution among blue-collar workers, and equalized nominal minimum wages between low- and high-income areas.

This section hypothesizes that these modifications influenced human capital accumulation, internal migration and the firm-size distribution, thus affecting the three proximate causes of Italy's decline. These hypotheses will then be individually explored in the substantive chapters of the thesis, so the section only provides general references to position the hypotheses within the broader discussion. Additional and different references are reviewed in each chapter.

2.4.2.1 Egalitarianism and human capital

With respect to human capital accumulation, the 1970s were characterized by a slowdown in the expansion of enrolment in upper secondary school, which diverted Italy from a path of convergence to the European average. To illustrate the timing and significance of this divergence, I follow the methodology in Bertola and Sestito (2011, p. 46) and A'Hearn and Vecchi (2017, p. 204), who compare enrolment rates between countries conditional on their level of development.

Figure 2.9 presents a scatterplot of secondary school enrolment and GDP per capita across twenty-three European countries between 1945 and 2010, in order to compare the Italian evolution over time. The fractional-polynomial fit shows a positive association between the two measures, indicating that countries with a higher level of GDP per capita also show a higher share of young people enrolled in secondary school. The relationship weakens only after enrolment rates reach a point of saturation, towards 80%.

The solid line represents the evolution of this association for Italy, at five-year intervals. The first noticeable characteristic is that, conditional on the level of GDP per capita, Italy had lower enrolment rates in secondary education

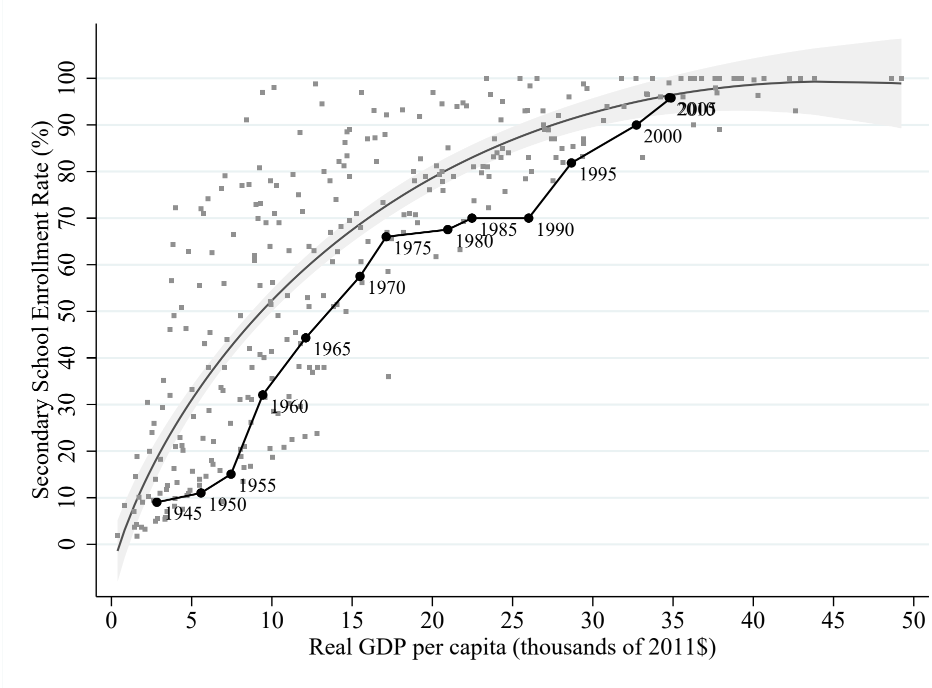


Figure 2.8: Secondary education and GDP across Europe

The black connected markers represent Italy in the labelled year (years 2005 and 2010 overlap). Each square marker in the scatterplot represents a European country in a given year between 1945 and 2010. Countries included are Albania, Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Greece, Hungary, Iceland, Ireland, Malta, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Turkey, and the United Kingdom. The solid line represents a twoway fractional-polynomial prediction plot estimated on all countries excluding Italy, the shaded area represents 95% confidence intervals. Quinquennial data between 1945 and 2010 or latest available. Adjusted secondary school enrolment rate are obtained from J. W. Lee and H. Lee (2016), GDP per capita from Maddison Project Database, version 2020 (Bolt and Zanden, 2020).

than the European average throughout the second half of the 20th century—the Italian graph lies below the expected value in every year, except after 2005. This observation is in line with indicators of educational attainment, such as the average years of schooling of the population (Nuvolari and Vasta, 2015, p. 275).

The second characterizing feature, however, is that Italy's comparative performance varied significantly over time. After a slow start, significant improvements were made between the 1950s and the 1960s, when enrolment rates increased by over twelve percentage points every five years, which reduced by two-thirds the gap with the conditional average. However, the growth slowed down in the first half of the 1970s and virtually stagnated throughout the next decade, while GDP per capita continued to grow. By 1990, Italy's enrolment rate was twenty percentage points lower than expected, making it a negative outlier in comparison to all other comparable European countries. Enrolment rates rose again in the 1990s through the 2000s, which allowed Italy to recover from the pause of the 1970s-1980s and converge to the conditional average. Thus, the slow-down of educational attainment led Italy along a temporary diverging path from comparable European economies.

What could explain this evolution? Common explanations for the slow expansion of secondary school have focused on the absence of reforms at the upper-secondary level (Bertola and Sestito, 2011). As was previously mentioned, in 1962 a major reform of lower secondary education had created a single comprehensive track which is commonly credited for stimulating the take-up lower secondary education, particularly among children from disadvantaged backgrounds (Brunello and Checchi, 2005; Cappelli, Ridolfi, and Vasta, 2021). No comparable reform was ever passed for upper secondary education: several proposals to create a comprehensive track at the upper secondary level were drafted between 1971 to 1977, and a bill to this effect was passed at the lower house of parliament in 1978, but snap elections were called and the reform stopped at the upper house (Ricuperati, 2015, pp. 308-319).

In 1974 a series of decrees (known as *Decreti delegati*) reformed several aspects of both lower and upper secondary schools, but they were largely focused on the democratisation of the educational system by regulating students' right to assembly, formalizing communication channels between parents and teachers, and providing the latter with greater say on the administration of schools (Rizzi, 1975, pp. 32-37). The decrees were to a large extent a response to the student movement's and teachers' unions requests for greater spaces of participation (Gaudio, 2019, pp. 191-98). Only one of the decrees addressed the provision of education by giving teachers greater independence with respect to course content and methodology, and by allowing schools to modify some aspects of the curricula.[53] The reform was not extensive enough to modify the tracked system but contributed to further fragmentation, while all plans of major restructuring stagnated (Schizzerotto and Barone, 2006, pp. 46-47; Ricuperati, 2015, pp. 291-300). Significant reforms of the upper secondary education have been passed only since the late 1990s, and a comprehensive system has not yet been established.

The absence of reforms might have made schools inadequate to the demand of the labour market (Emma and Moscati, 1976, pp. 73-81) and thus less valuable to teenagers that could opt to join the labour market, as the school-leaving age remained 14 throughout this period. This view, however, is difficult to combine with evidence that educational inputs improved throughout this period (Checchi, 1997, pp. 21-25). It also contrasts with contemporaries who maintained that the expansion of school enrolment during the Golden Age was pushed by households' changing preferences rather than being pulled by firms' demand, and that as a result there was an excess of educated workers for the economic needs of the country (Barbagli, 1973, pp. 212-270).

Sharing a similar view, Paci (1973a, pp. 42-49) argued that the expansion of secondary enrolment between the 1950s and the 1960s was a reaction to the stagnation of industrial wages. According to this interpretation, the children of blue-collar workers strove to attain a diploma of secondary education as a way to escape their parents occupational trap. Hence, to avoid an excess of education and 'intellectual unemployment' it would be necessary to realize egalitarian reforms such as 'wage increases [and] a common wage scale between blue- and white-collar workers so to 'increase the attractiveness of working in industry.' Writing as a contemporary, Paci (1973a, p. 49) concluded that things appeared to be moving—and would continue to move—in such direction.

Chapter 3 will expand on this intuition and hypothesize that the egalitarian turn affected secondary school enrolment by influencing the opportunity cost of post-compulsory schooling and the *ex ante* returns to vocational education

[53] This was the DPR n. 419 of 31 May 1974 regulating methodological and didactic experimentation and teachers' training.

for manufacturing jobs. The results will suggest that the wage shock had a temporary effect on school enrolment in the short term and a permanent effect on the composition of school tracks in the medium-term. The chapter will also suggest that this effect can explain a significant share of Italy's gap in educational attainment with respect to comparable countries.

2.4.2.2 Spatial wage equalization and internal migration

In the 1970s, internal migration rates dropped to the lowest levels since the Second World War and then stabilized for the next two decades. The decline in migration intensity was particularly strong and rapid with respect to flows from the *Mezzogiorno* to the North-West: Bonifazi and Heins (2000, p. 117) calculated that the annual net migration between the two areas dropped from over 100,000 people in 1970 to fewer than 30,000 in 1975, and then continued to decline until the early 1980s. The authors also identified the years 1975/76 as 'a turning point between old and new patterns' of migration for the whole country with 'an overall fall in mobility over medium and long distances and a [...] growing importance of short-distance moves' (Bonifazi and Heins, 2000, pp. 121, 129).

A large share of long-distance migration during the Golden Age had been pulled by the opportunities of employment in the industrial areas of the North West, so the decline is often associated with the oil crises (Panichella, 2014, ch. 2). However, migration flows did not recover in the following years, despite the fact that unemployment differentials started widening between the South and the North: Brunello, Lupi, and Ordine (2001, p. 105) report that between 1970 and 1979 the unemployment rate increased by an annual average of 0.36 percentage points in the South and 0.19 in the North-West and North-East (0.20 in the Centre); in 1980-1994, the gap widened even more, with annual averages of 0.90 and 0.22, respectively (0.30 in the the Centre and 0.11 in the North-East).

This and similar observations raised the question of why Southern Italians would not return to migrate. Among possible explanations, Attanasio and

Padoa Schioppa (1991, p. 237-320) and Faini, Galli, et al. (1997, pp. 572-74) listed demographic factors and attitudes (such as aging and rising female participation), higher household income (that would support young people during periods of unemployment), government transfers (also in the form of public employment), rent controls and housing costs, job matching inefficiencies, and the spatial equalization of minimum contractual wages that followed the repeal of the wage zone system (which make minimum wages higher in the South, in real terms). The latter would also be compounded by the labour unions' strategy of bargaining contractual minimum wages according to the tighter labour market conditions in the North, thus setting minimum wags that are too high for the South (Brunello, Lupi, and Ordine, 2001, p. 119)

Several studies have since discussed the role of the spatial differences in wages to explain low migration and excessive unemployment, using a wide range of methods and data. For instance, running OLS regressions on gross out-migration rates from 1960 to 1986 separately for six macro-areas, Attanasio and Padoa Schioppa (1991, pp. 270-282) found that private real wages at destination (origin) acted as pull (push) factor, but their estimates were not always significant. Focusing only on the relative migration flows between South and North in 1955-1984, Bodo and Sestito (1991, pp. 97-110) found that the main pull factor was represented by employment opportunities at destination, while reductions in the difference in consumption per capita (their proxy for real wages) reduced migration, even though the estimates were not robust across all specifications, especially after introducing a structural break in 1970.

Some years later, Brunello, Lupi, and Ordine (2001, pp. 119, 121–26) argued that the repeal of the wage zones was a major factor in the growth of wages in the South relative to the North in the 1970s. Estimating a pooled OLS regression on gross migration flows from regions in the *Mezzogiorno* to the rest between 1970 and 1993 they found that 'the rapid increase both of relative wages and of social transfers per head during the 1970s and the 1980s has significantly reduced migration flows, more than compensating the opposite effects on migration of higher regional unemployment.'

Manacorda and Petrongolo (2006, p. 157) discussed a model of asymmetric bargaining with two regions whereby labour unions set minimum wage rates according to unemployment levels in the leading region, thus causing excessive unemployment in the second region. Applying the model to the Italian case, they suggested that 33% of the increase in unemployment between 1977 and 1988 could be attributed to an excess growth of the labour supply in the South. Even though their model did not include migration, they presented back-of-the-envelope calculations showing that 60% of the change in the relative labour supply could be explained by falling migration, and mentioned the reduction in nominal wage differentials as one leading factor. Following a similar argument, Caponi (2008, p. 4) claimed that the abolition of the wage zones 'undoubtedly contributed to the end of the internal migration between the [South and the North],' even though he suggested that the main contribution to stopping migration flows came from government transfers, and that this was a conscious aim of the Italian parties.

This short review of the literature has shown that, throughout the years, several studies have hinted to the repeal of the wage zones as a leading cause of falling internal migration and excess unemployment in the South. However, I am not aware of researches that empirically estimate the impact of the repeal of the wage zones on internal migration flows with historical data. Chapter 4 will contribute to this direction by testing the hypothesis that the spatial equalization of minimum wages provoked a decline in internal migration and originated spatial mismatches in unemployment and real wages.

2.4.2.3 The Hot Autumn and the firm-size distribution

Could the egalitarian turn after the Hot Autumn have affected also the firm size distribution and the number of small firms in the manufacturing sector? To situate this question within its historical background, Figure 2.9 presents the number of industrial employees from census data, distinguishing by the size class of the establishment in which they were employed, based on elaborations from Giannetti and Vasta (2005, p. 39, 45).[54]

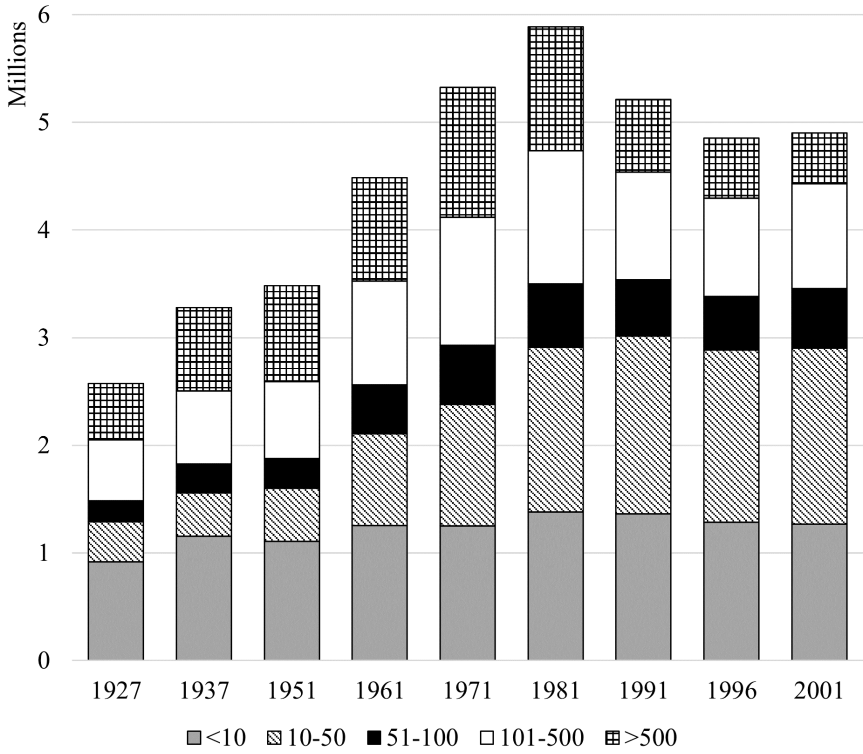


Figure 2.9: Size distribution of manufacturing activities

Total number of workers by establishment size, manufacturing sector proper. Size class is defined by the number of employees in the establishment. An establishment is an autonomous production unit, see Appendix 5 for a discussion of the definition. Source: own elaborations on data from Giannetti and Vasta (2005, Tab. 2.5, p. 39 and Tab. 2.9, p. 45).

The graph shows that Italy has been characterized by a large share of small businesses throughout the 20th century.[55] Establishments with fewer than 100 employees accounted for between 50% and 60% of all industrial workers from the 1920s to the 1960s. As a reference point, note that in 1961 this share was 30% in Germany and less than 20% in the United Kingdom. The constancy of small manufacturing was not due to stagnation, but rather to a certain vitality: during the Golden Age, total employment in these establishments grew continuously, especially in those employing between ten and fifty employees.

[54]The same source is used for the other computations in this section, unless otherwise stated.

[55]This section only discusses the growth spurt of SMEs in the 1970s. For long-run studies on the evolution of small firms in Italy see Colli (2002), Carnevali (2005), Giannetti and Vasta (2005, pp. 107-24), Amatori, Bugamelli, and Colli (2013a); Colli and Rinaldi (2015).

Nonetheless, the 1970s marked a distinct acceleration in their expansion, both in absolute terms and in comparison to large firms. Employment in establishments under 50 employees grew by 22% between 1971 and 1981, up from the 13% of the previous decade. Micro-businesses (those employing fewer than 10 employees) showed particular dynamism, expanding their employment by 10%, after having stagnated in the previous decade, largely thanks to the creation of new manufacturing firms: According to official reconstructions, their number increased by over 81,500 units between 1971 and 1981 (+18.5%).[56]

Meanwhile, employment in large firms (over 500) reduced by 5%, but the vitality of small firms more than compensated for these losses so that, overall, the total number of manufacturing workers increased by 11% through the 1970s. However, the contraction of large establishments accelerated in the 1980s. By 1991, the number of workers in establishments with over 100 employees had decreased from 2.4 million to about 1.7 million. Almost half a million jobs were lost in establishments employing over 500 workers alone. The growth spurt of SMEs, instead, had come to an end and the number of workers in small and medium-sized establishments remained stable after 1981.

Performing a comparison with France and Germany, Amatori, Bugamelli, and Colli (2013a, p. 473) note that 'the downsizing of Italian firms has been stronger than in other advanced economies, despite the fact that the initial size distribution of firms was already highly fragmented.' Extending the comparison to the United Kingdom and the USA, Traù (1999, pp. 82-104) had also found that the growth spurt of Italian SMEs in the 1970s caused the Italian firm-size distribution to further distance itself from the average. Understanding the causes of this extreme downsizing event would thus help recover the origins of the skewed firm-size distribution that we observe today.

Contemporaries established a link between the wage push of the Hot Autumn and the growth spurt of small manufacturing. For instance, Del

[56]Own computations on data from *Atlante Statistico dei Comuni*, 2013 edition, originally available at https://www4.istat.it/it/archivio/113712 (last retrieved January 2023). See data description in Appendix 5 for information on accessing the data.

Monte and Raffa (1977, pp. 30-31) pp. 30-31 noted that the end of wage moderation after the Hot Autumn reduced the profit share, making it difficult for large companies to finance investments in labour-saving technologies. Hence, the only strategy available to contrast the rising labour costs consisted in outsourcing the most labour-intensive production processes to small firms (*decentramento produttivo*, or decentralization of production). These firms were deemed capable to meet the requirements of the large companies because the production processes presented a high degree of standardization and no particular innovation. For the same reasons, the *decentramento produttivo* was deemed responsible for the growth of the informal labour market through unregistered workshops and domestic production (De Marco and Talamo, 1976, pp. 9-11; see also Brunetta, Grassivaro, and Marcato, 1975, pp. 407-415).

According to this view, small firms were technologically backward but enjoyed lower labour costs because they could more easily escape the unions' control. Even though union density could be high in small firms, these usually had few institutional figures—such as union delegates—that could police the application of collective agreements and report on it to their organization (Segreteria provinciale della FLM di Bergamo, 1975, pp. 77-81). This was partly attributed to the fact that firms under 15 employees were excluded from the stricter legislation on employment protection and union rights that was passed in 1970 (Mazzotta, 1979). The greater freedom of management in small firms was thought to make them more flexible in the use and disposal of workers, so through the *decentramento produttivo* large firms could sidestep the greater rigidity of the labour market after the Hot Autumn (Vianello, 1975, pp. 132-33).

The hypothesis of the *decentramento produttivo*, however, has been criticized from different perspectives. First, it was shown that small firms were not necessarily less innovative than large ones. On the contrary, it was argued that diffusion of new production technologies, such as computer numerical control (CNC) machines, were reducing the minimum efficient scale of production across sectors (Prodi et al., 1978). By decreasing the cost of switching materials and output characteristics, CNC machines allowed small firms to customise products in limited batches, effectively breaking the traditional connection between automation and large scale and closing the productivity gap between small and large firms (Giannetti, 1998, pp. 180-83).

So, did the Hot Autumn caused firms' downsizing through decentralization? Across the recent historiography on Italy's firm-size distribution, the hypothesis of the *decentramento produttivo* is a recurrent but secondary theme (e.g. Iuzzolino, Pellegrini, and Viesti, 2013, pp. 592-94). With respect to SMEs, the *decentramento produttivo* is sometimes mentioned as evidence of the favourable institutional setting that has allowed the preservation of a large segment of small firms since the Golden Age (Colli and Rinaldi, 2015, p. 250). However, contrasting opinions argue that the growth of SMEs was independent from large businesses and that the Hot Autumn brought about reforms that eroded the traditional cost advantages of small manufacturing (Arrighetti and Serravalli, 2010, pp. 377-83). Chapter 5 will contribute to this debate by bringing the hypothesis of the *decentramento produttivo* back to the test.

2.5 Conclusions

The Italian economy has been diverging from comparable countries for the past three decades. The debate on the causes of the divergence and their historical origins continues to inspire research in economics and economic history. This chapter has provided a selective review of the debate which serves as motivation and background for the substantive chapters of the thesis.

The first part of the chapter has focused on the stylized facts of growth since the 1990s and argued that Italy's divergence from the Western economies can be attributed to stagnant productivity. Then, the chapter has identified three proximate causes of stagnation: the prevalence of small firms, the low levels of human capital, and the spatial mismatch in the allocation of labour. The chapter has argued that each of these three proximate causes has a structural character which cannot be explained by recent shocks, and their origin should be traced back in history. The second part of the chapter has turned to historiographical interpretations. First, it has discussed two recent trends that represent contrasting views on the origins of the decline. Both views stress the role of structural weaknesses, but they disagree with respect to their evolution. Both interpretations, however, identify a turning point after the end of the Golden Age, when Italy converged to the leading economies. Hence, the chapter has discussed how convergence was achieved, singling out the role of wage moderation.

The third part of the chapter has argued that the Hot Autumn represented a critical juncture in Italy's economic history because labour unions shifted from wage moderation to egalitarianism. The chapter has finally suggested that this shift had significant consequences on wage setting institutions, causing a steep increase in minimum wage rates for blue-collar workers, a compression of their differential, and their spatial equalization between regions. The chapter has hypothesized that these changes to the wage-setting institutions influenced the three proximate causes of Italy's decline. In particular, the chapter has proposed that the wage shock might have affected enrolment in upper secondary education, provoking a pause in its expansion; that the spatial equalization of minimum wage rates could have reduced internal migration flows and caused excessive unemployment in the South; and that the steep increase in labour costs influenced the number and size distribution of industrial establishments. These hypotheses will then be separately tested in the following substantive chapters.

Chapter 3

Egalitarianism and human capital

The influence of contractual wages on secondary school enrolment

3.1 Introduction

Governments across Western countries are under pressure to address widening income inequalities, either by strengthening redistributive policies, enforcing statutory minimum wages, or promoting collective bargaining (OECD, 2019b; European Commission, 2020). But altering relative wages could affect the opportunity cost of—and *ex-ante* return to—formal education, influencing the decision to stay in school and the choice between alternative curricula (Neumark and Nizalova, 2007; Long, Goldhaber, and Huntington-Klein, 2015; Altonji, Arcidiacono, and Maurel, 2016). The resulting impact on human capital accumulation and skill mismatch could influence individuals' lifetime earnings and the economy's growth potential in the long run.

While an expanding literature is exploring these implications in the case of statutory minimum wages,[1] relatively little attention has been paid to other wage-setting institutions. This chapter focuses on the effect of collective

[1] For recent examples see Neumark and Shupe, 2019a; C. H. Lee, 2020; A. A. Smith, 2021; Alessandrini and Milla, 2021.

agreements that are bargained at the sector level and affect both unionized and non-unionized workers. Sector-level collective bargaining remains the prevailing wage-setting institution in most European countries, and extension mechanisms to non-signatory parties ensure that the agreements' coverage is greater than union membership figures would suggest (ILO, 2014, pp. 41-67). In fact, collectively-bargained sectoral minima with high coverage are functionally equivalent to national statutory minimum wages (Garnero, Kampelmann, and Rycx, 2015) and are usually set at higher levels in relation to the wage distribution (Boeri, 2012).

Italy provides a relevant case study because its centralized bargaining system sets wage floors that effectively produce minimum wages at the sectoral level (Pagani and Dell'Aringa, 2005; Boeri, Ichino, et al., 2021). Even though limits to the enforcing mechanisms and the liberalisation of the labour market have eroded their bindingness in recent years (Lucifora, 2017; Garnero, 2018), collectively-bargained minimum wages played a prevalent role in shaping the evolution of the wage distribution through the past decades (Devicienti, Fanfani, and Maida, 2019).

The paper focuses on the period between the 1960s and the 1970s. This period provides a quasi-natural experiment thanks to the labour unions' sudden shift in bargaining strategy, from wage moderation to egalitarianism, which dated to the autumn of 1969 and was largely precipitated by exogenous political pressure (Accornero, 1992; Franzosi, 1995). Presenting new data digitized from historical sources, I show that coordinated sectoral bargaining raised the minimum industrial wage, on average, by 14% per year for a decade and reduced the skill premium of blue-collar workers by one third. I hypothesize that this egalitarian wage hike affected teenagers' post-compulsory education through two distinct mechanisms. First, by raising the wage rate for entry-level jobs, it increased the opportunity cost of staying in school for the marginal student. Second, by reducing the skill premium for blue-collar workers, it decreased the *ex-ante* returns to vocational education for manufacturing jobs—relative to other types of specialist curricula—for inframarginal students. Italy's weakly-selective educational system—whereby students that intend to stay in school after the compulsory age of fourteen choose a track and specialist curriculum—allows to disentangle these the two effects. The decision to enroll in post-compulsory school and the track chosen reveal preferences on the desired number of years in school, while the choice between curricula reveals students' expectations regarding the *ex-ante* return to education for each curriculum.

Methodologically, I propose an identification strategy that exploits a contemporaneous but distinct institutional reform: the abolition of nominal wage differentials between geographic areas. Until 1968, minimum wages were bargained at the national level for each industry but their nominal value varied locally according to fixed scaling coefficients. This system was abolished in March 1969 and phased out by the end of 1972, leading to the spatial equalization of nominal minimum wages within each industry. Consequently, provinces that started from lower nominal levels experienced a steeper increase in local minimum wages through the transition period. This differential growth provides a source of exogenous variation in treatment intensity.

Exploiting this reform for identification purposes, I first apply an instrumental variable approach to estimate the average treatment effect of increasing the mean contractual minimum wage on school enrolment. I find that enrolment in post-compulsory secondary school is very responsive to minimum wages established by collective agreements. Estimating the marginal effect across the whole 1962-1982 period, a 1% increase in the local mean industrial minimum wage is associated with an increase in early school leavers by 0.3%-0.45%. The drop in enrolment appears particularly concentrated in vocational schools that prepare for skilled blue-collar jobs in the manufacturing sector.

Secondly, I use the spatial equalization of 1969-1972 as a natural experiment to study the dynamic response of school enrolment between provinces. I do so by treating the reduced form regression as a generalized Difference-in-Differences estimator, which can recover the average causal response to marginal increases in the mean contractual minimum wage, over time. I find that provinces which experienced a steeper minimum wage hike in 1968-1972 saw a significant increase in the number of early school leavers through 1976. By 1980, however, the effect had disappeared. The length of the impact suggests that only cohorts that turned 14 during the wage hike were influenced by it, either because they experienced the treatment first-hand, or because later cohorts were influenced by rising disemployment effects.

Even though the response on in early school leaving was only temporary, it was economically significant. Our estimates can explain four fifths of the reduction in gross enrolment rates that is observed at the national level between the 1970s and the 1980s. The dynamic estimates show that the negative impact on school enrolment was quick but temporary, as enrolment rates reverted to the mean by the early 1980s. These results support the hypothesis that, by setting high entry-level minimum wages with respect to the wage distribution, egalitarian collective agreements increased the opportunity cost of schooling and influenced the decision to stay in school for marginal students.

Repeating the analysis for a subset of school tracks and curricula, I find that the egalitarian wage hike provoked a permanent shift in educational choices for inframarginal students. enrolment in vocational schools preparing for skilled blue-collar jobs showed a negative response three times larger than the average secondary school. Moreover, enrolment remained depressed ten years after the end of the shock and showed no sign of recovery. Vocational schools for white-collar jobs, instead, showed no reaction to the minimum wage hike during the phasing out of the wage zones (1968-1972) nor in the following five years, but possibly a positive effect at the end of the period. These results support the hypothesis that the compression of wage differentials for blue-collar workers permanently reduced the perceived *ex-ante* returns to specialist education. In the long-run, inframarginal students shifted their demand for education towards curricula that were not as affected by the egalitarian wage hike.

These effects are equally found for male and female teenagers, but the larger number of male students enrolled in technical schools for manufacturing before the wage hike imply that the aggregate loss of human capital was due to males' sagging enrolment. Counterfactual estimates find that the sag in male enrolment caused a substantial loss for Italy's potential human capital stock (between 1.3 and 2.3 million graduates), which explains between 25% and 44% of the current lag in educational attainment with respect to the OECD average. This finding suggests that Italians' comparatively low educational attainment is not only a consequence of the late expansion of mass education, nor just a constant feature of the educational system, but also the consequence of a contingent compression in enrolment rates that, whilst temporary, will continue to linger on Italy's growth potential until the affected generations will exit the labour force.

The chapter's contribution is threefold. First, it complements the growing literature on the impact of statutory minimum wages on post-compulsory education (Neumark and Shupe, 2019a; C. H. Lee, 2020; A. A. Smith, 2021; Alessandrini and Milla, 2021) by studying the influence of collective agreements with extra coverage, a hitherto unexplored connection. Moreover, the paper distinguishes between the decision to enroll in post-compulsory education and the choice of alternative tracks and curricula, which is relevant for the many countries that allow students to choose between different school tracks (Ariga et al., 2005; Manning and J.-S. (Pischke, 2006; Brunello and Checchi, 2007; Betts, 2011).

Second, the chapter contributes to an expanding literature within economic history that studies the institutional determinants of educational development since the 19th century (Mitch, 2013; Mitch and Cappelli, 2019), and in Italy specifically (Cappelli and Ciccarelli, 2020). This recent stream of research has focused on the institutional legacy of former states (A'Hearn and Vecchi, 2017; Ciccarelli and Weisdorf, 2019), the expansion of primary education (see for instance Vasta and Cappelli, 2020) and, more recently, on the reform of lower secondary school in the postwar period (Cappelli, Ridolfi, and Vasta, 2021).

The paper extends the analysis to upper secondary education at the time of its mass expansion and presents a breakdown of enrolment by sex and type of school. The paper establishes the relevance of the pause between the 1970s and the 1980s for Italy's human capital stock, and identifying its intermediate and root causes.

Third, the chapter connects with research on education inequalities in contemporary Italy. While the current research on the Italian case focuses predominantly on educational inputs and parental background to explain unequal attainment within cohorts (Checchi, 2003; Checchi and Flabbi, 2007; D. Contini and Scagni, 2010; Ballarino, Bison, and Schadee, 2011; Ballarino, Panichella, and Triventi, 2014; Panichella, 2014; Ballarino and Panichella, 2016; D. Contini, Di Tommaso, and Mendolia, 2017; D. Contini, Cugnata, and Scagni, 2018; Giancola and Salmieri, 2020; Ballarino, Meraviglia, and Panichella, 2021), this chapter studies inequality between cohorts focusing on labour market factors that affect the demand for upper-secondary education.

The rest of the chapter is organized as follows: section 3.2 presents the historical background, formulates the hypotheses and provides descriptive evidence; section 4.3 discusses the data; section 3.4 presents the identification strategy; section 3.5 provides the results of the analysis and the discussion of the counterfactual scenarios; section 3.6 concludes.

3.2 Historical background and hypotheses

3.2.1 The rise of contractual minimum wages after 1969

Since the early 1950s, wages in the manufacturing sector were regulated by collective agreements signed at the industry level between the most representative labour unions and the employers' association. For each sector, the agreements established minimum wage scales according to the workers' skill level, which depended on the tasks performed on the job (Traversa, 1975).[2] These minimum wages represented a major component of the workers' take-home pay, and

[2]The sectoral agreements provided representative lists of the most common tasks in the industry and objective criteria to classify workers (Giugni, 1963, pp. 327-346).

firm-level agreements could only improve on their terms.[3] While in theory the wage floor only applied to unionised workers and/or to employees of firms that were members of signatory employers' associations, it was *de facto* applicable to non-covered workers through the courts—thus providing extra coverage via judiciary extension.[4]

During the 1950s and through most of the 1960s, labour unions followed a strategy of wage moderation (Bedani, 1995). As a consequence, contractual wages lagged behind productivity for two decades. However, union membership dwindled as growing numbers of young workers joining the labour force remained unsatisfied with the unions' strategy (Checchi and Corneo, 2000). Between the autumn of 1968 and the spring of 1969, grassroots movements organized workers outside of traditional labour unions, requesting higher wages and better working conditions. To avoid losing their capacity to represent workers, in the autumn of 1969 union leaders begrudgingly but decisively adopted a new bargaining strategy, requesting higher entry-level wages, more equal pay, and strengthening workers' rights (Lange and Vannicelli, 1982). Consequently, minimum sectoral wages outpaced productivity growth until the end of the 1970s, when macroeconomic conditions and factional differences within the

[3] Other fixed components of the workers' earnings were the inflation 'bonus' (*contingenza*), which was tied to the movements of a nationally-defined price index; seniority and family bonuses which depended, respectively, on experience at the current employer and on the marital and parental status. The only components that could be bargained at the firm level were collective and individual productivity premiums (*superminimo collettivo* and *superminimo individuale*). Additionally, wage earnings could be increased individually by working overtime or at piecework (Guidi et al., 1971, pp. 36-37).

[4] Article 39 of the Republican Constitution in principle dictate that collective agreements would be effective *erga omnes* provided that the signatory labour unions were organized as registered democratic organizations. However, due to the unions' opposition, the article was never regulated by legislation and, consequently, all collective agreements remain private contracts between the signatories and their members. Attempts to extend their coverage through legislation (Law 751/59 'Vigorelli') failed in 1960, due to the opposition of the Constitutional Court. Nonetheless, judicial coverage has been consistently motivated with reference to article 36 of the Constitution, which recognizes the workers' right to a fair wage—i.e. one that is proportionate to the quantity and quality of the job and in any case sufficient to ensure a free and decent livelihood for them and their households. Judicial practice identifies as 'fair' the wage level bargained between the most representative labour unions and employers' association for each sector and type of job. The courts' power to apply the contractual minimum wage in case of an inferior private agreement between the worker and the employer is justified with reference to article 2099 of the Civil Code (Martone, 2016, pp. 103-158; Lucifora, 2017; Treu, 2019; Ponterio, 2019).

workers' movement led to a new period of wage moderation (Accornero, 1992).

Due to the prevalence of sectoral collective agreements in wage determination, the average wage floor for workers performing low-skill tasks (henceforth, *low-skill workers*) represented the *de facto* minimum wage for legal employment in manufacturing. Figure 3.1 shows its evolution across twenty-four industrial sectors from 1962 to 1982, at constant prices (sources and harmonization procedures are described in detail in appendix A.1). The series shows that the average minimum wage in industry remained stable at comparatively low levels during the 1960s—when unions followed wage moderation—, but starting in 1969 it experienced rapid growth, which decelerated only in the early 1980s. In real terms, the average minimum wage for low-skill workers in industry grew by an annualized rate of 14.6% per year between 1968 and 1980 (ranging from 8% in constructions to 24.2% in food and beverage).[5]

The minimum wage hike was especially concentrated in two sub-periods: 1969-1972 (+40%) and 1975-1978 (+31%). Growth in the former period was entirely caused by coordinated collective bargaining at the sector level (Dell'Aringa, 1976). Growth in the latter period, instead, was also due to the reform of the wage indexation system in 1975, which provided lump some wage raises in each quarter for every percentage point increase in the reference price index (Spaventa, 1976; Modigliani and Padoa-Schioppa, 1977). To avoid confusion between the two causes and keep the focus of the paper on the role of collective agreements, the identification strategy will only exploit the wage hike of 1969-1972.

[5]It should also be noted that, before 1969, those under 21 years of age received lower contractual minimum wages than prime age workers, according to sectoral scales. For example, the 1966 collective agreement for state-owned enterprises in the engineering sector established that the minimum wage floor for low-skill blue-collar workers between the age of 16 and 18 was only 74% of the adults' rate, and for workers under 16 it was just 52% (FIM, FIOM, and UILM, 1966, pp. 236-237). However, post-1969 agreements significantly reduced these age differentials: by 1971 the reduced wage rate for under 16 was scrapped (FIM, FIOM, and UILM, 1970, pp. 255-308) and, in the following years, all age differentials would entirely disappear from most collective agreements. As a consequence, the rise in minimum wages during the 1970s was even steeper for teenagers than for prime age workers.

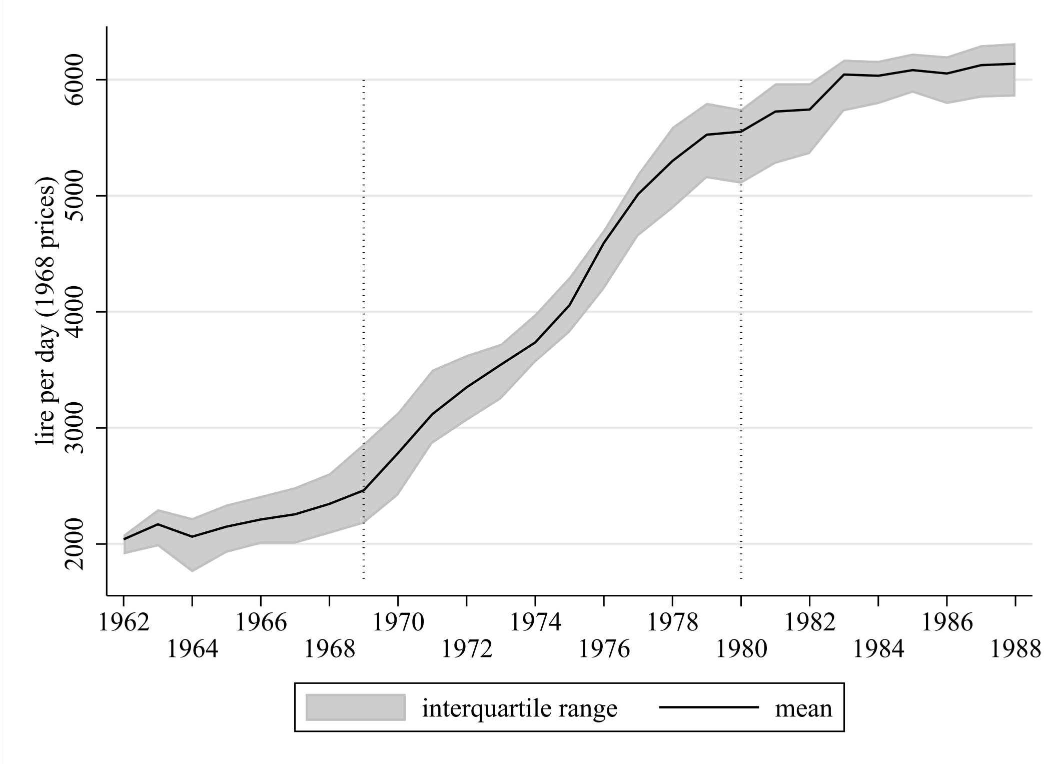


Figure 3.1: Minimum wage in manufacturing

Minimum wage floor for low-skill blue-collar jobs according to sectoral national collective agreements across 24 industrial sectors (manufacturing proper, mining, energy and construction) in ninety-two provinces. Sectoral minima are weighted using the estimated number of employees in each sector-province cell. The estimated number of employees is obtained as the linear interpolation from decennial industrial censuses. Details on sources and estimation strategy are provided in appendices A.1 and A.4. Conversion at constant 1968 prices performed using official coefficients from Istat, *Il valore della moneta in Italia dal 1861 al 2020*, available for download at `https://www.istat.it/it/archivio/258610` (last retrieved July 2022). Dotted vertical lines indicate 1969 and 1980, respectively the beginning and the end of the contractual wage hike.

3.2.2 The compression of the skill premium for blue-collar workers

The strategic turn of the labour unions with respect to collective bargaining after 1969 affected not only the growth rate of the contractual wage floors, but also the wage distribution of dependent workers in general and blue-collar workers in particular. In fact, both the rapid growth of entry-level wage floors in manufacturing and the reform of the wage indexation system in 1975 were strongly egalitarian, causing the minimum wages for low-skill blue-collar workers to increase faster than for all other groups. This resulted in a compression of the wage distribution both within blue-collar workers and between them and other categories (Erickson and Ichino, 1995; Manacorda, 2004).

To quantify the compression of the wage distribution within blue-collar workers I have reconstructed the skill premium for high-skill blue-collar workers using the tabulations from surveys conducted by the Ministry of Labour on a representative sample of manufacturing establishments between 1965 and 1974, and a similar source for 1984-1988. The skill premium is computed as the ratio between the average hourly effective wage of high-skill and low-skill blue-collar employees across all manufacturing sectors (excluding mining, construction and utilities). Figure 3.2 shows that, on average, this skill premium decreased by 56% between 1968 and 1980.[6] The rigid structure of the centralized wage-setting system implied that changes to the wage distribution were channelled through the collective agreements. In fact, the drop of the skill premium followed closely the evolution of the contractual wage floors: Figure 3.2 shows that, in 1968, the ratio between the average wage floors for high-skill and low-skill blue-collar workers was 1.35, but it dropped to 1.10 by 1980.

The egalitarian turn in collective bargaining also affected the wage distribution between blue- and white-collar workers, mainly due to a reform of the wage-setting mechanism in 1972 (*inquadramento unico*) which introduced a single wage floor scale for both blue-collar and white-collar workers, effectively equalizing the entry-level wages for low-skill workers in both manual and clerical jobs (Libertini, 1974). However, the extent and significance of the compression varied between sectors and groups of workers. The average contractual wage floor for blue-collar workers outpaced the white-collar workers' minima in industry, but not with respect to the service sector (see Figure 2.7). Moreover, in the industry sector between 1968 and 1984 the skill premium for hig-skill white-collar workers decreased by 29%, less than for high-skill blue-collar workers (-40% in the same period), and it remained higher in lev-

[6]The gap in the series is filled with the 75th-25th percentile ratio, which I estimate from the population of matched employer-employee administrative microdata for the region of Veneto, which has been shown to be largely representative of the national distribution for the wage earnings of blue-collar workers (Devicienti, Fanfani, and Maida, 2019).

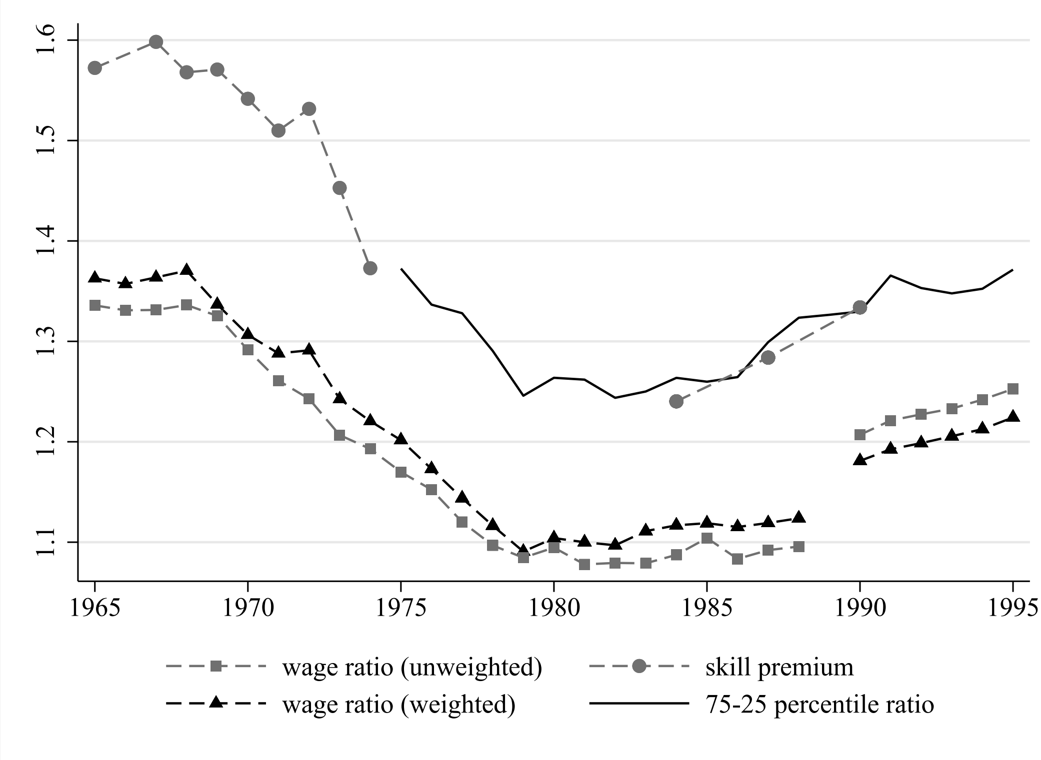


Figure 3.2: Wage ratio, skill premium and wage dispersion

Skill premium: ratio of the average hourly effective wage of blue-collar workers classified in the high-skill category over that of workers classified in the low-skill category in the manufacturing sector. Own elaborations on aggregate survey data from Ministero del Lavoro, *Statistiche del lavoro*, 1966-1975 and from *Rassegna di statistiche del lavoro*, several years, for 1984-1990. *Wage ratio*: minimum wage by collective agreement for most skill-intensive job class to the least for blue-collar workers in 19 industries (18 for 1990-1995). Own elaborations on contractual wage data from Istat *Statistiche industriali*, Roma, 1955-1990 and *Id.*, *Indagine sulle retribuzioni contrattuali*, Roma, 1998. Wages for 1965-1988 are weighted by the number of employees in the industries and 94 provinces, interpolated from the industrial censuses of 1961, 1971, 1981 and 1991. Wages for 1990-1995 are weighted by the number of employees in 18 sectors interpolated from the industrial censuses of 1981, 1991 and 2001. Armonized census data is extracted from Istat (2014). *Wage dispersion*: ratio of the 75th percentile to the 25th percentile from the distribution of weekly wages of blue-collar workers in the Veneto region. Weekly wages computed from Veneto Worker Histories data for thirteen industries. Weekly wages computed dividing total gross wage per employment spell by the number of weeks worked or, if unavailable, the number of days worked divided by 5.5. In case of multiple employment spells for the same worker and year, only the longest spell was used. Employment spells shorter than 16 weeks have been excluded. The dataset has been trimmed to exclude observations in the 1st and 99th percentile. The resulting sample size is 7,896,796 employment spells for 1,060,713 distinct workers from 1975 to 2000. See data appendix for harmonization methods.

els (1.8 in contrast to 1.35).[7] Hence, this evidence suggests that egalitarian

[7] A similar evolution is described by the P75-P25 ratio. These computations are performed on the same sources detailed in the note of Figure 3.2 and are available upon request.

collective agreements compressed the wage distribution for all workers, but with heterogeneous distributional effects. While nominal wages increased for all workers, high-skill blue-collar workers were relative losers, as they saw their skill premium rapidly eroding.

3.2.3 Implications for the demand of education

In summary, egalitarian collective bargaining after 1969 caused a steep increase in the entry-level wage for manufacturing jobs and a strong compression of the skill premium for blue-collar workers. Could this influence enrolment in post-compulsory education? To formulate some testable hypotheses, it is necessary to separately address the implications for the opportunity cost of schooling and the return to education.

3.2.3.1 Implications for post-compulsory school enrolment

In a standard framework of human capital investment (Becker, 1993), an individual's demand for education is a positive function of the expected return, which is derived by comparing the discounted value of future earnings—net of any financial and psychological costs of education—with the earnings that can be obtained on the labour market at the individual's current endowment of human capital (Checchi, 2006, pp. 18-35). Hence, *ceteris paribus*, the minimum wage hike could indirectly reduce the demand for education by raising the opportunity cost of staying in school. The immediate consequence would be an increase in the risk of dropout for the marginal student, that is an individual who—given their ability, preferences and intertemporal discount rate—was indifferent between school and work before the wage hike (Neumark and W. L. Wascher, 1995; Mohanty and Finney, 1997; Neumark and W. L. Wascher, 2003; Neumark and Shupe, 2019b; C. H. Lee, 2020; A. A. Smith, 2021). Assuming that marginal students were equally distributed across schools, we would predict a general decrease in post-compulsory educational attainment.[8]

[8] In fact, the choice of school track in the Italian educational system was strongly influenced by the student's socio-economic background, most importantly parental occupation (Panichella, 2014). Vocational education for manufacturing jobs was the favourite option among the male children of blue-collar workers. A survey conducted by Istat on 88% of all

This second-order effect, however, would be contrasted by the potential first-order effect of the minimum wage hike on teenagers' unemployment. Theoretically, a high enough minimum wage is expected to increase unemployment, even though how high the minimum wage should be set to cause disemployment effects is contingent on the degree of monopsonistic power in local labour markets and on the bite of the minimum wage (Neumark, Salas, and W. Wascher, 2014; Manning, 2021). If the minimum wage has strong enough disemployment effects among young people—who are typically less skilled than the average worker and thus more probable to receive earnings close to the minimum wage rate—we would expect students to stay in school rather than remain idle. In fact, some research argues that statutory minimum wages increase schooling by incentivizing teenagers to acquire more skills which would make them productive enough to be employed by firms at the higher wage rate (Mattila, 1981; Belman and Wolfson, 2014, pp. 209-217). Contrarian research notices that the effect can be heterogeneous between groups of teenagers (depending on age, sex, parental and socio-economic background, etc.) leading to polarisation in educational attainment and to lower completion rates of further education (Ehrenberg and Marcus, 1982; Landon, 1997; Crofton, W. L. Anderson, and Rawe, 2009). For these reasons, the net effect of the minimum wage hike on school enrolment cannot be anticipated, and we will need explore the impact on youth unemployment during the analysis.

Historically, it is important to test for the effect on unemployment because the 1970s are considered a decade of relatively high youth unemployment in Italy (Pugliese and Rebeggiani, 2004, pp. 78-87). While unemployment rates remained at low absolute levels with respect to the following decades, in com-

upper secondary school graduates in the academic year 1966-1967 found that over 44% of male children of blue-collar workers graduated from this path, followed by 18% choosing technical schools for white-collar jobs, and 12% opting for technical schools for jobs in the construction sector; only 28% of male children of blue-collar workers graduated from non-vocational tracks (Istituto Centrale di Statistica, 1971, pp. 397-399). Since the probability of being a marginal student was plausibly higher for this group—surveys found a a greater sensitivity to the opportunity cost of schooling and liquidity constraints than the average secondary school student (Padoa Schioppa, 1974)—, we would expect the reduction in enrolment to be proportionally greater in vocational schools.

parison to prime-age rates they surged at historical highs: the unemployment rate of 15-19 years old rose from five times the prime age rate in 1965 to twelve times in 1975, while that of 20-24 years old increased from three to seven times (see Figure 3.3). This period of high relative youth unemployment continued into the 1980s, at which point prime age unemployment reduced the distance to youth rates. Nonetheless, high relative youth unemployment has remained a feature of the Italian labour market with respect to comparable European economies. The formation of this dualistic labour market has been attributed, among other causes, to high employment protection for dependent workers and high entry-level wages, which would cut young people out of the formal labour market and direct them into the informal economy, which swelled in the same years (B. Contini, 1979, pp. 15-57). Support for this thesis is provided by the composition of unemployment, for the growth of youth unemployment was mainly concentrated among first job seekers (Reyneri, 1996, pp. 189-230).

Even though we do not aim to establish the root causes of the Italian dual labour market, these observations are relevant for assessing the plausibility of our interpretation with respect to school enrolment. If we find an immediate large disemployment effect of the minimum wage hike on first job seekers, it would be necessary to justify why marginal students would leave school early only to face a greater risk of unemployment and/or a longer waiting time to enter the formal labour market. If, instead, we do not find such an effect—or we find it with a delay—we could argue more convincingly of the negative impact on schooling choices.

3.2.3.2 Implications for the choice of school field

The second potential influence of egalitarian collective agreements on school enrolment acts through the compression of the skill premium in manufacturing jobs, which could affect the choice between alternative school tracks and curricula (for short, school field). Basic models of human capital accumulation treat schooling as homogeneous in providing general knowledge to students—that is, skills that can be used in any occupation. In contrast, Altonji, Blom,

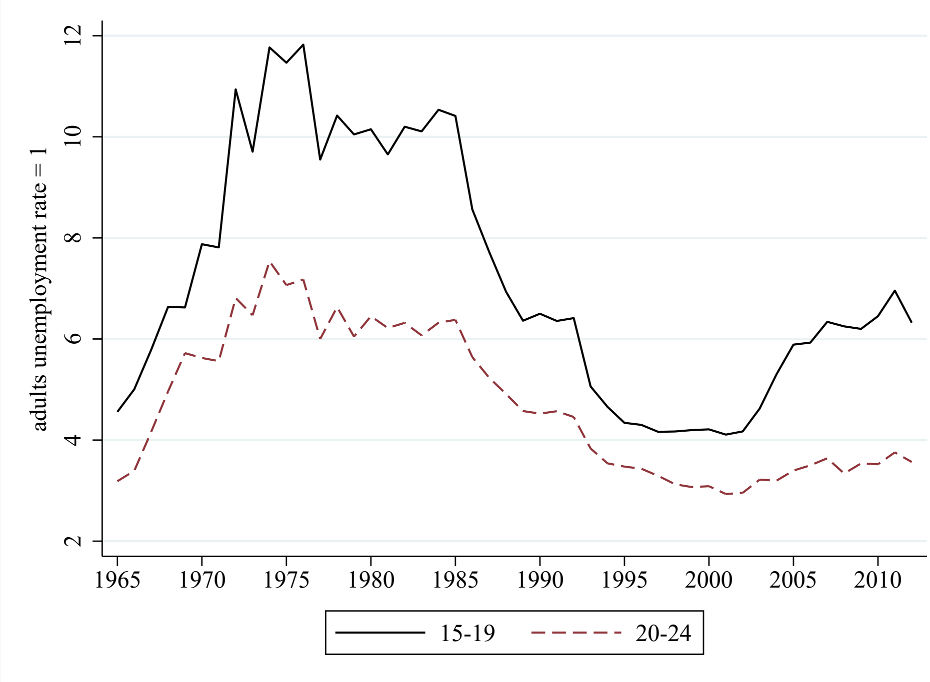


Figure 3.3: RELATIVE YOUTH UNEMPLOYMENT RATES

Relative unemployment obtained by dividing the unemployment rate for each group divided by the unemployment rate for over 25-years-old, including men and women. Unemployed include first job-seekers and people previously employed. For 1965-1969, own elaborations on Istituto Centrale di Statistica (1966a, p. 52), Istituto Centrale di Statistica (1967a, p. 70), Istituto Centrale di Statistica (1968b, p. 72), Istituto Centrale di Statistica (1969a, p. 72), and Istituto Centrale di Statistica (1970, p. 108). For 1970-2012, own elaborations on data from U.S. Bureau of labour Statistics, *International comparisons of Annual labour Force Statistics, 1970-2012*, June 7, 2013, tables by country, available for download at `https://www.bls.gov/fls/flscomparelf.htm`. From 1965 to 1968, the 15-19 group includes 14-year-olds.

and Meghir (2012) present a model where schools are heterogeneous in the provision of specialist knowledge—that is, knowledge that can be directly applied only to a limited range of occupations. In this model, 'the field of education conditions occupational path' (Altonji, Blom, and Meghir, 2012, p. 186), so the choice of a school field over another depends in part on the predicted (*ex ante*) relative return to the specialist knowledge that it offers.[9] This model has been shown to explain the choice of college field, for the return

[9] In the model, the individual maximizes her expected utility which depend on current consumption and on the expected value in the labour market for graduating in the chosen field, conditional on occupational random shocks and a set of factors—including beliefs about personal ability and preferences—that are influenced by previous experience and parents' genetic, cultural, and financial influence (Altonji, Blom, and Meghir, 2012, p. 187-197; see also Altonji, Arcidiacono, and Maurel, 2016, pp. 333-342).

to education can vary significantly between different specialisations (Long, Goldhaber, and Huntington-Klein, 2015; Altonji, Arcidiacono, and Maurel, 2016; see also M. C. Berger, 1988 for an early formulation).

The same intuition can be applied to post-compulsory education in Italy. At the time, Italy was characterized by a weak tracking system at the upper secondary level, which is schematically represented in Fig. 3.4. After passing a leaving exam from lower secondary school, at age 14 students could leave school or enroll in upper secondary courses. In the latter case, they had to choose between three main tracks and a range of curricula. With respect to the track, the choice was between professional schools, technical schools and general academic schools. Both professional and technical schools were vocationally-oriented, but they were differentiated because the former were focused less on theoretical contents and more on practical applications.[10] Within each track, schools offered distinct curricula, which students could not mix or modify at will. Professional and technical schools offered four main curricula, each geared towards a different economic sector: agricultural, construction, industrial, and 'business' (i.e. imparting specialist knowledge for clerical jobs).[11] Academic schools (*licei*) offered traditionally a humanistic curriculum (*classici*) but there was a significant share of students enrolled in schools offering a scientific curriculum (*licei scientifici*).[12]

Assuming that vocational schools offering an industrial curriculum were the only ones to provide specialist knowledge for manual jobs in manufacturing, the compression of the skill premium for blue-collar workers would decrease their relative expected returns. This would reduce the incentive for inframarginal students enrolling in upper secondary education to choose vocational schools

[10] In addition, professional schools gave students the option to leave school with a professional qualification after three years (age 16) rather than staying until the completion of the usual 5-year grades. Professional schools did not give access to university courses, unlike technical schools.

[11] Other technical and professional schools offered curricula preparing for careers in the merchant navy, in hospitality, and for artistic professions (figurative arts, music, design, etc.).

[12] Other schools qualified to become teachers or offered curricula specifically geared towards female students (technical and vocational schools 'for girls', which taught skills for artisanal and secretarial jobs).

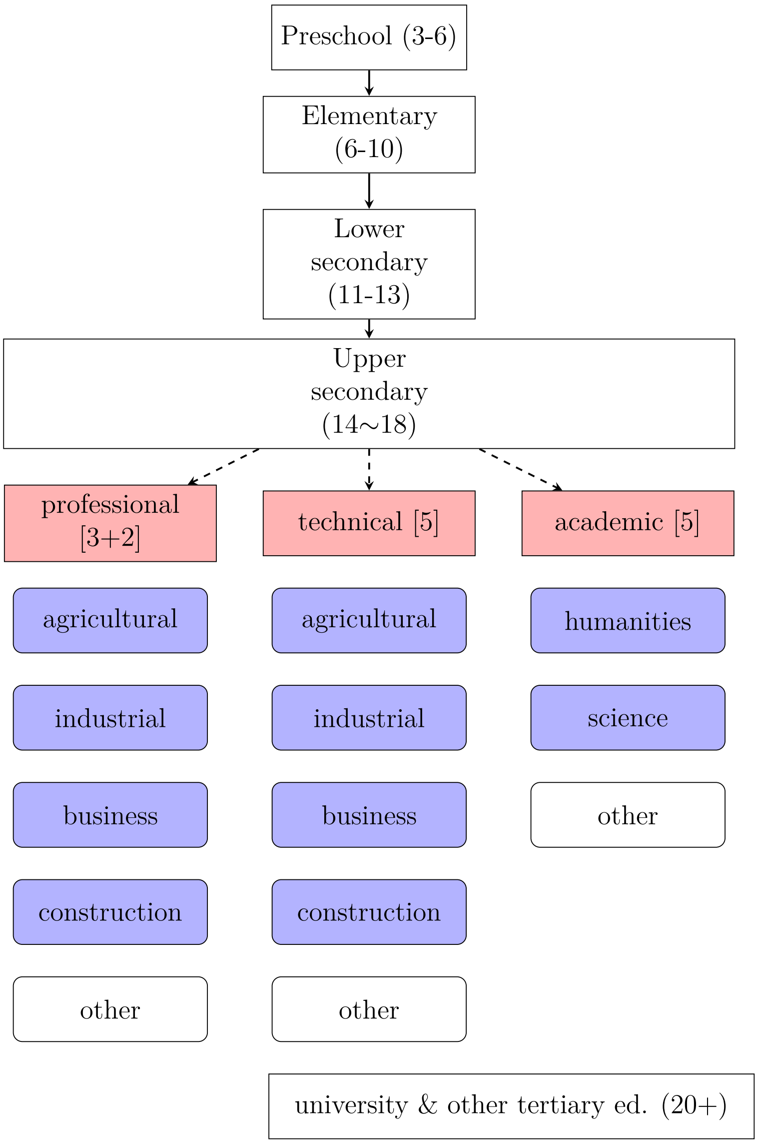


Figure 3.4: TRACKING AND CURRICULA IN THE EDUCATIONAL SYSTEM, 1960S-1980S

This schematic representation highlights the three tracks facing pupils at age 14 (in red) and the main curricula within each track (in blue rectangles with rounded corners). Numbers in parentheses indicate the representative age for each level of school. Numbers in brackets indicate the minimum number of years required to obtain the leaving qualification within each track. 'Other' curricula include professional and technical schools for the merchant navy (*istituti professionali marinari* and *istituti tecnici nautici*), female professional and technical schools (*istituti professionali femminili* and *istituti tecnici femminili*), schools preparing teachers at different educational levels (*scuole magistrali*, *istituto magistrale*, etc.), and schools for artistic jobs (*scuole d'arte*, *istituti d'arte*, *licei artistici*; *conservatori di musica*, etc.). New curricula were added within each track over time, including professional and technical schools for hospitality (*istituti professionali alberghieri* and *istituti tecnici per il turismo*) and technical schools for low-management jobs (*istituti tecnici per periti industriali*) in the 1960s, and an academic track with a modern languages curriculum (*licei linguistici*).

for industry. *Ceteris paribus*, we would predict a shift in the composition of enrolment in favour of other curricula and/or tracks.

The assumption that vocational schools with an industrial curriculum prepared specifically for skilled blue-collar jobs in manufacturing is supported by historical evidence. An official survey on the hiring practices of over six thousand large firms in 1960 found that 60% of employers required an upper-secondary qualification from technical or vocational schools for supervisors on production lines, and 40% of the surveyed firms applied the same requirement for high-skill manual jobs. In contrast, about 50% of firms maintained that for simpler industrial jobs a lower-secondary school diploma was sufficient, and only 32% were satisfied with a primary school qualification (Istituto Centrale di Statistica, 1964b, p. 25).[13]

However, we cannot exclude that the minimum wage hike of 1969 disproportionately reduced the creation of blue-collar jobs in manufacturing (for instance, because firms could respond with labour-saving technical change). In this case, the minimum wage hike would decrease the expected returns to specialist education not through the compression of the skill premium but rather through the decrease in employment opportunities. Our estimation strategy accounts for this possibility by controlling for the share of local GDP produced in the industry sector, which proxies for changes in the composition of the sectoral structure.

3.2.4 Descriptive evidence on post-compulsory education

To summarize, we have hypothesized that the egalitarian wage push could affect schooling choices through two distinct channels. First, the steep rise

[13]The surveyed firms (covering 26% of dependent workers in manufacturing) also expected to increase by 1.5 times the number of employees with an upper-secondary school diploma from vocational manufacturing schools, at a time when overall labour demand was expected to grow only by 15%. Demand for employees with lower education was predicted to increase by just 7% (Istituto Centrale di Statistica, 1964b, p. 33). It also appeared that demand outstripped supply for the more skilled roles: technical graduates with an industrial curriculum alone made over 34% of all unfulfilled vacancies in manufacturing (Istituto Centrale di Statistica, 1964b, p. 48).

in the average minimum wage increased the opportunity cost of staying in school for the marginal student, raising the risk of dropping out. Second, the egalitarian compression of the skill premium for blue-collar workers reduced incentives to invest in specialist education for manual manufacturing jobs. These implications would predict post-compulsory school enrolment to decrease in the aftermath of the minimum wage hike. This decrease would be especially evident in vocational schools preparing for manufacturing jobs. In the medium term, we would expect a shift in the composition of school enrolment between tracks and curricula. This section presents some descriptive evidence in favour of the hypotheses.

Figure 3.5 shows that enrolment and graduation rates in post-compulsory upper secondary education (age 14-18) followed a path of sustained expansion through the 1950s and the 1960s, starting from low absolute levels in the postwar period.[14] This expansion, however, decelerated in the first half of the 1970s and halted entirely in the second half of the decade, when only one in two young Italians enrolled in secondary school. enrolment and graduation rates would return to their pre-trends only in the late 1980s, finally leading to levels of educational attainment over 90% in the first half of the 2000s. The temporary pause of post-compulsory education in the 1970s is a characterizing feature of the slow expansion of secondary education in Italy with respect to other Western countries (A'Hearn and Vecchi, 2017).

What might be the proximate causes of this pause? By distinguishing enrolment rates according to the students' sex, Figure 3.6 shows that the pause of the 1970s was largely explained by male teenagers failing to transition from lower secondary education (age 11-13) to upper secondary education. The

[14] Gross enrolment rates are computed as the ratio of the total number of students enrolled in the academic year over the total population in the theoretical age group of school attendance (11-13 for lower secondary school, 14-18 for upper secondary). Academic years in Italy started at the beginning of October and finished in June in the period under consideration. For short, the academic year is defined by the year of the first term, so 1961 stands for 1961-1962. This is preferred because it gives greater relevance to the year when students chose between schools (usually, between January and September prior to starting school).

Figure 3.5: ENROLMENT AND GRADUATION RATES IN UPPER SECONDARY SCHOOL

Gross enrolment rate computed as the ratio between number of students and population between 14 and 18 years old. Gross graduation rate computed as the ratio between the number of high school graduates and the 18-year old population. Computations on data from Checchi, 1997.

former had considerably expanded in the postwar period: thanks to the high demand of semi-skilled workers in the fast-growing economy and a 1962 reform that instituted a comprehensive educational system (Brunello and Checchi, 2005; Cappelli, Ridolfi, and Vasta, 2021), enrolment in lower secondary school doubled in less than a decade, reaching 76% of all children by 1965 and virtually 100% ten years later (Checchi, 1997). The expansion of lower secondary education pulled enrolment in post-compulsory secondary schools throughout the 1960s, with enrolment rates reaching 50% for males. However, starting in the early 1970s, the expansion of male enrolment in upper secondary education slowed significantly—the annual growth fell from a five-year moving average of 8% in 1951-1969 to 3% between 1970 and 1975—, and sagged through the following ten years: in 1985, the gross enrolment rate was about the same as in 1976

(56.4% and 56.7%, respectively). Female enrolment also slowed down after the growth spurt of the early 1960s, but it did not come to a halt, which allowed it to catch up with the men's rate in 1985. The expansion of male enrolment resumed after 1985 at the same rate as the female, with enrolment rates for both sexes overcoming 80% around 1995 and 90% in the early 2000s: a thirty-year delay with respect to lower secondary education.

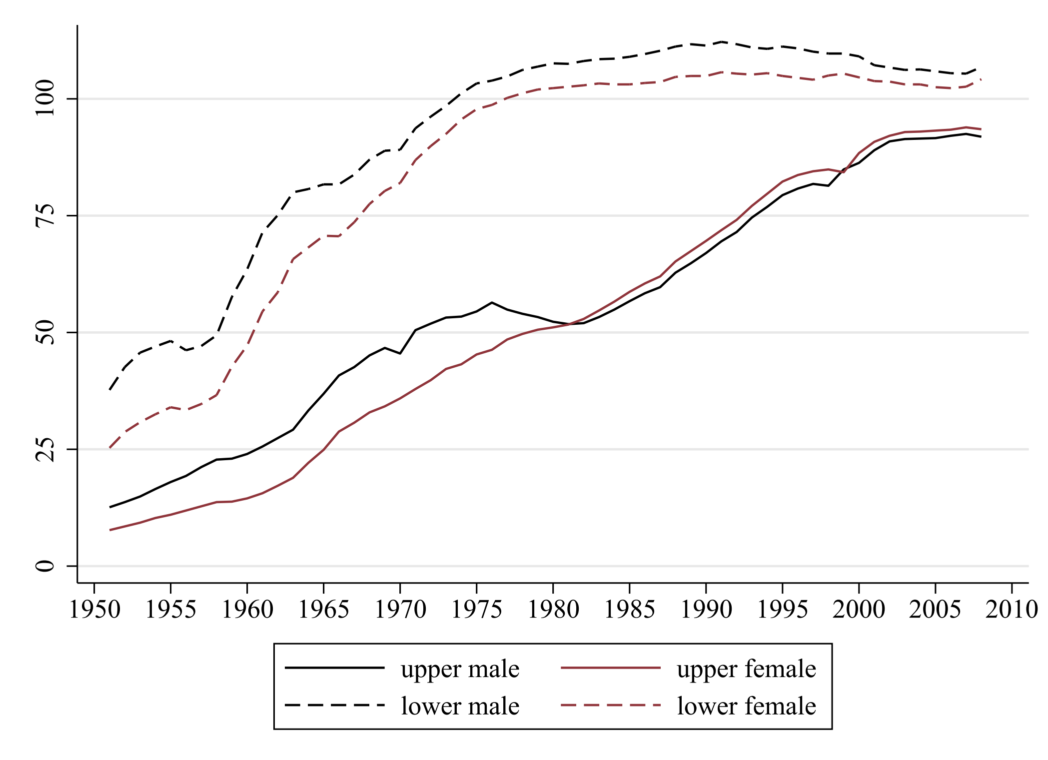


Figure 3.6: ENROLMENT IN LOWER AND UPPER SECONDARY EDUCATION BY SEX

Gross enrolment rates in lower secondary education (age 11-13) and upper secondary education (age 14-18) by sex. Rates can be greater than 100 due to students repeating grades, students enrolling before the standard age, and students not officially residing in Italy. Years are defined as the calendar year at the start of the academic year (i.e. 1951 stands for academic year 1951/52). Data from 1998 to 2000 are estimated in the source due to gaps in coverage. Source: Istat (2011, p. 369).

Why did post-compulsory school enrolment evolve differently by sex after 1969? One possible explanation has to do with sorting between school tracks and curricula. Figures 3.7a and 3.7b show the evolution of enrolment rates for women and men, respectively, distinguishing between the top-six types of schools, by track and curriculum, and a residual category. For female students, technical schools with a business curriculum were the fastest-growing choice through most of the period, experiencing slow but continuous increases from the 1950s through the mid-1970s. By 1975 they overtook women's traditional first choice—schools preparing for teaching jobs. A similar evolution was followed by professional schools with business curricula, although with a delay and slower rate of growth. All the traditional choices stagnated in the second half of the 1970s, but overall enrolment was pulled by residual options, foremost academic schools with a foreign languages curriculum. Thanks to the expansion of these alternative options, total enrolment rates among females continued expanding throughout the period.

The fastest growing curriculum among male students, instead, was the industrial. Its expansion accelerated dramatically in the second half of the 1950s through 1965, and continued to grow at high rates in the following years. By the end of the decade, over one in four male pupils was enrolled in a technical school preparing for manufacturing jobs.[15] However, the expansion of technical schools with an industrial curriculum slowed down in the first half of the 1970s, and enrolment sagged through the following decade. The only type of school to show a similar sag for male students was the academic track with a scientific curriculum, which had experienced comparatively fast growth in the previous decade. Male enrolment in most other school types stagnated through the 1970s: professional schools for manufacturing had expanded significantly between 1965 and 1975, but they made little progress in the following fifteen years, which suggests that they did not compensate for the missing students in

[15]Including professional schools, the share of male students enrolled in upper secondary education preparing for manufacturing jobs reached 40% in 1970. enrolment in technical schools was buttressed by the extension of university access in 1965, which removed existing caps to the number of technical school graduates that could enroll in higher education. Using data for students in Milan, N. Bianchi and Giorcelli (2020, pp. 2617-2619) find that the reform increased graduates in STEM degrees that originated from technical schools, although the effect of this positive shock waned in the early 1970s. Transition rates from upper secondary school to university, in fact, increased almost continuously from 1954 to 1970, rising from a historical low of 40% to a peak of 67%. However, university students from technical schools remained a minority, and their family background often implied a greater necessity to work part-time, which increased the time to graduation and the risk of dropping out (Martinotti, 1969, pp. 89-204).

the technical schools with a similarly-oriented curriculum.

A compensatory effect can instead be detected with respect to technical schools with a business curriculum: a growth spurt around 1975 made this type of school the second most favourite choices among male teenagers, even though it never reached the enrolment rates of the technical schools with an industrial curriculum. No compensatory dynamics can be detected within the academic track, instead, for the traditional humanities curriculum continued to follow a downward trend that had initiated in the late 1960s, and the new curricula (e.g. foreign languages) were not as popular among male teenagers as their female peers—in 1983, just over one male enrolled for every ten females.

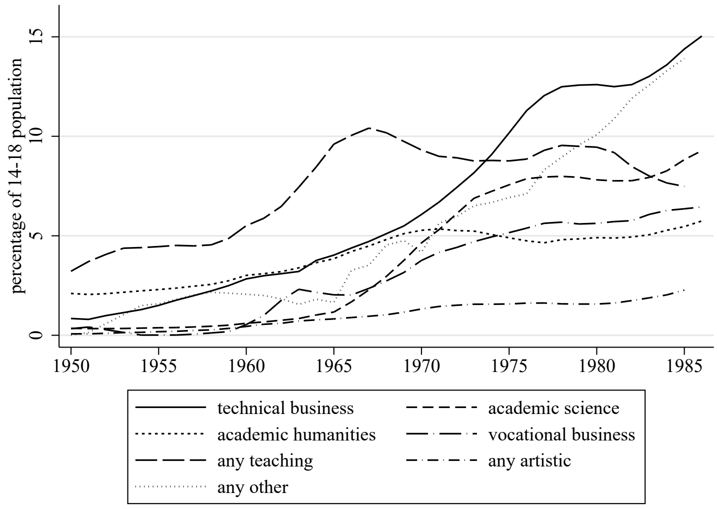
This evidence suggest that the pause in the expansion of secondary school observed between the 1970s and the 1980s can be largely ascribed to male teenagers, whose enrolment rate in technical schools for industry dropped by 25% between 1973 and 1982 (respectively, its peak and through). Female enrolment in this type of schools also stagnated in the second half of the 1970s, following a decade of continuous growth; however, females amounted to only 3.3% of the total students enrolled in this type of schools in 1973—in fact, only 1.2% of female secondary school students opted for technical schools for manufacturing, compared to over 20% choosing technical school for business in the same year.

It is worth noting that, despite significant geographical differentials in enrolment levels, the bell-shaped trajectory of enrolment in technical schools for manufacturing was replicated across all of Italy's macroregions. Figure 3.8 shows that gross enrolment rates were predictably higher in the industrial core than in the South and especially in the Islands, but all areas exhibit rapid growth in the 1960s followed by stagnation in the first half of the 1970s and decrease in the second half of the decade.[16] The contrast between the two periods is most accentuated in the North-Western provinces, but the decline in

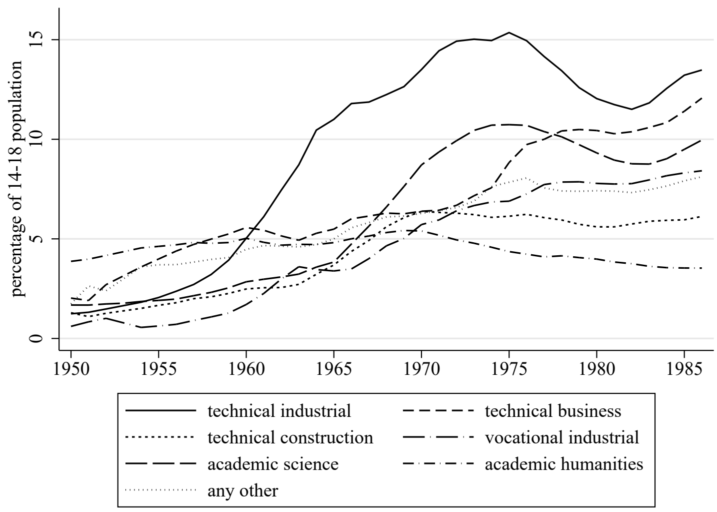
[16]Historical path dependency caused Southern Italy (including Sicily and Sardinia) to start from lower enrolment rates in secondary schooling than the rest of the country in the postwar period (A'Hearn and Vecchi, 2017).

enrolment rates can be identified in all areas. The downturn appears to start around the same time for most areas, possibly with a delay in the Islands.

These reconstructions suggest that, while there are common elements that could explain the slow-down in enrolment expansion for both men and women in the 1970s, the sagging of enrolment rates between the 1970s and the 1980s is largely explained by the contraction of technical schools for manufacturing jobs, which were largely attended by males. Is it possible that this evolution was caused by the egalitarian turn in collective bargaining after 1969? The evidence presented in this section is coherent with our hypotheses but cannot substantiate a causal claim. The next sections introduce the data and an identification strategy to credibly identify the effect of the minimum wage hike on post-compulsory school enrolment by sex, track and curriculum.



(a) Female



(b) Male

Figure 3.7: ENROLMENT RATES BY SEX, TRACK AND CURRICULUM, 1950-1986

Gross enrolment rates in upper secondary school, by track and curriculum (share of students enrolled on the 14-18 population, by sex). The year refers to the beginning of the academic year (i.e. October). 'Any other' includes all other choices. Source: own computations on education data from Istituto Centrale di Statistica, *Annuario statistico dell'istruzione italiana*, Roma, years 1953-1972 and *Id*, *Annuario statistico dell'istruzione*, Roma, years 1973-1990, and from Istat, *Serie storiche*, *Tavola 7.8* available for download from https://seriestoriche.istat.it (last retrieved June 2022). Population age 14-18 estimated for both sexes from the official intercensual reconstruction by summing the total population of age 14 to 18 in each year, dividing by two and multiplying by .96 for male and 1.04 for female, to account for the average sex ratio in Italy in the period considered. Official intercensual reconstruction available from Istat's *I.Stat* datawarehouse at http://dati.istat.it/Index.aspx?DataSetCode=DCIS_RICPOPRES1971 (for 1952-1972), http://dati.istat.it/Index.aspx?DataSetCode=DCIS_RICPOPRES1981 (for 1972-1981) and, http://dati.istat.it/Index.aspx?DataSetCode=DCIS_RICPOPRES1991 (for 1982-1991), last retrieved October 2021. For 1951, the population considered is that in the age range 15-19 in 1952; for 1950, the population is that in the age range 16-20 in 1952.

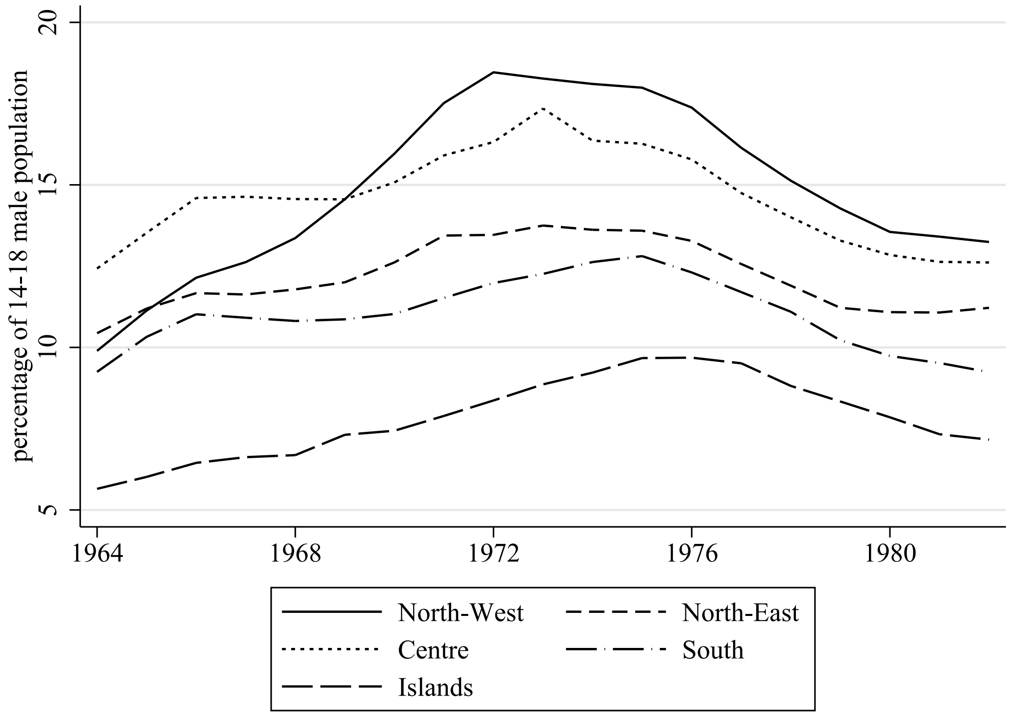


Figure 3.8: Male enrolment in technical schools for manufacturing by macroregion

Gross enrolment rates of male students in technical schools for manufacturing jobs (*istituti tecnici industriali*) by macroregion. The GER is computed as the ratio between the number of male students enrolled and the male population between the age of 14 and 18, in the relevant macroregion. North-West includes provinces in Valle d'Aosta, Piedmont, Lombardy and Liguria, North-East includes provinces in Trentino-Alto Adige, Emilia Romagna, Veneto, Friuli-Venezia Giulia, Centre includes provinces in Tuscany, Marche, Latium and Umbria, South includes provinces in Abruzzi, Campania, Molise, Apulia, Basilicata and Calabria, Islands include provinces in Sicily and Sardinia. For data sources and estimations see text and Appendix A.7.

3.3 Data

The ideal setting to study the effect of the egalitarian wage bargaining on educational choices would provide information on career progression, wage earnings and detailed educational attainment for a representative sample of dependent workers across multiple birth cohorts before and after 1969. Unfortunately, such microlevel data does not exist in usable format for Italy during the period under study: official matched employer-employee datasets are only available since the 1980s, as are commonly-used household and labour force surveys—moreover, neither source provides information about the school track and curriculum attended. Italian census microdata are not available before 1971. Smaller surveys that collect such information are usually more limited in time range, geographical scope or statistical representativity.

To circumvent these limitations, I present a new historical GIS dataset which contains information on enrolment rates, minimum and effective industrial wages and youth unemployment for Italy's ninety-two provinces from 1962 to 1982, with annual frequency. The data has been digitized and harmonized from a vast range of printed primary sources, and adjusted to constant historical borders to ensure comparability. The province is the second-smallest administrative division for which data is consistently available in Italy, they are functionally comparable to the American counties, and the spatial level of detail is NUTS-3 in the EU framework for statistical units. During the whole 1962-1982 period, provinces had an average population of 596,746 (standard deviation 608) and mean area of 3,276 km^2 (standard deviation 1,849). The section provides a brief description of the computations behind each variable, while more detailed information on sources, comparability and harmonization procedures is provided in appendix A.

3.3.1 Local minimum wages

To measure the opportunity cost of staying in school for the marginal student, I compute the mean local minimum wage in the province as the weighted average of the collectively-bargained wage floors for low-skill blue-collar workers, across twenty-four industrial sectors (manufacturing proper plus construction, mining and utilities). This range of sectors covers 97% of manufacturing establishments and 98% of industrial workers according to the 1971 census. The weights are given by the number of employees in each sector and province, for I assume that a young individual with a lower-secondary school endowment of general human capital faces an expected entry-level wage which depends on the minimum wages payed in the industries that are present in the province, and on the probability of being employed in any such industries, which is assumed to be proportional to the number of employees in each industry. This procedure is also similar to adjusting the statutory minimum wage for coverage, as it is conventional in empirical applications where the minimum wage does not cover all workers in the area (Neumark and W. L. Wascher, 1992a). The minimum wage data has been digitized and harmonized from printed primary sources that consistently report the wage floors bargained in each sector, with annual frequency, at the province level until 1972 and at the national level thereafter (the motivation for this distinction is given in the next section).

The local industry shares are computed according to two alternative procedures, for greater robustness of the estimates: in one set of reconstructions, the local industry composition is given by the linear interpolation of industrial employees in each sector at the province level, from the industrial censuses of 1961, 1971, 1981 and 1991. The interpolation is necessitated by the lack of disaggregated annual data on industrial employment at the province level, but it also allows to avoid that the minimum wage series is affected by short-term shocks to local employment. Consequently, the mean minimum industrial wage $\overline{M}$ in province j at time t is obtained as:

$$\overline{M_{jt}} = \frac{\sum_{i=1}^{24} M_{ijt} \cdot \overline{S_{ijt}}}{\sum_{i=1}^{24} \overline{S_{ijt}}}$$

Where $\overline{S}$ is the share of employees in province j and sector i at time t, computed as the intercensual interpolation according to the formula:

$$\overline{S_{ijt}} = S_{ijT} \cdot \frac{(S_{ijT+10} - S_{ijT})/S_{ijT}}{10}$$

Where T is the earliest census year in any two consecutive, starting with 1961. This weighting procedure ensures to capture local long-term trends in sectoral composition, that affect a teenager ex-ante employment opportunities. The resulting series is represented by Figure 3.19, with annual box plots showing the interquartile range and the median, adjacent and outside values. The graph clearly shows the acceleration of the contractual minima after 1969, but also the compression minimum wage differentials between provinces, which will be described in the next section.

3.3.2 School enrolment and control variables

The main dependent variables are gross enrolment rates in upper secondary school, by track and curriculum. To obtain these rates at the province level with annual frequency, I have first collected and digitized annual official statistics on the number of students enrolled, distinguishing by sex and province, and I have harmonized the resulting series to constant historical 1961 borders. Secondly, I have reconstructed the size of the relevant age group (14-18 years old) at the province level from census statistics.

The use of population censuses is necessitated by the lack of official reconstructions of intercensual population at the province level before the year 1982. To perform this reconstruction, I have digitized tables reporting the age distribution of the resident population in each province in 1961 and in 1971, I have linked them to the official intercensual reconstructions for 1982, and I have harmonized the data to constant historical borders. To obtain the intercensual estimates I first identified the year of birth for each age group, and then I ran a linear interpolation between the benchmark years for each birth cohort, by sex and province. Finally, the size of the 14-18 age group was computed by summing the number of individuals in the respective age range, for each year-province cell. Appendix A.6 provides additional details on the interpolation method, corrections to the data, and limitations of this methodology and sources.

Since these are entirely new reconstruction obtained from a range of different sources, I have checked their compatibility with aggregate statistics that are available at the national level. The tracks and curricula included in the dataset cover about 90% of all secondary school students in any given year, and an even larger percentage for male students. The total number of students, including those enrolled in the residual curricula, is virtually identical to the numbers presented by Checchi (1997). The gross enrolment rates, instead, are lower than Checchi's estimates due to differences in the size of the age group which are attributable to errors in the population census of 1971. Following the correction proposed by Caselli, Golini, and Capocaccia (1989), I obtain an age-group profile that is compatible with official intercensual reconstructions at the national level. Consequently, my computations of gross enrolment rates are in line with the aggregate time series published by Istat. Additional details on these procedures and checks are presented in appendix A.7.

To test that the minimum wage had a sizeable effect on the wage distribution, one would need to know the complete earnings distribution for blue-collar workers at the province level in the period under consideration. While this is not possible due to the mentioned data limitations, I have collected, digitized and harmonized aggregate statistics on the average wage of blue-collar workers by industrial macro-sector, which allows to check the bite of the minimum wage. The data were published with annual frequency by INAIL, the National Institute for Insurance against Workplace Accidents. The publications reported the mean daily earnings of blue-collar workers that suffered a temporary incapacitating accident on the workplace in the solar year. The earnings were reported separately for each province in nine macro-sectors. To harmonize the series with the minimum wage and industrial census data, I have devised a conversion system—reported in table A.2—and I have rescaled all wages by a common coefficient to correct for an underestimate of the wage level in the source—the correction does not alter relative wages between provinces and sectors (see appendix A.2 for details and methdology). The local mean effective wage is obtained as the average of mean wages across the ten macro-sectors, using both weighting procedures detailed above (for details on sources and methodologies, see appendix A.4).

The control variables include the provinces' population size, income per capita, value added in industry, and prime age and youth unemployment. The economic variables have been digitized and harmonized to constant historical borders from the income accounting estimates at the province level produced by Guglielmo Tagliacarne and the namesake Institute (Tagliacarne, 1963; Tagliacarne, 1972; Tagliacarne, 1975; Tagliacarne, 1979; Istituto Guglielmo Tagliacarne, 1986).[17] Youth unemployment is obtained from registrations at job centres at the provincial level (see section A.8 in the Appendix for a discussion of the sources). Table 3.1 shows the descriptive statistics from the dataset, distinguishing by time period, that is before 1969, during the convergence period, and after 1972.

3.4 Identification strategy

3.4.1 Baseline specification and endogeneity concerns

We argued that the egalitarian collective agreements of the 1970s were functionally equivalent to statutory minimum wages, hence we can take references for the identification strategy from the vast empirical literature on the latter. A common requirement for the identification of the causal effects of minimum wages is, in fact, the availability of credible research designs. Since the path-breaking contributions of Katz and Krueger (1992) and Card and Krueger (1994), quasi-natural experiments that exploit exogenous spatial variation in treatment are considered among the most appropriate strategies for minimum wage studies. In the standard approach, Difference-in-Differences estimates are employed to compare labour markets that receive a minimum wage hike with similar

[17]Data for years 1978-79 are linearly interpolated from 1977 and 1980 due to missing sources.

Table 3.1: Descriptive statistics by period

	(1) 1962-1968		(2) 1969-1972		(3) 1973-1982	
	mean	sd	mean	sd	mean	sd
ln(minimum wage)	7.62	0.17	8.16	0.17	9.62	0.61
ln(minimum wage const)	7.62	0.17	8.16	0.17	9.62	0.61
ln(average wage)	8.15	0.25	8.72	0.21	9.99	0.57
ln(average wage const)	8.14	0.25	8.70	0.21	9.98	0.58
% early school leavers	69.53	9.32	56.10	9.29	48.31	8.68
% GER tech manufacturing male	9.75	5.61	12.10	5.44	11.54	4.86
% GER tech manufacturing female	0.25	0.37	0.43	0.49	0.66	0.66
% GER tech business male	5.20	1.90	6.29	2.05	9.37	2.99
% GER tech business female	4.54	2.15	7.40	2.84	13.08	4.54
% GER voc manufacturing male	3.82	2.19	5.96	2.78	7.64	3.30
% GER voc manufacturing female	0.13	0.34	0.27	0.51	0.65	1.07
% GER voc business male	0.64	0.51	0.84	0.73	0.89	0.87
% GER voc business female	2.33	1.67	4.08	2.35	5.76	3.02
% GER academic science male	3.95	2.20	8.13	2.92	8.69	2.72
% GER academic science female	1.70	1.26	5.39	2.30	7.36	2.57
ln(prime-age male unemployed)	8.47	0.79	8.24	0.85	8.16	0.97
ln(prime-age female unemployed)	7.17	1.11	7.25	0.97	7.79	0.87
ln(under-21 male unemployed with previous job)	6.11	0.89	5.79	0.88	6.20	0.94
ln(under-21 female unemployed with previous job)	5.35	1.04	5.28	0.88	6.13	0.89
ln(under-21 male first job seekers)	6.56	1.03	6.53	1.04	7.01	1.22
ln(under-21 female first job seekers)	5.83	0.90	6.02	0.88	7.16	1.14
% 14-18 pop	7.65	1.11	7.13	1.20	7.65	1.14
% 15-21 pop	10.59	1.22	9.97	1.54	10.47	1.46
ln(population)	13.02	0.65	13.03	0.66	13.05	0.68
ln(industrial value added)	25.16	0.96	25.72	0.85	27.03	1.07
ln(gdp per capita)	13.19	0.41	13.74	0.29	15.01	0.70
Observations	629		360		900	

localities that remain untreated in the period under study. To strengthen the external validity of the results, two-way fixed-effect estimation with panel-data have been applied, for they generalize the Difference-in-Differences approach by exploiting identifying variation from multiple localized differences in minimum wages over time (Neumark and W. L. Wascher, 1992b; Neumark, Salas, and W. Wascher, 2014, Wolfson and Belman, 2019), even though debates continue regarding the most appropriate strategies to select comparable groups (Allegretto et al., 2017; Neumark and Shupe, 2019b; Manning, 2021).

In our case, the spatial variation in minimum wage levels originates from differences in the industrial structure of the provinces and from the different evolution of minimum wages established by collective agreement in each sector. In the baseline approach, we would estimate the following structural equation as two-way fixed-effects model where the dependent variable Y (for instance, early school leavers) in province i at time t is regressed on the level of the mean minimum wage M, controlling for a vector of time-varying covariates X, and including province and time fixed effects (respectively, α and τ). Given the possibility that our time-varying covariats could be influenced by the minimum wage hike, the vector of control includes only the variables' trends before 1968 (Joshua David Angrist and J.-S. Pischke, 2009; Caetano et al., 2022). Robustness checks that include the full set of time-varying values do not produce qualitatively different results.

$$ln(Y)_{it} = \beta ln(M)_{it} + X_{it}'\gamma + \tau_t + \alpha_i + \varsigma_{it} \qquad [3.1]$$

The coefficient β in Equation 3.1 would thus provide the marginal effect of increasing the mean minimum wage floor in the province on the dependent variable. However, the endogeneity of minimum wage determination is a major threat to causal identification in this type of designs. In the literature on statutory minimum wages this possibility mainly arises from self-selection by local authorities (Card and Krueger, 1995, pp. 183-186; Baskaya and Rubinstein, 2012). Statutory minimum wages that are set at the state or city level, in particular, are the product of political processes that incorporate information on the local economy. The case of Italy differs because minimum wages were bargained between labour unions and employers' associations at the national level, for each sector. Our estimate of β would be biased if the bargaining process within each sector incorporated unobservable information on local labour markets, and/or if the change in sectoral minimum wages modified the industrial structure of the province, thus biasing the computation of the average minimum wage. Of the two potential threats, the first appears less plausible. The centralization of collective bargaining at the sector level implies that local labour market conditions were less relevant than sectoral trends. However, it is possible that employment and wage levels in core industrial areas were considered in the bargaining process, especially for regionally concentrated sectors (Manacorda and Petrongolo, 2006). The second threat appears, instead, more plausible, for we cannot exclude that the local minimum wage affected the composition of the industrial structure within each province, creating a feedback loop with respect to our independent variable. This effect appears particularly plausible for the period after 1969, following the steep increases in minimum wages across sectors. To address these potential threats of endogeneity, we need to isolate variation in M that is uncorrelated with the error term in the post-1968 period.

3.4.2 Exogenous variation in treatment intensity

One source of exogenous variation in the intensity of the minimum wage is provided by a contemporaneous institutional change in the wage-setting system, which offers a credible research design. Before 1969, sectoral collective agreements established a single nominal wage floor for each skill category, but its level applied only to the provinces of Milan and Turin. In all other provinces, its effective value was automatically rescaled according to local coefficients which were based on differences in the cost of living, in order to equalize real wages over the national territory. This practice had been established in the postwar period to contrast high inflation that showed significant spatial variation depending on the impact of the war. Originally, thirteen local coefficients were established. Each of Italy's ninety-two provinces was assigned to an index, according to the similarity of local price levels in 1946, thus creating thirteen 'wage zones'. For each sector, minimum wage nominal levels were equal within, and differed between, wage zones (Poy, 2015). The system was partially reformed in 1961, when the number of wage zones was reduced to seven, and the maximum difference between the local minimum and Milan's nominal level was set to 20%.[18] The resulting map of wage zones is shown in Figure 3.20.

This system was maintained through the 1960s, but it met growing aversion from the labour unions. The unions' proposal to repeal the wage zones hinged on equity grounds: reformist union leaders argued that workers performing the same tasks should be paid the same irrespective of the location of the factory (Poy, 2017). The contrast grew in 1968, when calls for equal nominal pay for the same jobs found the support of more radical groups inside and outside unions. An agreement was eventually reached in March of 1969, establishing a convergence process which would partly reduce the wage differentials on 1 April 1969, halve them on 1 October 1970 and remove all remaining differentials on 1 July 1972.[19]

The resulting compression of spatial differentials in minimum wage levels can be appreciated from Figure 3.22, which plots the log difference between the average minimum wage in Milan and the rest of Italy's provinces. The graph shows that the median difference decreased from about 5 percentage points in 1968 to effectively zero in 1972. Most importantly, however, the extent of the reduction shows significant variation, ranging from less than one percentage point for the 25th percentile to over ten percentage points for the 75th percentile. While a mild reduction appeared underway in the early period (possibly driven by the Intersind agreement of 1968), it is clear that most of the convergence took place in 1969-1972 and was completed by 1976.

[18] Attachment to the Interconfederal agreement of 2 August 1961 (*Accordo interconfederale per la revisione dell'assetto zonale delle retribuzioni e il conglobamento della contingenza 2 Agosto 1961*), available for download from the website of CNEL (National Council for Economics and Labour) at https://www.cnel.it/Archivio-Contratti (last retrieved July 2021).

[19] See article one of the *Accordo Interconfederale 18 marzo 1969 per il conglobamento della contingenza e per la revisione dell'assetto zonale delle retribuzioni* available at https://www.cnel.it/Archivio-Contratti. Notice that a similar agreement had already been reached between the labour unions and the labour relations' representative for state-owned companies (Intersind). See article two of the *Accordo Interconfederale 21 dicembre 1968 per il conglobamento dell'indennità di contingenza e per il graduale superamento delle differenze zonali delle retribuzioni* available on the digital Historical Archive of the collective labour agreements maintained by CNEL (Italy's National Council of the Economy and Labour) at https://www.cnel.it/Archivio-Contratti).

Thus, the compression in minimum wages between provinces after the repeal of the wage zones represents an exogenous source of spatial variation in treatment intensity because, during the adjustment period, provinces that started at lower nominal levels relative to Milan experienced a steeper minimum wage hike than provinces whose mean minimum wage in 1968 was closer in levels to that of Milan, irrespective of their industrial composition and local labour markets conditions. Figure 3.9 shows that there was a strong association between the deviation of mean minimum wages from Milan's level in 1968 and minimum wage growth during the adjustment period (1968-1972), while no significant association is found between 1964 and 1968, which strengthens our argument that the repeal of the wage zones was an exogenous shock to the determination of the local minimum wages and did not correlate with pre-trends.[20]

A similar source of spatial variation in the intensity of a minimum wage hike has been used by Kawaguchi and Mori (2021) for identifying the impact on unemployment after 2007 in Japan. In that case, the variation originated from the introduction of the indexation of province-specific minimum wages to the local cost of living, rather than its repeal, but the effect on the wage hike was comparable to our case.[21] Given the similarity between the two natural experiments, we can adapt the estimation strategy of Kawaguchi and Mori (2021) to our case. The analysis is realized in two steps. First, we estimate the average treatment effect of the minimum wage hike on schooling using an instrumental variable approach.[22] Second, we explore the dynamic response

[20]Notice that there are few observations with a higher mean minimum wage than Milan in 1968, which is due to a greater concentration of high-wage industries in these provinces and their location in high minimum wage zones. As expected, these provinces experience a lower increase in minimum wage between 1968 and 1972 than the average, but higher than the one predicted by the linear regression. To ensure that results are robust to these outliers, I either exclude them from some of the regressions or I set their difference with respect to Milan equal to zero, without significant consequences for the estimates.

[21]In our case, minimum wages rose more steeply in provinces with lower cost of living after the repeal of the indexation; in the case of Japan, minimum wages rose more steeply in places with higher cost of living after the introduction of the indexation (Kawaguchi and Mori, 2021, pp. 390-391). To the best of my knowledge, this is the only published research exploiting a similar natural experiment for identification purposes.

[22]This approach builds on Joshua D. Angrist and Imbens (1995).

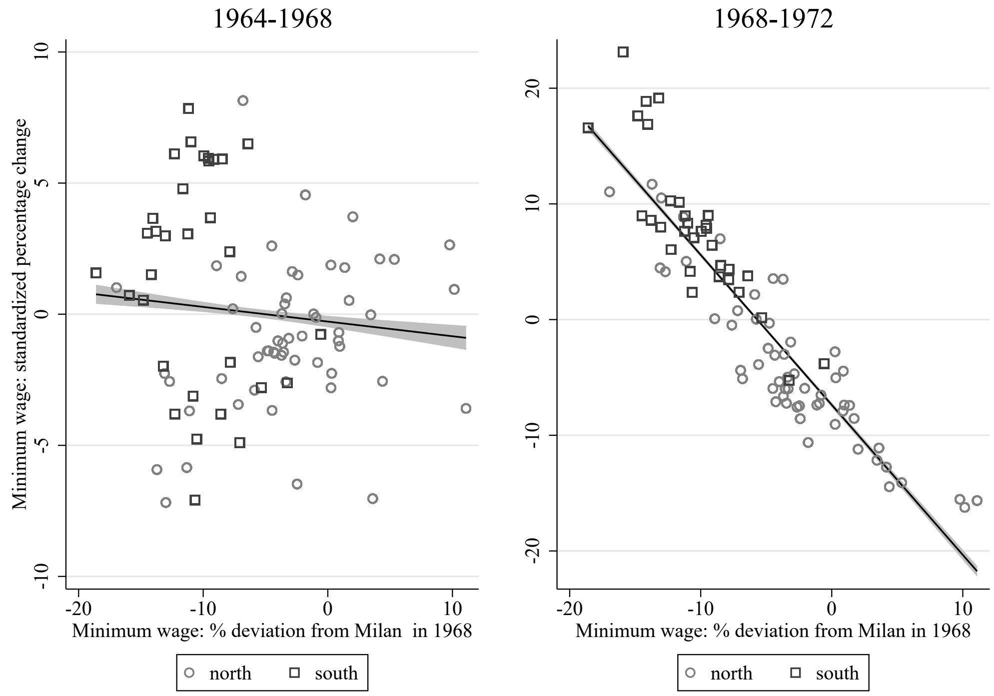


Figure 3.9: Nominal wage equalization and minimum wage growth

The figure shows the relationship between the four-year change (expressed in log-point differences) of the minimum wage between 1964 and 1968 (left panel) or between 1968 and 1972 (right panel), and the log-point difference with respect to the minimum wage level in Milan in 1968. Each circle represents one of 91 provinces. The size of the circle is proportional to the size of the province population. The solid line represents the linear prediction from the scatterplot, while the shaded area represent the 95% confidence interval. For the sources of the minimum wage data see section A.1.

over time (both before, during and after the transition period) by estimating the reduced-form regression. This second step is akin to a natural experiment and the estimation is equivalent to a generalized Difference-in-Difference design with a continuous variable.

3.4.3 Instrumental variable approach

In the first step, the instrumental variable approach allows to identify the average marginal effect of the minimum wage hike on the outcome variables by exploiting, for the period after 1968, only the variation that is predicted by the repeal of the wage zones. To retrieve this effect, I estimate the following baseline model by two-stage least squares:

$$ln(Y)_{it} = \pi\, ln(\widehat{M})_{it} + \psi X'_{it} + \tau_t + \alpha_i + \eta_{it} \qquad [3.2]$$

$$ln(\widehat{M})_{it} = \sum_{y=1962}^{1982} \theta_y \left[ln(M)^{1968}_{Milan} - ln(M)^{1968}_{i}\right] * 1(Year = y) + \phi X'_{it} + \tau_t + \alpha_j + \epsilon_{jt} \qquad [3.3]$$

In Equation 3.2, Y is the dependent variable in province i at time t and M is the instrumented nominal minimum wage (the endogenous regressor). The instrument in Equation 3.3 is the inverse of the gap between the nominal minimum wage in the province in 1968 and that of Milan in the same year, expressed in log differences. The inversion facilitates the interpretation of the estimated sign, but is not consequential for the results. To allow the coefficients of the instrument to vary over time, I interact the deviation from Milan with time dummies. This instrument predicts the spatial variation in the minimum wage hike which is only caused by the repeal of the wage indexation system in 1969—hence, only the variation that is exogenous with respect to local labour market and industrial characteristics.

Like before, the vector time-varying controls (X'_{it}) is built using the pre-treatment values and the coefficient for year 1968 is set to zero as a reference point (Borusyak, Jaravel, and Spiess, 2021). I also include time (τ) and province (α) fixed effects. As a robustness check, I alternatively include province-specific time trends, in which case I set to zero both the coefficient for 1968 and that for 1962 to avoid over-parameterization, following Kawaguchi and Mori (2021). Standard errors are clustered at the province level to control for possible serial autocorrelation. The second stage in Equation 3.2 regresses the dependent variable on the instrumented minimum wage, and controls for the same variables as in Equation 3.3, including province and time fixed effects. Standard errors are also clustered at the province level. Thus, assuming that the parallel trends assumptions are met, the coefficient π recovers the ATE for the minimum wage on the dependent variable. It is important to notice that the estimated ATE concerns only the transition period 1968-1972, because it exploits the variation caused by the spatial equalization of nominal wages, and not the total increase in minimum wage levels.

3.4.4 Assessing the instrument

To establish the relevance of the instrument, I run the first stage regression from Equation 3.3. The estimate of the θ coefficient of the instrument is plotted for each year in Figure 3.10. The figures shows that the gap with respect to Milan in 1968 had no significant association with the minimum wage levels in the pre-treatment period. However, after the repeal of the wage zones in 1968, the coefficient quickly turns positive and statistically significant, stabilizing at around 1 in the post-transition years. These results imply that a 1% difference in the mean minimum wage with respect to Milan in 1968 predicts a 1% higher minimum wage level after 1972, which is additional proof that nominal wages became substantially equalized between provinces. This confirms the argument that the repeal of the wage zones introduced a source of exogenous variation in the steepness of the minimum wage hike that is uncorrelated with previous levels, which we will use for identification in the second stage.[23]

The random assignment of the instrument cannot be formally tested, but the historical context can provide a motivation. The spatial variation in treatment intensity appears to be independent from local labour market conditions by construction: the classification into the different wage zones was based on post-war inflationary pressure—over twenty-five year prior to the minimum wage hike—and partly on the simplification of 1961, eight years earlier.[24]

[23]Alternatively, I run the regression using the mean minimum wages computed at constant industry share, without obtaining significantly different results (not reported, results are available upon request).

[24]Wage zone 0 included provinces from three regions in the North-West (Turin, Milan and Genoa) and one from the Centre (Rome), each from a different region; zone 1 included three provinces in Lombardy plus Florence (in Tuscany); zone 2 included provinces from eight different regions (Valle d'Aosta, Piedmont, Liguria, Lombardy, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, and Tuscany); zone 3 covered provinces from six regions (Piedmont, Lombardy, Liguria, Emilia-Romagna, Veneto and the province of Naples in Campania); zone 4 included provinces from Piedmont, Tuscany, Emilia-Romagna, Veneto, Friuli-Venezia

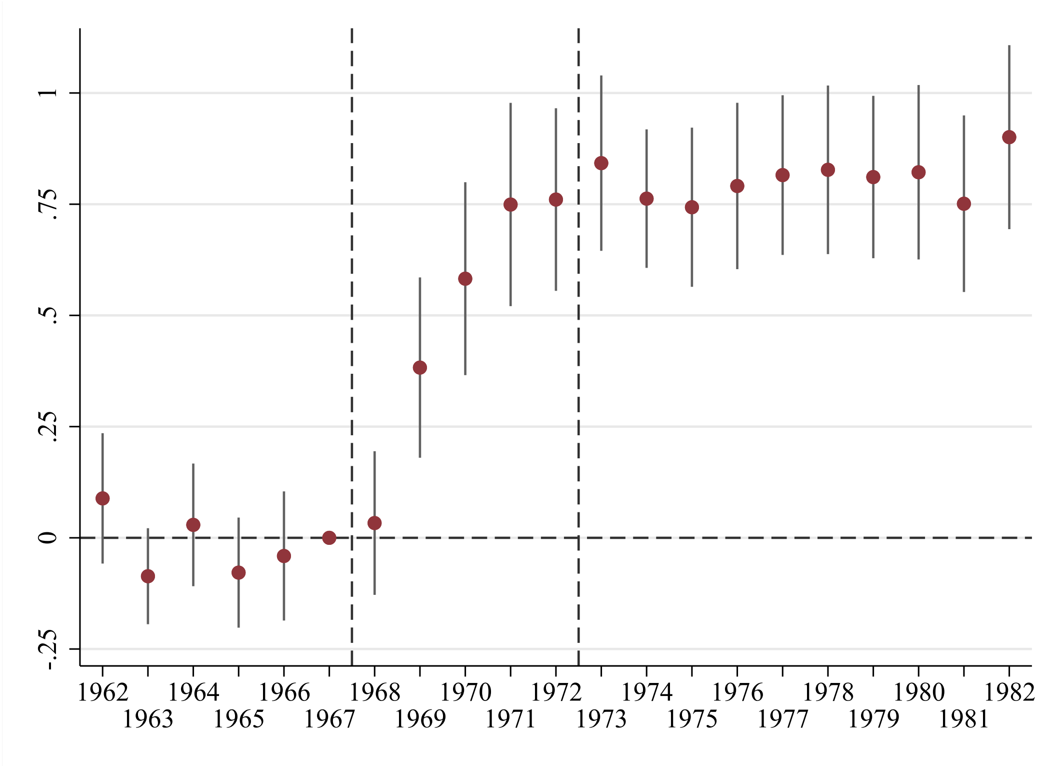


Figure 3.10: Gap with respect to Milan in 1968 and minimum wage levels

Coefficients for the interaction term between the log difference between the mean minimum wage in Milan and in the province in 1968 and year dummies, with 1968 set to zero. OLS estimates controlling for time and province fixed effects, and time-varying controls. The vertical solid lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start and the end of the convergence period, following the repeal of the wage zones in 1968.

However, since low-wage zones were predominantly located in the continental South, the minimum wage growth during the transition period shows a strong North-South gradient, as represented in Figure 3.21. This is due to two distinct causes: first, the Allied liberation of Italy moved from the South to the North of the country, leaving the provinces south of the Gothic Line exposed to the inflationary pressure of the military government's new

Giulia, the province of Ancona in the Marche region and that of Palermo in Sicily (seven regions in total); zone 5 covered provinces across the Centre, the South and the Islands (nine regions, including Tuscany, Umbria, Marche, Latium, Abruzzi, Campania, Apulia, Sicily and Sardinia); zone 6 covered most Southern regions (all of Calabria, Basilicata and Molise, and parts of Abruzzi, Campania, Apulia, Sicily and Sardinia) but it also included one province in the Marche region (Macerata). Consequently, there was significant geographical variation in wage zone assignment: the North-West included six wage zones (considering Genoa separately from Milan and Turin), the North-East three, the Centre six and the South and islands four.

currency for longer (C. R. S. Harris, 1957, pp. 445-449), so much so that these wage zones were assigned a different indexation mechanism once the country was entirely liberated;[25] second, the reform of the wage zone system in 1961 decreased the number of wage zones especially in the South, thus reducing the spatial variation of the instrument within this macroarea. Given the historical differences in economic development, social structure and culture between the North and the South, these otherwise unrelated causes could correlate with unobservable variables that can also affect schooling decisions. To control for this, robustness checks include either a time trend for Southern provinces or macroregion time trends.

As usual, the exclusion restriction that the instrument affects the outcome variables only through the endogenous regressor cannot be formally tested, but the contextual evidence suggests that a province's wage zone had little effect on enrolment rates except through the minimum wage level. Wage zones did not overlap with administrative divisions, which reduces the risk that the spatial variation correlates with local policies. One case where this case might not apply are special statute regions, who had legislative autonomy on several areas, including education. For this reason, I exclude from the main analysis regions that had special statute in 1962.[26] Adding or excluding the regions from the analysis does not significantly alter the results, except for the case of Sicily, which introduces a contrarian response in the baseline analysis with respect to all other regions. Future research should address this specificity in light of the special characteristics of this region (few wage zones, greater legislative autonomy, prevalence of organized crime).

[25] See 'Concordato del 23 Maggio 1946 per la perequazione del trattamento economico dei lavoratori dell'industria nelle provincie dell'Italia centro-meridionale', reprinted in *Gli accordi interconfederali di lavoro dal 1944 al 1954* (1955, pp. 44-62)

[26] Special statute regions in 1962 were Sicily, Sardinia, Valle d'Aosta and Trentino-Alto Adige, totalling fifteen provinces out of ninety-two. Friuli-Venezia Giulia was made special statute region in 1963.

3.4.5 Generalized Difference-in-Differences

The second step of the analysis consists in using the repeal of the wage zones as a natural experiment, which allows to estimate the dynamic average causal response of school enrolment to the minimum wage shock of 1969, over time. Following Kawaguchi and Mori (2021) again, we can specify the reduced-form regression:

$$ln(Y)_{it} = \sum_{y=1962}^{1982} \delta_y \left[ln(M)_{Milan}^{1968} - ln(M)_i^{1968}\right] * 1(Year = y) + \rho X'_{it} + \tau_t + \alpha_j + \zeta_{jt} \quad [3.4]$$

Where the dependent variable Y is regressed directly on the gap with respect to Milan in 1968. This regression is equivalent to a generalized Difference-in-Differences approach where the continuous treatment variable (the log difference in nominal minimum wages in 1968 between each province i and Milan) predicts the extra increase of the province's minimum wage that was caused only by the repeal of the wage zones.

Figure 3.11 provides a simplified diagram of this variation for two representative provinces, one with a small gap with respect to Milan before 1969, and one with a larger gap. The diagram assumes that there is only one industry, so the starting difference between provinces in the nominal level of the minimum wage is entirely attributable to their being assigned into different wage zones. Following the egalitarian turn of 1969, the minimum wage set by collective agreement for Milan starts rising. Meanwhile, however, the repeal of the wage zones requires that the minimum wage in the other province converge to Milan's level. Consequently, the wage hike for these provinces is steeper than in the counterfactual scenario where the wage zones are not repealed. This extra wage raise represents the treatment in our design. All provinces but Milan are treated at the same time, but the intensity of treatment differs on a continuous scale. Following the terminology in Callaway, Goodman-Bacon, and Sant'Anna

(2021), the larger the gap in 1968 with respect to Milan, the greater the 'dose' of the minimum wage hike that the province receives in 1969-1972. In the example, the province starting with the smaller gap receives a low does, while the province starting with a large gap receives a high dose. The coefficient δ would thus recover the average causal response of the treated provinces (i.e., provinces where the 1968 gap was larger than zero, in absolute value) in each year, provided that the stricter parallel trends assumptions identified by Callaway, Goodman-Bacon, and Sant'Anna (2021) hold. These require the usual conditions of DiD designs as well as that 'for all doses, the average change in outcomes over time across all units if they had been assigned that amount of dose is the same as the average change in outcomes over time for all units that experienced that dose' (Callaway, Goodman-Bacon, and Sant'Anna, 2021, p. 11). This assumption requires that provinces receiving a smaller dose of treatment are a good counterfactual for provinces receiving a larger dose. This assumption does not hold if observations self-select into the dose levels, but this does not seem to apply to our case: the dose depended only on which wage zone the province had been assigned to in 1953 (as reformed in 1961), which increases our confidence that the extra minimum wage hike was as good as randomly assigned between the provinces. While there are no explicit tests for this assumption, as a robustness check we will estimate the average causal response only for marginal increases in the dose at different dose levels, rather than averaging across the whole range. This will allow to individuate possible heterogeneity in the causal response for different levels of the minimum wage hike.

3.5 Results and discussion

3.5.1 Impact on the opportunity cost of schooling

To verify that the minimum wage hike effectively increased the opportunity cost of schooling, I first test the impact of contractual minima on the effective wages of blue-collar workers in manufacturing. If we cannot reject the null

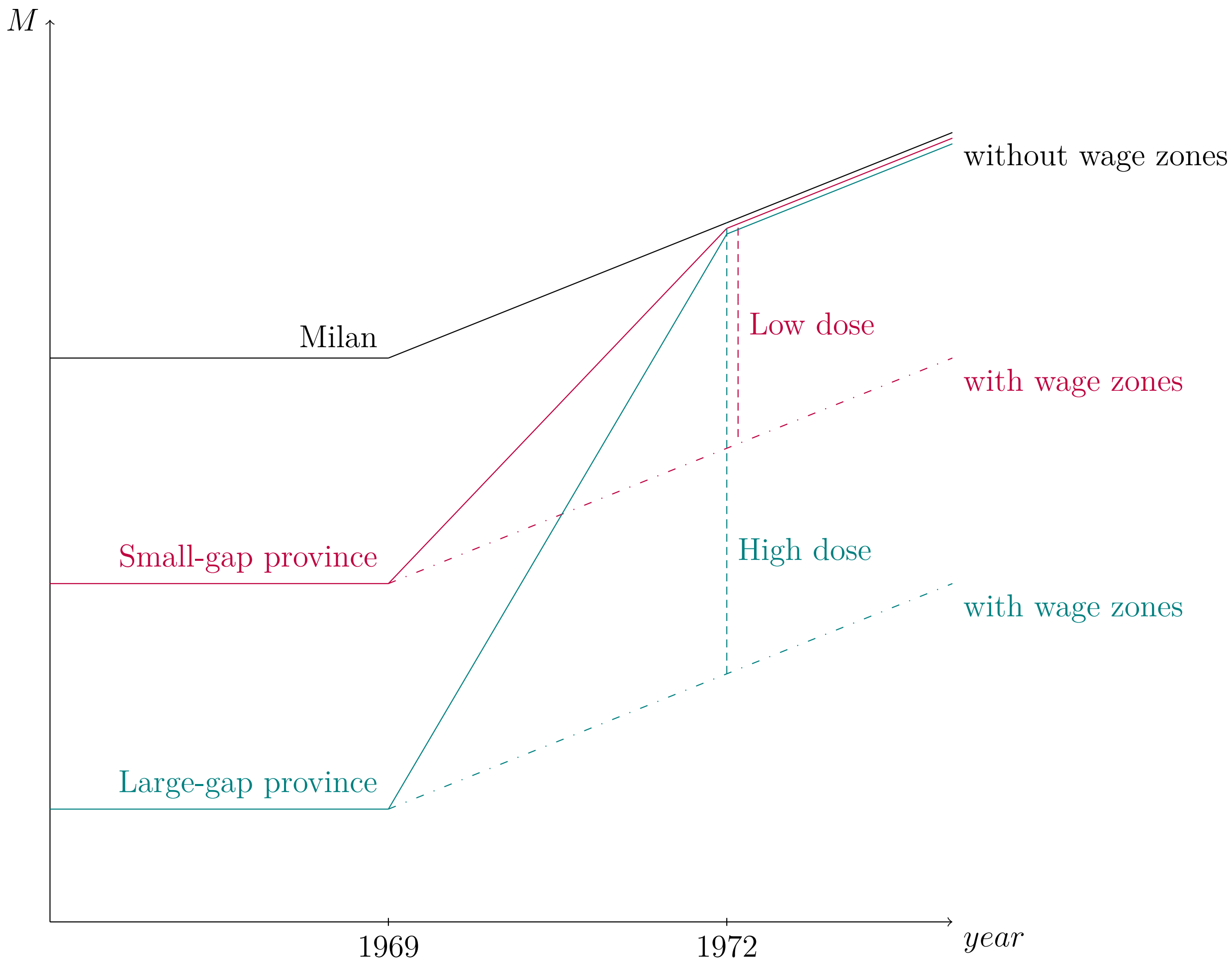


Figure 3.11: Representation of the identification strategy for DiD

This diagram shows a schematic representation of the identification strategy for the generalized Difference-in-Differences. The solid lines represent the level of the mean minimum wage (M) in the province of Milan and in two representative provinces—one with a small gap with respect to Milan in 1968, and another with a large gap. The size of the gap at the start of the period depends on the wage zone to which the province is assigned before 1969. After the repeal of the wage zones in 1969, the minimum wage level in all provinces must converge to that of Milan by 1972. The dotted lines represent the counterfactual minimum wage if the wage zones had not been abolished. The dashed vertical line represent the variation in minimum wage caused only by the repeal of the wage zones. Both provinces are treated with this extra wage hike, but the province with a small starting gap receives a lower 'dose' of treatment than the province with a larger starting gap. Milan represents the control group.

hypothesis that the minimum wage hike had no effect on blue-collar wages, it would be difficult to argue that it was influential enough to affect teenagers' schooling decisions.

Table 3.2 reports the OLS estimates for the structural Equation 3.1, and the 2SLS results from Equation 3.2, separately with and without macroregion trends. The dependent variable is the average wage of blue-collar workers in the industrial sector, while the vector of trended pre-1968 controls includes the province's population, GDP per capita, the share of value added produced in the industrial sector, and the number of both young and prime-age individuals (under and over 21) registered as unemployed at local job centres.[27]

Table 3.2: Log average wage elasticity to mean minimum wage

	ln(average effective wage)			
	(1) OLS	(2) OLS	(3) OLS	(4) 2SLS
ln(minimum wage)	0.533***	0.622***	0.745***	0.887***
	(0.108)	(0.104)	(0.187)	(0.166)
Province FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Pre-treat controls	Yes	Yes	Yes	Yes
Macroregion FE	No	Yes	No	Yes
Clustered SE	Yes	Yes	Yes	Yes
Adj R2	0.998	0.998		
Adj within R2	0.323	0.34		
Kleibergen-Paap F statistic			156.69	147.66
N	1701	1701	1701	1701

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

OLS estimates for the baseline model (columns 1-2) and 2SLS estimates for the IV model (columns 3-4). The dependent variable is the natural logarithm of the average effective wages of blue-collar workers employed in manufacturing, construction and utilities. In the second specification for both models, the regression controls for pre-1968 trends in total population, prime age and youth unemployment, GDP per capita, and share of GDP produced in the industrial sector. All specifications include time and province fixed effects. Standard errors are clustered at the province level. The observations exclude provinces with an average minimum wage higher than Milan in 1968, due to the instrument's restriction.

[27] For this section only, the observations for Sicily are dropped due to missing data on the outcome variable.

The OLS estimate without macroregion trends suggests an elasticity of .5 with respect to the mean minimum wage, which increase up to 0.89 in the fully-saturated specification. The implied elasticities are particularly high, especially compared to the wage elasticities commonly found in studies on statutory minimum wages. Our results can be explained by the greater bite of wage floors established by collective agreements and the centralized bargaining system, which reduced room for firm-level adjustments, and by the fact that they affected the wage distribution across all sectors. Even though the absence of detailed data on the wage distribution does not allow to test the for compliance in levels, these results suggest that collective agreements influenced growth rates, for changes to the sectoral minima were almost entirely incorporated into the growth rate of effective wages.

3.5.2 The response of early school leavers

3.5.2.1 The marginal effect across across the whole period

Having established that the minimum wage hike had the potential to bite the wage distribution and influence the opportunity cost of schooling, we turn our attention to testing the main hypotheses of the paper, i.e. that high contractual minimum wages can discourage post-compulsory school enrolment. I start the analysis by estimating the baseline specification in Equation 3.1 by OLS and the IV model in Equation 3.2 by 2SLS, using as dependent variable the log of the number of early school leavers, which is defined as all individuals between the age of 14 and 18 that are not enrolled in upper secondary education, controlling for the size of the same age cohort in the province, besides all other pre-1968 trended controls Table 3.3 presents the estimates for β and θ, both with and without macroregion trends.

A higher mean minimum wage is associated with a larger number of teenagers not enrolled in upper secondary education, although the size of the effect varies between specifications. In the structural specification a 1% increase in the mean minimum wage is associated with 0.45% increase in early school leavers, which is attenuated to 0.33% after we control for trended pre-1968

Table 3.3: Minimum wage and early school leavers

	ln(early school leavers)			
	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS
ln(minimum wage)	0.446***	0.325***	0.612***	0.631***
	(0.133)	(0.119)	(0.197)	(0.233)
Province FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Pre-hike controls	No	Yes	No	Yes
Time-variant cohort size	Yes	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes	Yes
Adj R2	0.996	0.952		
Adj within R2	0.696	0.744		
Kleibergen-Paap F statistic			164.747	133.593
N	1344	1344	1344	1344

Cluster-robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

OLS estimates for the baseline model (columns 1-2) and 2SLS estimates for the IV model (columns 3-4). The dependent variable is the natural logarithm of the number of individuals enrolled in upper secondary education in the academic year running from October to June. The models control for the size of the cohort between the age of 14 and 18 in the province. In the second specification for both models, the regression controls also for pre-1968 trends in total population, prime age and youth unemployment, GDP per capita, and share of GDP produced in the industrial sector. All specifications include time and province fixed effects. Standard errors are clustered at the province level. The observations exclude provinces in special statute regions and those with an average minimum wage higher than Milan in 1968, due to the instrument's restriction.

confounders. The 2SLS estimates present the same sign and are significantly larger. In the specification without controls, the coefficient increases to 0.612 and, after the inclusion of the controls, it reaches 0.631.

The difference in the estimates between the structural equation and the IV approach corroborate our argument for instrumenting the nominal minimum wage. Moreover, the Kleibergen-Paap F Statistic for the first stage is confidently larger than the critical value, reassuring us about its strength. All results are statistically significant at the 99% level.

These results appear also economically significant: with the log of the minimum wage increasing by circa 34% between 1968 and 1972, our estimates would predict an increase in early-school leaving between 14% and 20%. This is close to but larger than the 12% difference between the enrolment rate extrapolated from the trend before 1969 and its effective value in 1972.

3.5.2.2 Robustness check: fractional response model

The OLS and IV estimators applied in the previous section assume linearity, which may cause inaccurate estimates with bounded variables, as is the case with enrolment rates. To avoid such biases, we chose to estimate the effect in levels of the dependent variables of interest, controlling for the size of the relevant demographic group. However, in order to check that the results are robust to alternative estimation strategies, in this section I normalize the dependent variables by the size of the relevant demographic group and I implement a fractional response model that allows for bounded endogenous variables. A presentation of fractional response models with panel data and IV estimators and the code for their implementation is provided by Papke and Wooldridge (2008), which I follow in the rest of the section.

To perform this analysis, I define a new dependent variable at the share s of individuals between the age of 14 and 18 in the province that are not enrolled in upper secondary education. This is essentially the inverse of the gross enrolment rate divided by 100. The variable is bounded by construction between 0 and 1, which respectively represent the extreme cases where either the whole cohort is enrolled in upper secondary school or none is. These are obviously theoretical bounds, for the lowest value registered in the dataset is .17, the greatest is .90 and half of the observations fall between .48 and .66. The linear specification is thus modified accordingly as:

$$s_{it} = \beta ln(M_{it}) + X'_{it}\gamma + \tau_t + \alpha_i + \xi_{it} \qquad [3.5]$$

Where X is the usual vector of trended pre-1968 controls, and τ and α are time and province fixed effects. The fractional response model, instead, is modelled as a generalized estimating equation (GEE) and takes the following specification:

$$E(s_{it}|M_{it},\mathbf{X}_{it},a_i) = \Phi(\psi + M_{it}\beta_1 + \bar{M}_i\beta_2 + X'_{it}\gamma_1 + \bar{X}'_i\gamma_2 + \tau_i + a_i) \qquad [3.6]$$

In contrast to the linear specification, this model does not use province fixed effects, but it controls for the province-specific time averages of all variables on the right-hand side ($\bar{M}$ and $\bar{X}$), which is akin to demeaning them. It does include, however, the full set of time dummies. $\Phi(.)$ is the standard cumulative distribution (cdf) of the Probit regression. This choice allows the response variable s of being defined as $0 \leq s_{it} \leq 1$. The term a indicates the residual. The discussion of this specification is provided by Papke and Wooldridge (2008).

First, for comparison purposes, I assume that the minimum wage is entirely exogenous. Hence, I estimate Equation 3.5 by OLS and the Equation 3.6 by Probit. The results are presented in columns 1 and 3 of Table 3.4. Both models find a positive and statistically significant association between the level of the minimum wage in the province and the share of people leaving school early. However, the coefficients are not directly comparable due to the different estimation techniques. To perform a more appropriate comparison, I compute the average partial effect (APE) from the Probit estimates, which can be compared with the marginal effect estimated by OLS. The APE for the exogenous specification (0.149) is close but slightly lower than the coefficient estimated by OLS (0.163), suggesting that the linear model overestimates the impact of the minimum wage hike on school enrolment.

I then relax the exogeneity assumption and I instrument the log of the nominal minimum wage with the usual gap in minimum wages interacted with the full set of time dummies (setting 1967 equal to zero to avoid multicollinearity), both in the linear and in the fractional response model. Column 2 of Table 3.4 shows the results obtained by 2SLS, while columns 5 and 6 the coefficient and the APE from the Probit model, respectively. As was the case in the main

Table 3.4: Robustness test: fractional response models

	share not enrolled					
	Linear		Fractional probit GEE			
	OLS Exogenous	2SLS Endogenous	Exogenous		Endogenous	
	Coefficient (1)	Coefficient (2)	Coefficient (3)	APE (4)	Coefficient (5)	APE (6)
ln(minimum wage)	0.163***	0.202***	0.393***	0.149***	0.510***	0.193***
	(0.046)	(0.0623)	(0.120)	(0.0454)	(0.160)	(0.0607)
scale factor				0.379		0.378
Pre-treat controls	YES	YES	YES		YES	
Time FE	YES	YES	YES		YES	
Province FE	YES	YES				
Clustered SE	YES	YES	YES		YES	
N	1512	1512	1512	1512	1512	1512

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Estimates obtained from regressing the share of individuals between the age of 14 and 18 not enrolled in upper secondary education on the natural logarithm of the minimum wage and the usual pre-treatment trended controls. Column 1 reports the coefficient estimated by OLS in the baselines specification. Column 2 reports the coefficient estimates by 2SLS, after instrumenting the independent variables with the minimum wage gap with respect to Milan in 1968, interacted with the time dummies. Both specifications include time and province fixed effects. Column 3 and 4 report the coefficient obtained with the generalized estimating equation (GEE) approach described by (Papke and Wooldridge, 2008). Column 3 assumes strict exogeneity and regresses the outcome on the dependent variable, while column 5 is the second stage from the predicted values obtained by regressing the log of the minimum wage on the wage gap interacted with time dummies. In both cases, the model controls for time averages of the dependent variables. Standard errors are clustered at the province level across all models. For the fractional probit model, standard errors are obtained by bootstrapping the 1512 provinces using 1500 bootstrap replications. Columns 4 and 5 report the Average Partial Effects estimated by multiplying the coefficient for the reported scale factor.

analysis, the IV strategy finds a larger coefficient than the OLS model, across both models: the average marginal effect estimated by OLS is 0.20, while the APE estimated by Probit is 0.193. In this case, too, it appears that the linear model slightly overestimates the effect with respect to the fractional probit model.

3.5.2.3 The causal response to the 1969 minimum wage hike

The previous estimations have established that, across our panel of provinces between 1962 and 1982, exogenous minimum wage hikes were associated with significant increases in early school leavers. However, our research question focused the attention on the steep rise of minimum wages after 1969, for this is the natural experiment that can provide a clean identification of the causal effect. To perform this analysis, I estimate the reduced-form regression from Equation 3.4, which allows for a dynamic response to the shock. As previously discussed, this approach is equivalent to a generalized DiD that exploits the exogenous variation in the intensity of the minimum wage hike to recover the causal response.

The dependent variable is defined as the log of the number of individuals between 14 and 18 not enrolled in post-compulsory secondary school, and the vector of controls includes the size of the cohort (logged). This definition allows us to immediately interpret the coefficient of interest as the marginal increase in the number of young people that leave school early for a 1% increase in treatment. Treatment is continuous and is defined as the gap between the minimum wage in Milan and the minimum wage in the province in 1968. Recalling our previous discussion, we know that provinces with a larger starting gap with respect to Milan experienced a steeper increase in minimum wages after 1968. This differential increase provides the source of variation in treatment intensity to estimate the causal response over time. To recover the dynamic causal response, I interact this variable with a full set of time dummies, setting the coefficient for 1967 equal to zero.

Figure 3.12 reports the coefficient from the interaction term, both including and excluding trended pre-treatment controls. The inclusion of the controls attenuates slightly the causal response but does not modify the interpretation. The figure shows that there was no association between early school leaving and the 1968 minimum wage gap before the wage shock, providing indirect evidence in support of the parallel trend assumption. The coefficient turns positive and statistically significant during the transition period (1968-1972), when provinces with a larger wage gap experienced a proportionally steeper increase in the minimum wage level. By 1972, a province that in 1968 had a gap of 10% with respect to the minimum wage in Milan see early school leaving in excess of 5.2%-7.3% (respectively, with and without controls). For reference, one quarter of the provinces had a wage gap larger than 10% with respect to Milan in 1968.

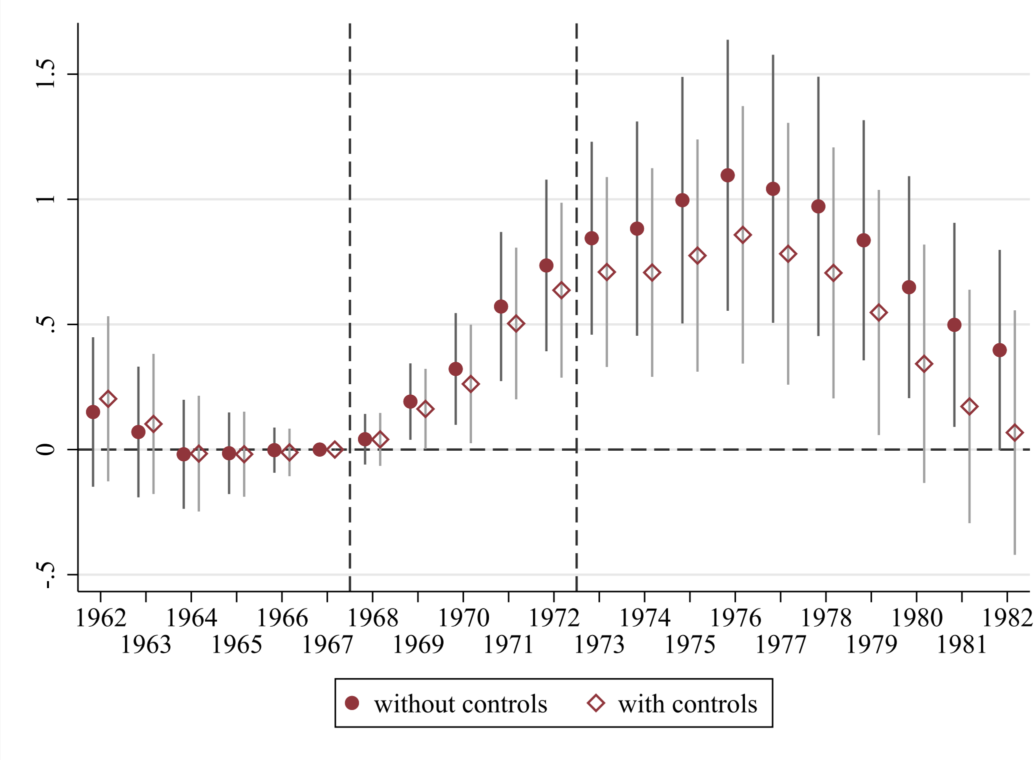


Figure 3.12: Dynamic response of early school leavers

OLS estimates if the coefficients for the interaction term between the inverse of the minimum wage gap with respect to Milan in 1968 and year dummies, with 1967 set to zero to avoid multicollinearity. The dependent variable is the log of the number of individuals between the age of 14 and 18 not enrolled in post-compulsory upper secondary education. The regression controls for the size of the age cohort in every province-year cell. Both specifications control for time and province fixed effects. The second specification also includes trended pre-treatment controls. The vertical lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start (1968) and the end (1972) of the convergence period, following the repeal of the wage zones in 1968. Number of observations: 1344. The estimation excludes provinces in special statute regions and provinces that had a higher mean minimum wage than Milan in 1968.

By 1972 the spatial convergence in nominal minimum wages was achieved, so our treatment switches off. Nonetheless, the estimated coefficient continues to grow until 1976. Why would the response continue to increase after the treatment switched off? A plausible explanation attributes this evolution to the fact that our measure of enrolment averages across five birth cohorts every year (the expected duration of most secondary school courses). This means that the cumulative opportunity cost of enrolling in secondary school varies between cohorts within each year. It is possible that the minimum wage hike that started in 1969 was steep enough to immediately discourage enrolment among the younger cohorts (those turning 14 in 1969), but not enough to cause similarly large dropouts in the older cohorts (those approaching 18 in 1969). Hence, the coefficients for the early years would underestimate the true effect. In fact, the first year for which all individuals had turned 14 after the start of the wage hike is 1974. Moreover, the peak year of 1976 is the final year in which all individuals had turned 14 before the switching off of the treatment in 1972. Starting in 1977, we begin observing the response of the cohorts that turned 14 after 1972.

Assuming that the coefficient in 1976 recovers the 'true' average causal response across the treated cohorts, our estimate implies that a 1% larger minimum wage gap with respect to Milan in 1968 is associated with a 1.1% increase in early school living (0.86% with controls). To understand what this means in terms of the impact of the minimum wage on enrolment, we recall from the first stage of the IV approach that the coefficient obtained from regressing the minimum wage on the wage gap was circa 0.85 in the same period. This yields indirect least squares of about 1.29 (1.01 with controls), which suggests that enrolment responded fairly elastically to the minimum wage shock of 1969-1972.

This large effect, however, did not carry over to the cohorts that turned 14 after the switch-off of the treatment, as shown by our coefficients' tendency to revert to the mean after 1976. By 1982, provinces that had experienced a steeper increase in the minimum wage due to their greater starting gap with respect to Milan showed no sign of extra early school leavers. It should be noted that the compression of male enrolment as identified by the aggregate descriptive statistics also lasted about six years before starting to recover (cf. Figure 3.6), albeit with a small lag with respect to our estimates.

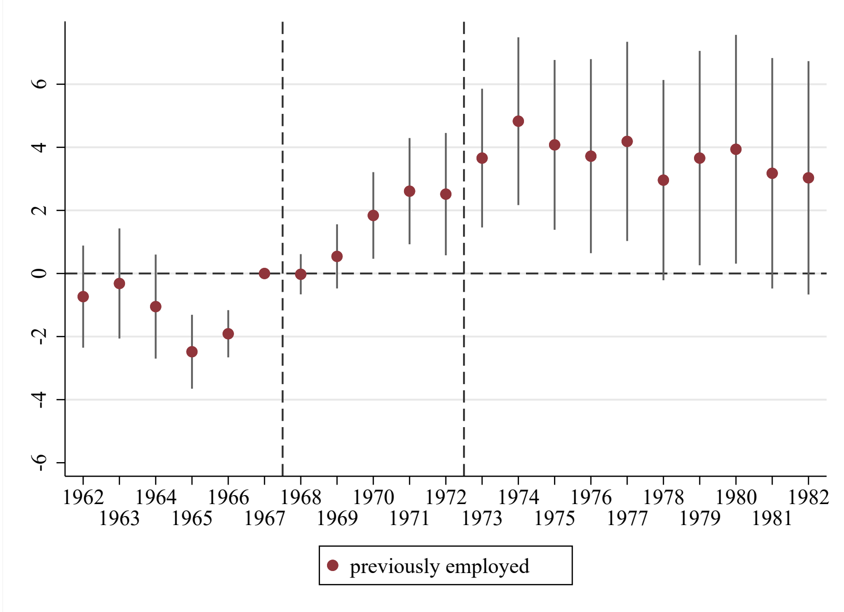
3.5.2.4 Youth unemployment and the recovery of school enrolment

The previous analysis has shown that the egalitarian wage hike provoked a temporary increase in early school leavers, and we suggested that the disappearance of the effect after 1976 is due to the substitution of the treated cohorts (teenagers who decided to enroll during the 1968-1972 period) with untreated cohorts (those that turned 15 after 1972). However, an alternative interpretation might point to the disemployment effect of the minimum wage hike. This is a plausible explanation because, for such a steep wage hike, we would expect to find some impact on youth employment—especially if the labour demand did not adjust to the extra supply of early school leavers. In order to test this alternative hypothesis, I estimate the causal response of youth unemployment using the preferred generalized DiD model. The estimate is performed separately by sex and, for each sex, by whether the unemployed individual was a first job seeker or had been previously employed.

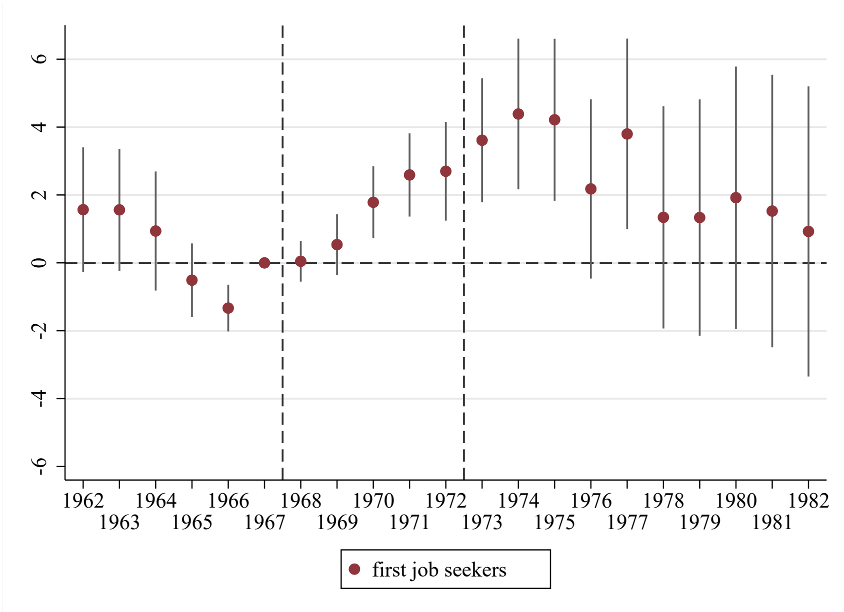
Figure 3.13 presents the results for men under 21. Both groups show no pre-trends and a significant increase during the transition period. The increase is comparable between the two groups, but the coefficients evolve differently after 1972: provinces that experienced a steeper increase in minimum wages show permanently higher levels of youth unemployment among those previously employed. The coefficient remains stable and statistically significant through the 1970s and into the 1980s. The coefficients for first job seekers, instead, revert back to zero after 1974

While this result appears counter-intuitive given the aggregate trends in relative unemployment, it would explain why we observe an increase in early school leaving during the transition period: while youth unemployment was rising across all provinces, those that experienced a steeper increase in the minimum wage hike did not disproportionally penalize first-job seekers. Thus, it is possible that, in the short run, opportunity cost considerations prevailed over the rising risk of unemployment. This coincides with that of early school leavers, and it is possible that the two dynamics are connected, for a larger number of people in school would reduce the number of individuals searching for their first job. Hence, it is possible that, in the long run, the risk of unemployment prevailed over opportunity cost considerations for marginal students, who opted to stay in school. On the other hand, the permanent increase in unemployed young people with previous work experience could be explained by the cumulative stock of early school leavers that had accumulated over the transition period, and by general equilibrium effects that we cannot account for, such as lower job creation in the provinces which experienced the steeper increase in minimum wages.

Figure 3.14 shows the same analysis for women under 21. Both groups show a similar reaction to the male counterparts during the transition period. However, the coefficients quickly revert back to the mean after 1974, so we cannot reject the null hypothesis that there was no association between the deviation from Milan's nominal wage in 1968 and the number of young women registered as unemployed after this period. These results raise two interesting points. First, young women were equally responsive to the wage hike than men, which is coherent with the rising female labour force participation among young cohorts in this period (Reyneri, 1996, p. 115). Second, for previously employed women we do not find the same permanent effect that we found for men. Two interpretations seem most plausible: either the labour market was strongly segmented by gender—for instance, because women would more frequently find occupation in the service sector (Fullin and Reyneri, 2015)—, or women were more easily discourage when facing the prospect of unemployment. Distinguishing between these two interpretations is not possible with our data, but the results suggest an avenue for future research.



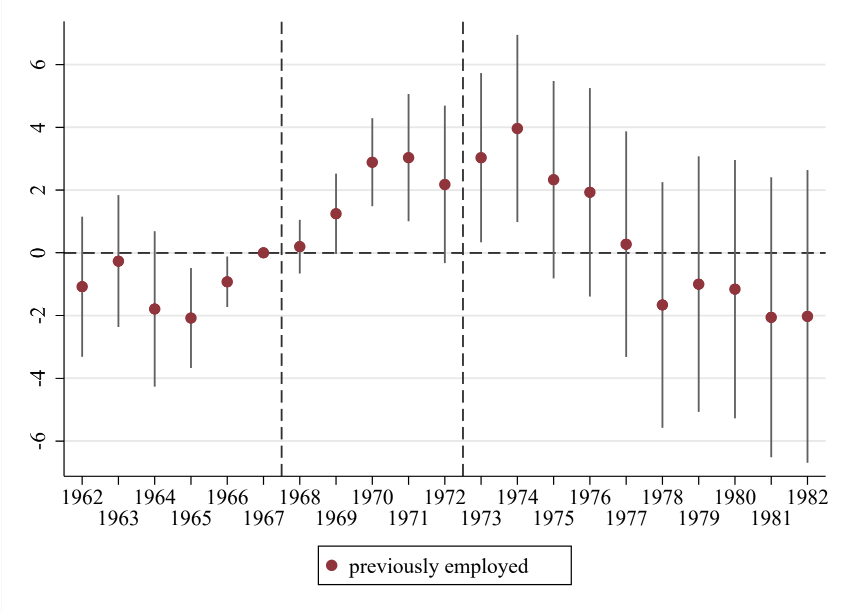
(a) male



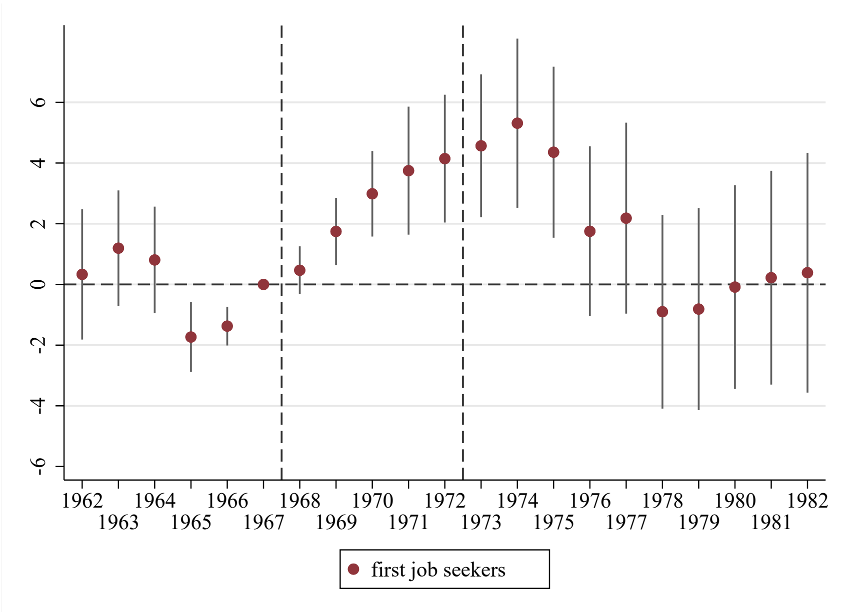
(b) female

Figure 3.13: THE RESPONSE OF MALE YOUTH UNEMPLOYMENT

Coefficients for the interaction term between the inverse of the log-point difference with respect to the mean minimum wage of Milan in 1968 and year dummies, with 1968 set to zero. The vertical lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start (1968) and the end (1972) of the convergence period, following the repeal of the wage zones in 1968.



(a) male



(b) female

Figure 3.14: The response of female youth unemployment

Coefficients for the interaction term between the inverse of the log-point difference with respect to the mean minimum wage of Milan in 1968 and year dummies, with 1968 set to zero. The vertical lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start (1968) and the end (1972) of the convergence period, following the repeal of the wage zones in 1968.

3.5.3 The effect on the choice of school field

This analysis has shown that the minimum wage hike caused by the egalitarian collective agreements affected educational investment on the extensive margin, as higher mean minimum wages were associated with a significant increase in early school leaving. This, however, does not exclude that the egalitarian wage hike also affected investment on the intensive margin by provoking a shift in the composition of school enrolment through its effect on the relative returns to specialist education. This section tests this second hypothesis by looking at alternative school choices.

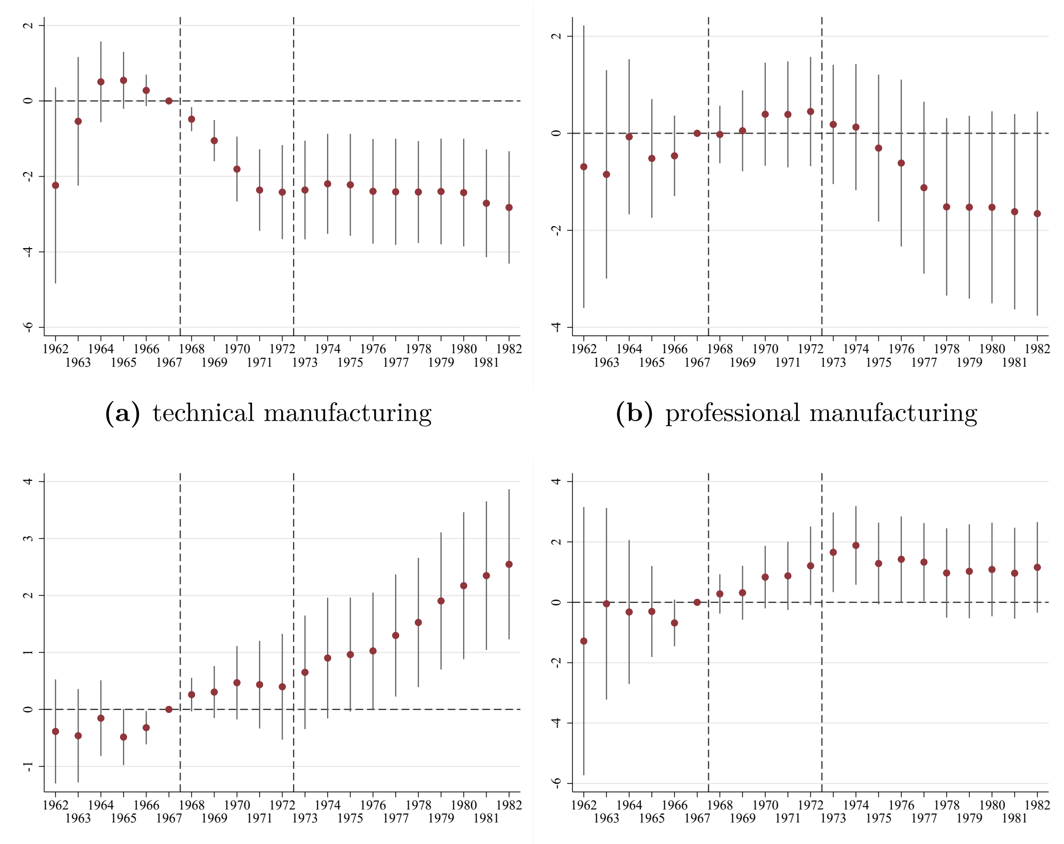
To test whether the egalitarian wage hike modified the composition of school enrolment, I distinguish between the choice of track and the choice of curriculum. I focus specifically on two alternative tracks—technical and professional schools—and two alternative curricula—schools for manufacturing and schools for business—which were chosen by teenagers that sought a practical education with immediate use in the private sector, for this group would be the most sensitive to changes in the *ex-ante* return to education.

Both the professional and the technical track were vocationally oriented, but the former was focused on application and gave students the option of leaving with an intermediate diploma after three years (age 16) instead of the customary five (age 18), while the latter had more theoretical components and only offered five-year courses. Hence, the choice between tracks reveals students' preferences with respect to the intensive margin of educational investment: choosing the technical track implied a longer time to completion but potentially access to further education. If the egalitarian wage hike was strong enough to reduce the ex-ante return to education for all students, we would expect students to shift their demand from technical to professional schools. Hence, we would observe enrolment decreasing in the former and increasing in the latter. Alternatively, in the extreme case that the ex-ante (discounted) return to education dropped below the reservation wage for the median student, we would expect enrolment to decrease in both tracks. Either way, results would inform us about changes in the quantity of education demanded.

The choice between curricula, instead, reveals students' preferences with respect to the content of the specialist education offered by the schools. Schools for manufacturing provided specialist knowledge for high-skill blue-collar jobs across a range of industries, qualifying graduates to be employed as machine operators, maintenance workers, technicians and floor managers. Schools for 'business' (*commerciali*), instead, prepared for clerical jobs or white-collar professions that did not require a tertiary degree. Hence, the choice between the two curricula would be influenced by the relative return to specialist education for blue-collar workers. If the egalitarian wage hike decreased the ex-ante return to specialist education for blue-collar jobs more than for white-collar jobs, we would expect to see a shift from schools offering manufacturing curricula and to schools offering business curricula.

To test these hypotheses, I estimate the reduced form regression separately for each type of school and sex, using as dependent variable the log difference between the number of individuals enrolled in the relevant school field and the size of the 14-18 age cohort. Using equivalent definitions such as the log of the share enrolled or the log of the individuals enrolled after controlling for the size of the cohort does not produce significantly different results. The main regressor of interest is the interaction between the minimum wage gap with respect to Milan in 1968 and the time dummies. The coefficient of the interaction would recover the causal response an increase in the minimum wage gap, which proxies for an increase in the minimum wage after 1968, but not before.

Figure 3.15 shows the estimated interacted coefficients between the instrument and the time dummies for both male and students, separately by type of school. The first panel shows that enrolment in technical schools offering a manufacturing curriculum dropped after the repeal of the wage zones: starting around 1970, a 1% deviation from Milan's mean minimum wage in 1968 is associated with a decrease in the gross enrolment rate by over 2%. This



(a) technical manufacturing

(b) professional manufacturing

(c) technical business

(d) professional business

Figure 3.15: Dynamic response by school type (male and female)

Coefficients for the interaction term between the log difference between the mean minimum wage in Milan and in the province in 1968 and year dummies, with 1968 set to zero. OLS estimates controlling for time and province fixed effects. The vertical lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start (1968) and the end (1972) of the convergence period, following the repeal of the wage zones in 1968.

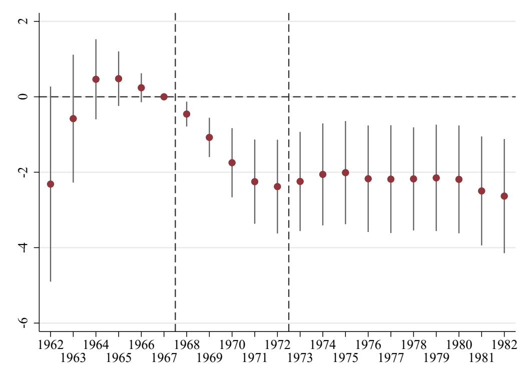
effect is larger, in absolute values, than the general increase in early school leavers, which suggests that teenagers who would enroll in technical schools for manufacturing were disproportionally affected by the minimum wage hike. Moreover, unlike the estimates for early school leavers, the coefficient does not show a tendency to revert to the mean by the end of the period, hinting to a permanent effect.

So, did students shift their demand in favour of other types of specialist education in the long run? Panel 3.15c shows that there was no strong association between mean minimum contractual wages and male enrolment in technical schools for business either before or immediately after the repeal of the wage zones. However, the coefficients turn positive, large and statistically significant by the end of the period.This result would suggest that the loss of students in schools preparing for high-skill blue-collar jobs in manufacturing was partly compensated, in the long run, by an increase in schools preparing for white-collar jobs.

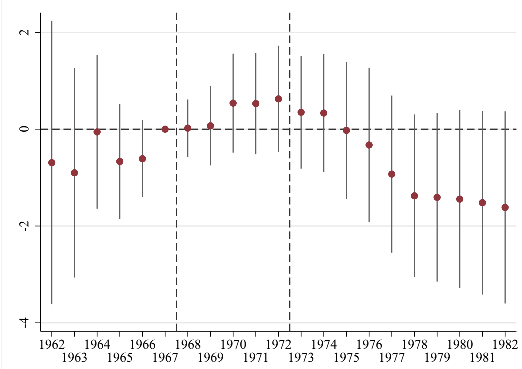
The delay between the reduction in enrolment in technical schools for manufacturing and the increase in enrolment in technical schools for business suggests that the two mechanisms discussed in the introduction acted in sequence: first, the raise in minimum wages increased the opportunity cost of schooling, pushing marginal students out of post-compulsory education. In the long-run, however, the compression of the skill premium for blue-collar workers prevailed, provoking a shift in the composition of educational demand from curricula preparing for manufacturing jobs and those preparing for blue-collar jobs.

This interpretation seems to be supported by the evolution of enrolment in professional schools. As mentioned above, these schools allowed to graduate in a shorter time, so the a relative preference for these schools implies a reduction in the investment in formal education on the intensive margin. Even though the estimates are imprecise, it appears in fact that enrolment in these schools did not decrease in the aftermath of the minimum wage hike and, possibly, increased somewhat during the repeal of the wage zones. Over the longer run, however, enrolment in professional schools for manufacturing jobs decisively decreased, while that in professional schools for business increased. This diverging evolution supports the hypothesis that concerns with respect to the relative return to education prevailed over the influence of the opportunity cost of staying in school for educational decisions.

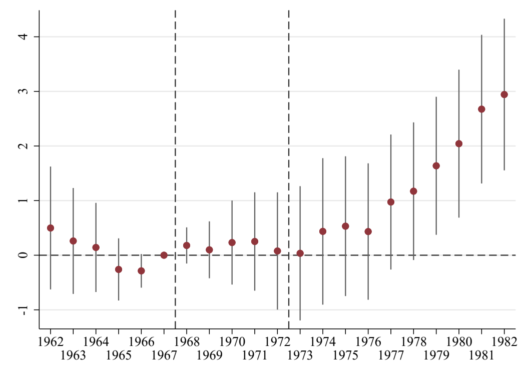
Figure 3.16 presents the results from the same estimation, but only for male students. The dynamic response for technical and professional schools for manufacturing is essentially identical to that for the full sample—which is to be expected, considering that man represented the vast majority of students choosing these school fields.The panels 3.16c and 3.16d, instead, show an even larger shift in favour of schools preparing for white-collar jobs than the previous estimates, suggesting that male students were more responsive to changes in the relative return to specialist education than aggregate statistics might lead to believe.



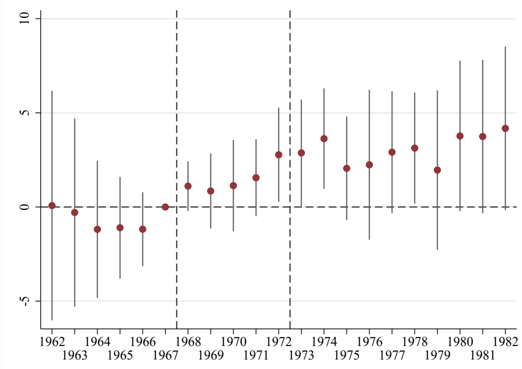
(a) technical manufacturing



(b) professional manufacturing



(c) technical business



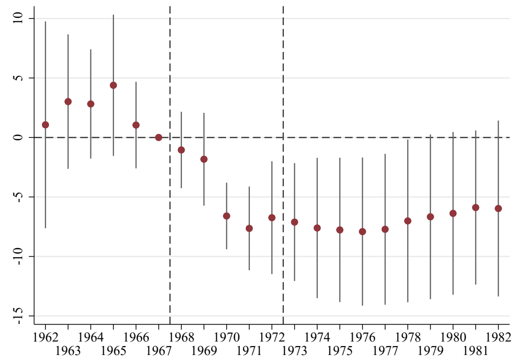
(d) professional business

Figure 3.16: Dynamic response by school type (male only)

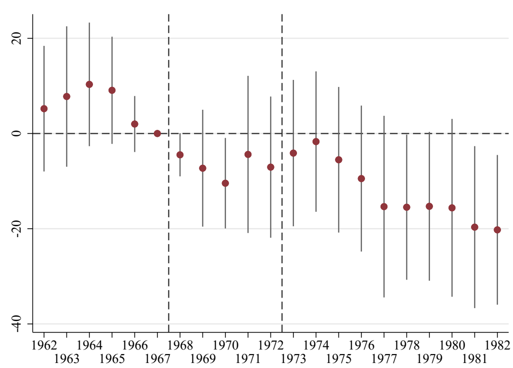
Coefficients for the interaction term between the log difference between the mean minimum wage in Milan and in the province in 1968 and year dummies, with 1968 set to zero. OLS estimates controlling for time and province fixed effects. The vertical lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start (1968) and the end (1972) of the convergence period, following the repeal of the wage zones in 1968.

Figure 3.17 repeats the analysis for female students. It should be noted that very few female teenagers enrolled in schools with a manufacturing curriculum in the first place, so the precision of the estimates is affected by the small cross-sectional and longitudinal variation of the dependent variables.[28] Nonetheless, the exercise is useful because, if the results point to the same direction as for their male classmates, it would add evidence to the argument that the effect identified can be causally attributed to the egalitarian wage hike and not to unobservable factors that only affected male enrolment in secondary school. The figure shows that the response of female students was indeed similar to that seen before for men: technical and professional schools for manufacturing show a negative response after the abolition of the wage zones (with a tendency to mean reversion for the former); the coefficients for technical and professional schools for business turn positive in the long run (even though we detect some pre-trends in this specific case).

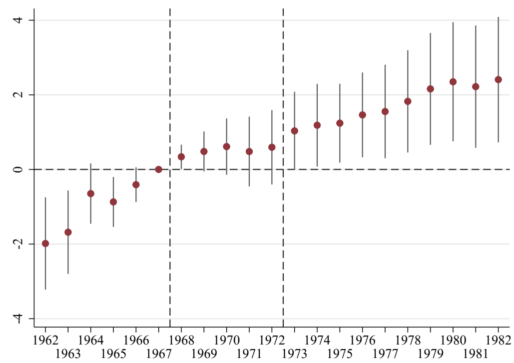
[28] Across all provinces and years, the average number of female students choosing manufacturing curricula is 78 for professional schools and 98 for technical schools, against 2,747 and 1,288 for male, respectively.



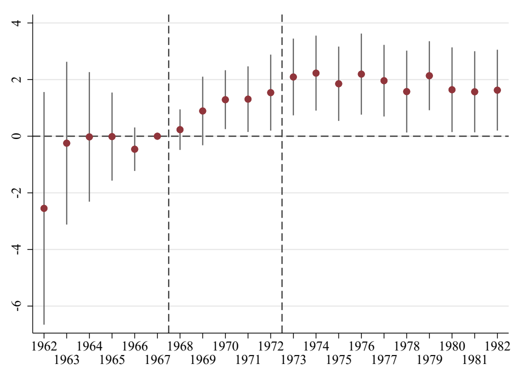
(a) technical manufacturing



(b) professional manufacturing



(c) technical business



(d) professional business

Figure 3.17: Dynamic response by school type (female only)

Coefficients for the interaction term between the log difference between the mean minimum wage in Milan and in the province in 1968 and year dummies, with 1968 set to zero. OLS estimates controlling for time and province fixed effects. The vertical lines indicate the 95% confidence interval with standard errors that are clustered at the province level. The vertical dashed line indicate the start (1968) and the end (1972) of the convergence period, following the repeal of the wage zones in 1968.

3.5.4 Implications for the human capital stock

The empirical analysis has shown that the steep rise of contractual wage floors caused by egalitarian collective bargaining affected teenagers' educational decisions. In particular, the minimum wage hike temporarily reduced enrolment rates in upper secondary education and permanently decreased enrolment in technical and vocational schools that prepared for blue-collar jobs in the manufacturing sector. But just how large was the impact on the accumulation of human capital in the long run? To quantify the impact on the stock of secondary school graduates we can compare the number of individuals holding at least a secondary education diploma with a counterfactual estimate, that is the number of individuals that would have graduated if the dip in enrolment rates had not materialized.[29]

For this analysis I use the 'Historical Database' (version 10.1) of the Bank of Italy's Survey on Household Income and Wealth (SHIW), which contains cross-sectional microdata from all the surveys that were conducted annually from 1977 to 1987 (excluding 1985) and every other year from 1989 to 2016.[30] I exclude the waves from 1977-1983 because the individuals' age is estimated and only takes four possible values. Among other variables, the database provides information on the highest level of education attained by the surveyed individuals. The SHIW defines six levels of education: none, primary school, lower secondary school, upper secondary school, university degree and post-graduate degree. An individual is classified in the uppermost possible category, conditional on having completed the relevant educational cycle. Hence, the SHIW tends to underestimate years of education because it does not account for the number of years spent in school before dropping out. Information on the

[29]The use of educational attainment rather than enrolment rates, as in the previous section, is justified by the fact that the same dynamics can be observed for both gross enrolment rates and gross graduation rates (see Figure 3.5), and that educational attainment can be observed also at a later stage in life, allowing us to perform estimates for each birth cohort based on individual-level data.

[30]The survey has been conducted since the 1960s on a representative sample of Italian households and is available for download from the Bank of Italy's website: `https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/index.html`.

level of education is available for 374,755 individuals across all survey waves, that is 85% of all observations. Hence, I exclude observations with missing values from the analysis. Additionally, I drop all individuals younger than 26, to account for late graduates and cohorts that are still in education at the time of the survey.

To estimate the educational attainment for each cohort, I compute the share of individuals with an upper secondary school diploma or higher in each cohort, accounting for the relevant population sampling weights. Figure 3.23 shows the resulting graduate-cohort profile, distinguishing also between men and women. These estimates confirm the dynamics depicted by the educational statistics and comparable with alternative estimates that can be computed on data from population censuses (see Figure 3.5 and Figure 3.24). All statistics confirm that the generation born after 1955 and before 1970 (theoretically to be enrolled in upper secondary school between 1970 and 1985) contributed the least to the expansion of secondary school enrolment throughout the period 1930-1990.

To compute a plausible counterfactual without the pause of the 1970s, I first estimate the absolute number of secondary school graduates in each cohort, multiplying the share of graduates by the size of the cohort at age 18, which I obtain from my intercensual reconstructions (see appendix A.6 for sources and methodology). Then, I estimate the number of additional individuals that would have graduated if growth had continued following the trend of the cohorts 1930 to 1954. For this purpose, I regress the graduation rate on the year of enrolment, under the condition that the year of enrolment is between 1945 and 1969. Hence, I use the fitted values of the regression as a counterfactual estimate of the gross graduation rate for subsequent age groups. To compute the number of graduates in the counterfactual scenario, I multiply the predicted gross graduation rate by the size of the age group at 18 for the cohorts born after 1954.

Figure 3.18 shows the number of graduates estimates for each cohort and the counterfactual scenario, together with the size of each the cohorts. The cumulative net loss until the 1990 cohort is over 2.3 million graduates. A back-of-the-envelope calculation finds that, had secondary education continued to expand at the same rate, the share of individuals aged 25 to 64 with at least a diploma of upper secondary education in 2015 would have increased from 60% to 67%. This is possibly an upper bound estimate, because it assumes that, without the dip in enrolment of the 1970s-1980s, graduation rates would have grown at the same trend as in the 1950s and in the 1960s, the time of fastest expansion of secondary school. To account for a plausible natural decrease in the rate of growth, we can repeat the same computations using the trend after the pause (the cohorts born after 1970). In this case, the cumulative net loss is estimated at 1.3 million graduates. The additional graduates would increase the share of people between 25 and 64 with an upper secondary school diploma or higher in 2015 to 64%. Moreover, it appears that the missing graduates can be mostly attributed to the specific dynamics of male educational attainment, rather than factors that were common to both sexes: 97% of the missing graduates from the more conservative counterfactual can be entirely attributed to men's sagging attainment.

But by just how much did this diversion from the trend matter for Italy's current lag in its human capital stock? Considering that, in 2015, the average share of upper secondary graduates in OECD countries was 76% of the population aged between 25 and 64 *vis-à-vis* 60% in Italy, our counterfactuals would see the gap decrease by between 9 and 16 percentage points. In other words, the pause in the expansion of secondary school enrolment between the 1970s and the 1980s would explain between 24% and 44% of Italy's lag in 2015.

3.6 Conclusions

Collective agreements are labour market institutions that, like statutory minimum wages, regulate entry-level salaries and influence the wage distribution. However, their relatively large bite with respect to the median wage can significantly raise the opportunity cost of investing in formal education for marginal student, and their egalitarian influence can alter the ex-ante return to education for inframarginal students. Thus, collective agreements that set high contractual minimum wage floors can reduce the accumulation of formal human capital and the relative supply of specialist knowledge, causing skill mismatch and lower growth potential in the long run.

The paper has explored these implications studying a historical natural experiment from Italy between the 1960s and the 1980s. Reconstructing new series of contractual and effective wages across the manufacturing sector, the paper has shown that labour unions' shift in favour of egalitarian bargaining in 1969 provoked a steep increase in entry-level minimum wages and a compression of the skill premium for blue-collar workers. New estimates on educational data have also shown that the wage hike was accompanied by a dip in male enrolment in upper secondary school and by a shift in the composition of curricula chosen by those who stayed in education.

The paper has hypothesized that the two phenomena are linked. In particular, two mechanisms have been proposed: first, that the increase in minimum contractual wages motivated marginal students to leave post-compulsory school early, either by dropping out entirely or by choosing tracks that offered shorter courses. Second, the compression of wage differentials for blue-collar workers incentivized inframarginal students to shift away from specialist curricula providing skills for manufacturing jobs. While the first effect was only temporary—possibly due to the rising risk of not finding a job at the higher minimum wage—the second effect was permanent.

The paper has also argued that, despite its temporary nature, the negative impact on enrolment rates continues to affect Italy's ranking in educational attainment to this day. Depending on the counterfactual scenario, the pause in enrolment cost between one and two million missing graduates, which would have reduced the distance in educational attainment between Italy and the OECD average by at least 25%. These empirical results support our hypothesis that the steep egalitarian rise of contractual minimum wages modified the incentive structure for young Italians, affecting their post-compulsory educational choices. These results also reinforce our argument that empirical analyses of the impact of minimum wages—either statutory or bargained—on schooling should take into account not only the effect on drop out rates, but also its potential impact on the fields of education chosen by the students and its eventual implications for labour market outcomes and an economy's growth potential in the long run.

The analysis, however, has presented some limitations that stemmed from the aggregate nature of the data. In particular, the analysis did not take into account indirect channels, such as the effect of the wage shock on parents' income, whose sign cannot be anticipated. If parents' salaries increase due to the raising contractual minimum wages, the additional household income could expand the investment on children's 'quality,' financing a longer period in education. If this is the case, our results would underestimate the true effect of the wage shock on school enrolment. On the other hand, if raising minimum wages increases the risk of unemployment for parents, the opposite effect could prevail. Finally, our estimates might be influenced by parents' migration decisions. The next chapter will show that, in general, the wage shock was associated with lower internal migration. However, we cannot rule out the possibility that high-skill parents moved to provinces which experienced a smaller compression in skill premiums, which might introduce a selection effect through the intergenerational transmission of education. These different channels could not be explored for the Hot Autumn shock with the data available in this chapter, because it would require household-level information on both parents' income and occupational status, children's educational attainment, and place of residence before and after the shock. However, these hypotheses could be tested in other contexts and time periods.

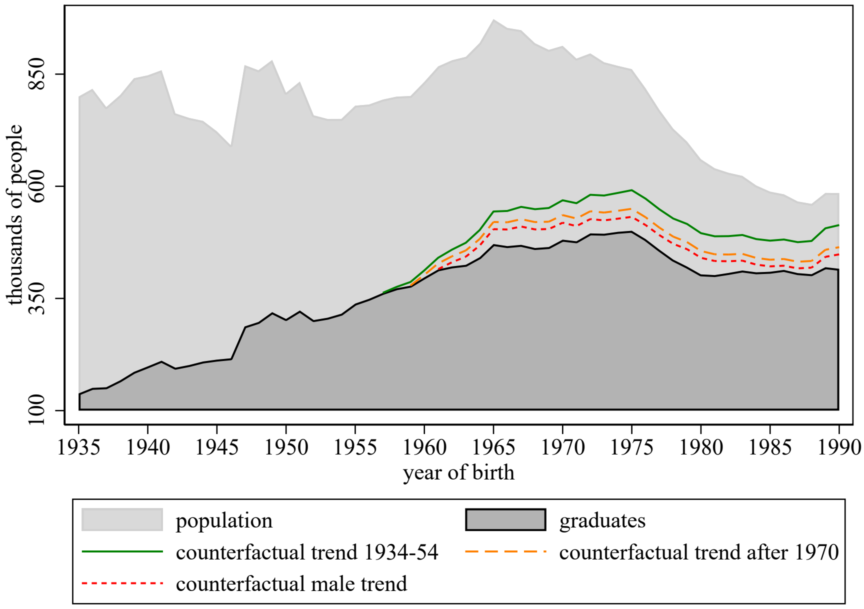


Figure 3.18: Upper secondary school graduates and counterfactual estimates

Population size at age 18 and number of upper secondary school graduates by birth cohort, with counterfactual estimates. Number of graduates computed by multiplying the share the smoothed graduation rate in each birth cohort by the size of the cohort at age 18. The smoothed graduation rate is computed as the trend component from a Hodrick-Prescott filter applied to the share of individuals with an upper secondary diploma or higher in the SHIW surveyed sample, for each birth cohort. The HP filter is applied with a smoothing parameter of 6.25 (cf. Ravn and Uhlig, 2002). The counterfactual trend 1934-1954 shows the total number of graduates in case educational attainment of the birth cohorts born after 1954 had expanded at the same rate as for the cohorts born in 1934-54. The counterfactual trend after 1970 shows the total number of graduates if attainment for the 1954-69 cohorts had expanded following the same trend as the cohorts born after 1970. The counterfactual male trend show the total number of graduates had the attainment of the male cohorts born after 1954 followed the contemporary female trend. Counterfactual trends are the predicted values from linearly regressing the smoothed number of graduates on a time trend, restricted to the relevant birth cohorts (female only for the third counterfactual), and multiplying the predicted enrolment rates by the size of each birth cohort at age 18. Source: own estimates on microdata from the Bank of Italy's Survey on Household Income and Wealth (SHIW), Historical Database, version 10.1, waves 1984-2016 pooled together. Year of birth computed subtracting the individual's age from the year of the survey. Individuals born before 1900 are excluded from all waves, as well as individuals younger than 26 in each wave. Before the 1989 wave, only the educational level of income earners was recorded. Upper secondary school is considered attained if the educational qualification is upper secondary school (*medie superiori*), graduate degree (*laurea*) or postgraduate degree (*specializzazione post-laurea*). Total sample size: 245,116 observations. Data available for download at `https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/distribuzione-microdati/index.html` (last retrieved October 2021). Size of cohorts at age 18 is obtained from the official reconstruction of the national population on January 1st of each year by age group since 1952, available from Istat's *I.Stat* datawarehouse at `http://dati.istat.it/Index.aspx?DataSetCode=DCIS_RICPOPRES1971` (for 1952-1972), `http://dati.istat.it/Index.aspx?DataSetCode=DCIS_RICPOPRES1981` (for 1972-1981) and, `http://dati.istat.it/Index.aspx?DataSetCode=DCIS_RICPOPRES1991` (for 1982-1991), last retrieved October 2021.

Additional figures

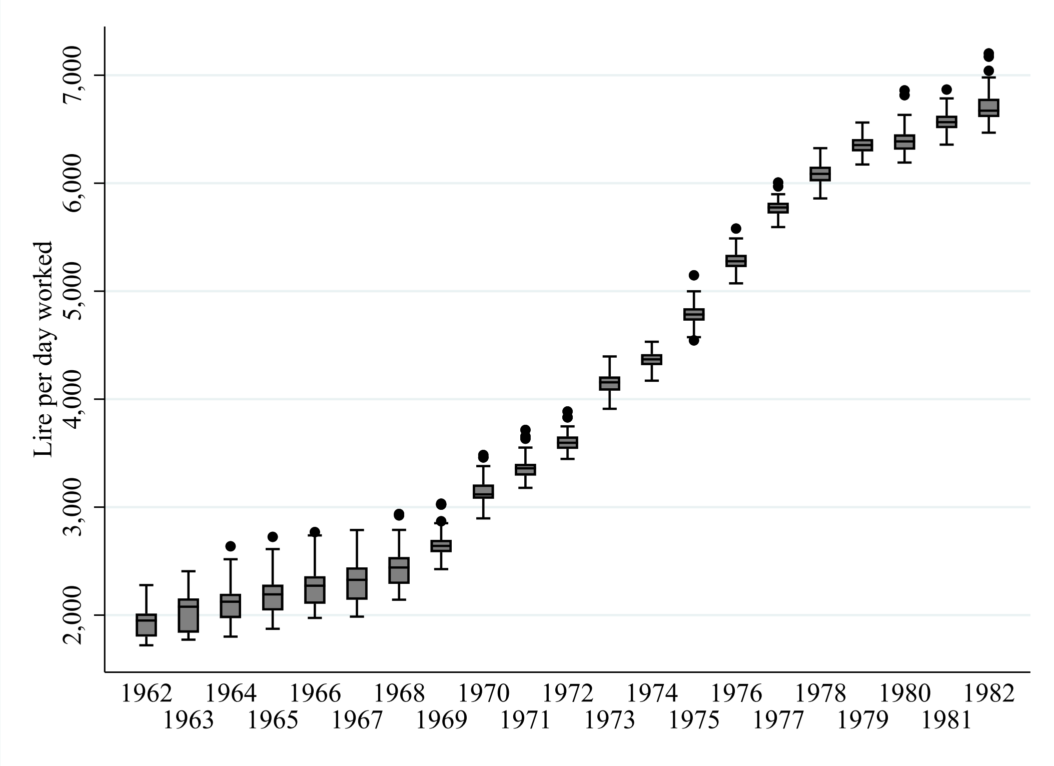


Figure 3.19: Box plot of mean minimum wages at 1968 constant prices

Box plot of mean minimum wages for low-skill blue-collar workers in 24 industrial sectors across ninety-two provinces. The box indicates the interquartile range, the line indicates the median, the whiskers connect to the adjacent values and the markers indicate outside values. Sectoral minima are weighted using the estimated number of employees in each sector-province cell, obtained as the linear interpolation from decennial industrial censuses. Details on sources and estimation strategy are provided in appendices A.1 and A.4. The nominal value of the minimum wage is originally expressed in current Italian lire per hour worked, converted to daily wages multiplying by eight and converted to 1968 prices using official coefficients from Istat, *Il valore della moneta in Italia dal 1861 al 2020*, available for download at `https://www.istat.it/it/archivio/258610` (last retrieved July 2022).

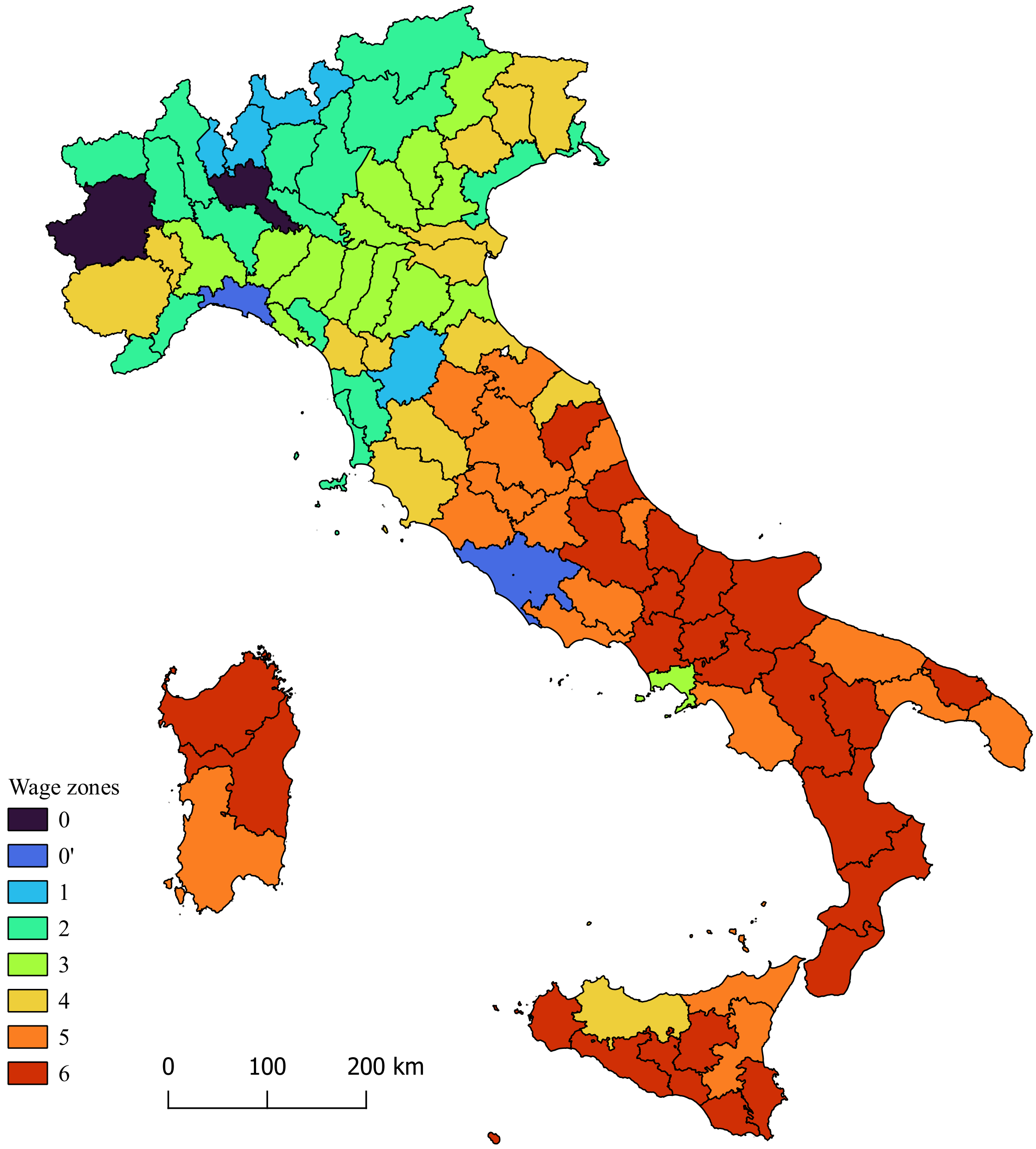


Figure 3.20: Wage zones before 1969

Classification of provinces according to the assigned wage zone during the 1960s. These wage zones were defined with the interconfederal agreement of 2 August 1961, which established seven wage zones, from zero to six. Wage zone zero included Milan, Turin, Rome and Genoa. However, nominal wage levels differed between the former couple of provinces and the latter. To signal this, the map indicates Rome and Genoa as wage zone 0'. The wage zones were abolished with the interconfederal agreement of 18 March 1969. Source: Istituto Centrale di Statistica (1969b, p. 150, footnote a). The shapefile of the provinces at 1971 historical borders is available at https://www.istat.it/it/archivio/231601 (last retrieved July 2022).

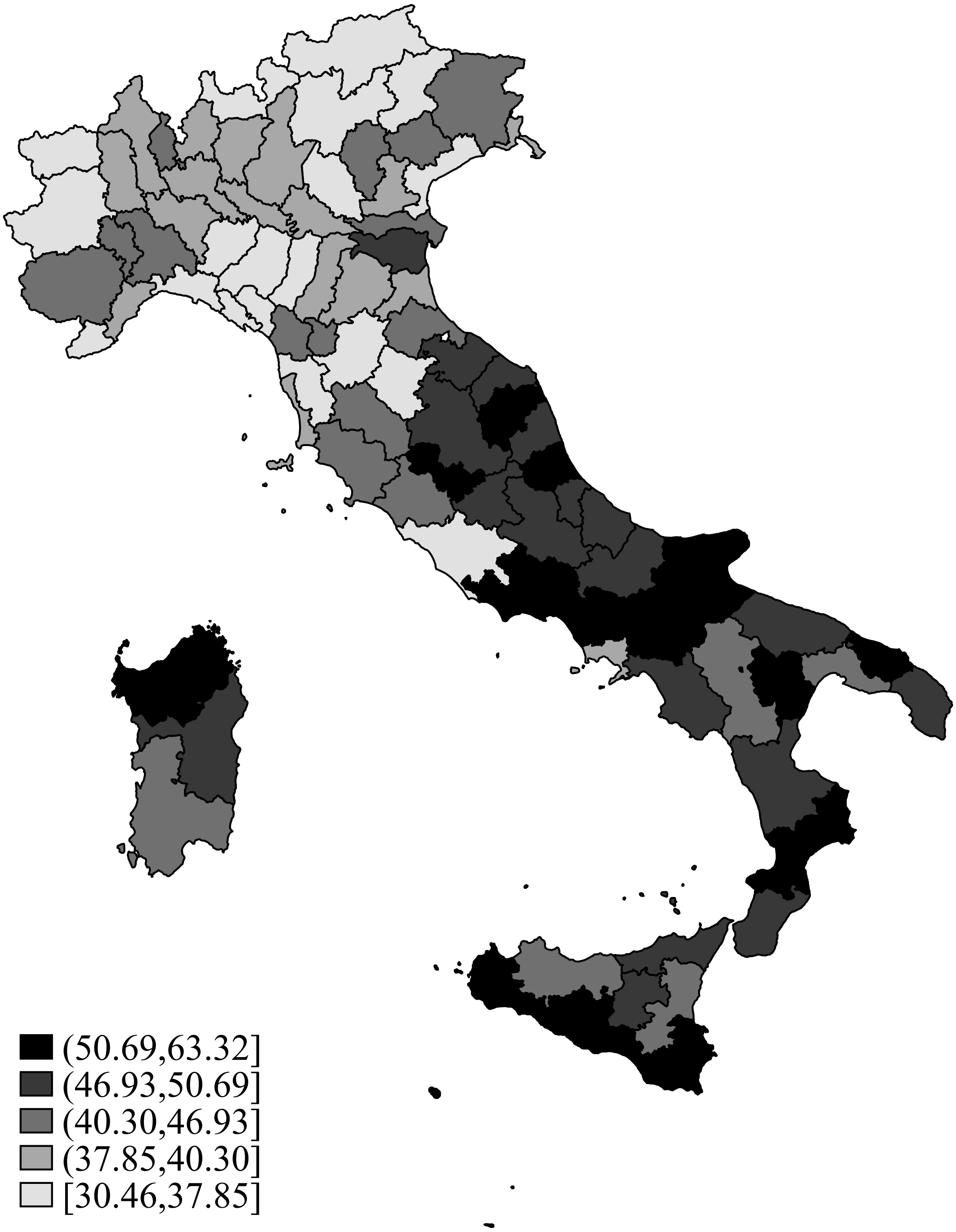


Figure 3.21: Change in mean industrial minimum wage 1968-1972

The map shows the percentage change in the mean nominal minimum wage across nineteen industrial sectors between 1968 and 1972. The change is computed at constant 1968 prices. Sectoral wages are weighted according to local industry shares, in each province. For additional details on the methodology see section 3.2.1. For the sources of the minimum wage data see section A.1. The shapefile of the provinces at 1961 historical borders is available at https://www.istat.it/it/archivio/231601 (last retrieved July 2022).

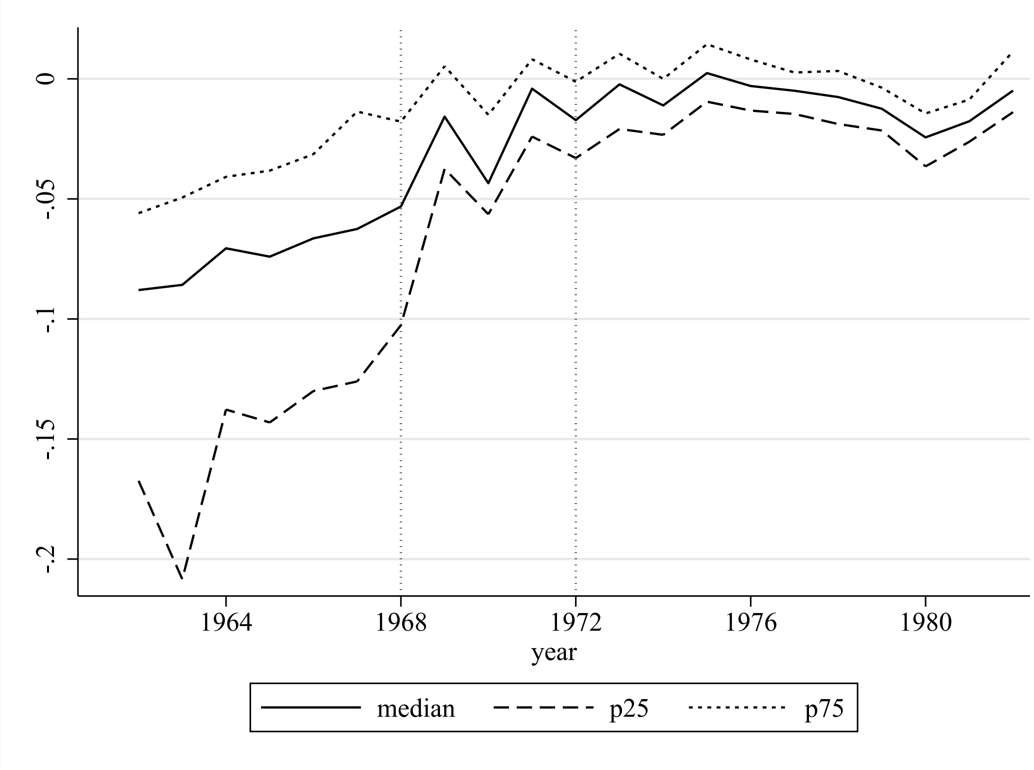


Figure 3.22: Minimum wage differentials with respect to Milan

Log difference of the provincial mean minimum wage with respect to Milan. The mean minimum wage is computed as the weighted average of the minimum wage for the lowest category of blue-collar worker across twenty industrial sectors. Weights are obtained from the industry shares of employees in the province. The median, 25th percentile and 75th percentile are the respective values of the difference with respect to Milan, for all remaining 91 provinces. For data sources see text and Appendix A.1.

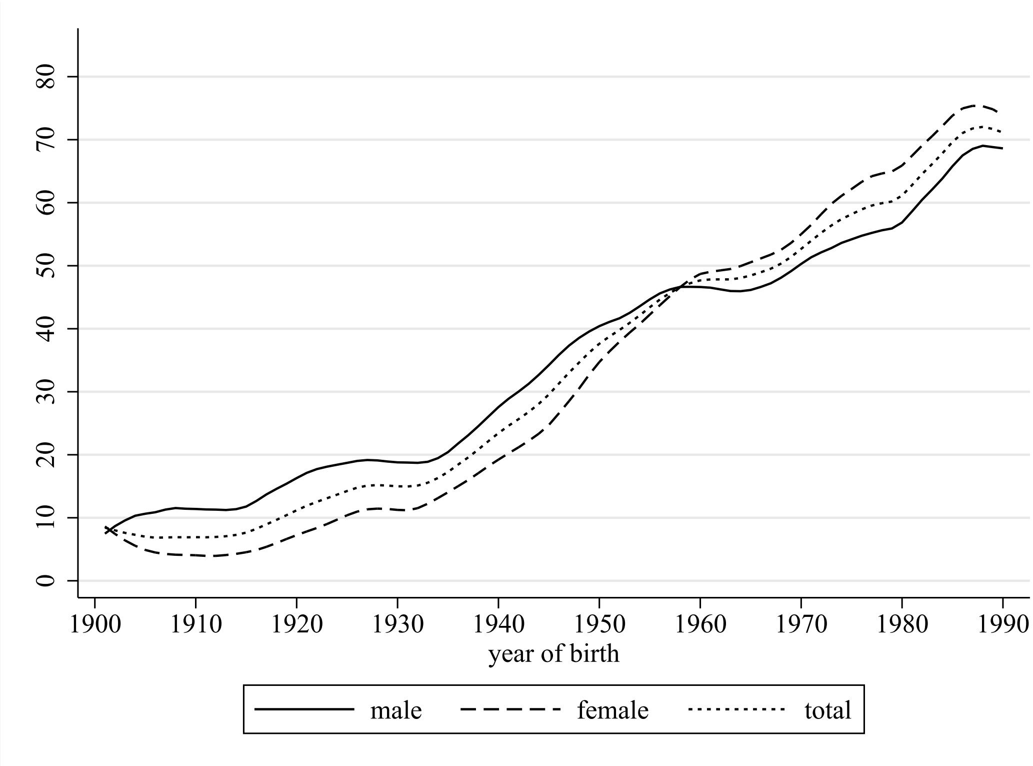


Figure 3.23: Upper secondary school attainment by birth cohort

Percentage of individuals with a secondary school diploma or higher by birth cohort. Trend component from a Hodrick-Prescott filter with a smoothing parameter of 6.25 to account for the annual frequency of the data (cf. Ravn and Uhlig, 2002). Source: own estimates on microdata from the Bank of Italy's Survey on Household Income and Wealth (SHIW), Historical Database, version 10.1, waves 1984-2016 pooled together. Year of birth computed subtracting the individual's age from the year of the survey. Individuals born before 1900 are excluded from all waves, as well as individuals younger than 26 in each wave. Before the 1989, only the educational level of income earners is recorded. Upper secondary school is considered attained if the educational qualification is upper secondary school (*medie superiori*), graduate degree (*laurea*) or postgraduate degree (*specializzazione post-laurea*). Total sample size: 245,116 observations. Data available for download at https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/distribuzione-microdati/index.html

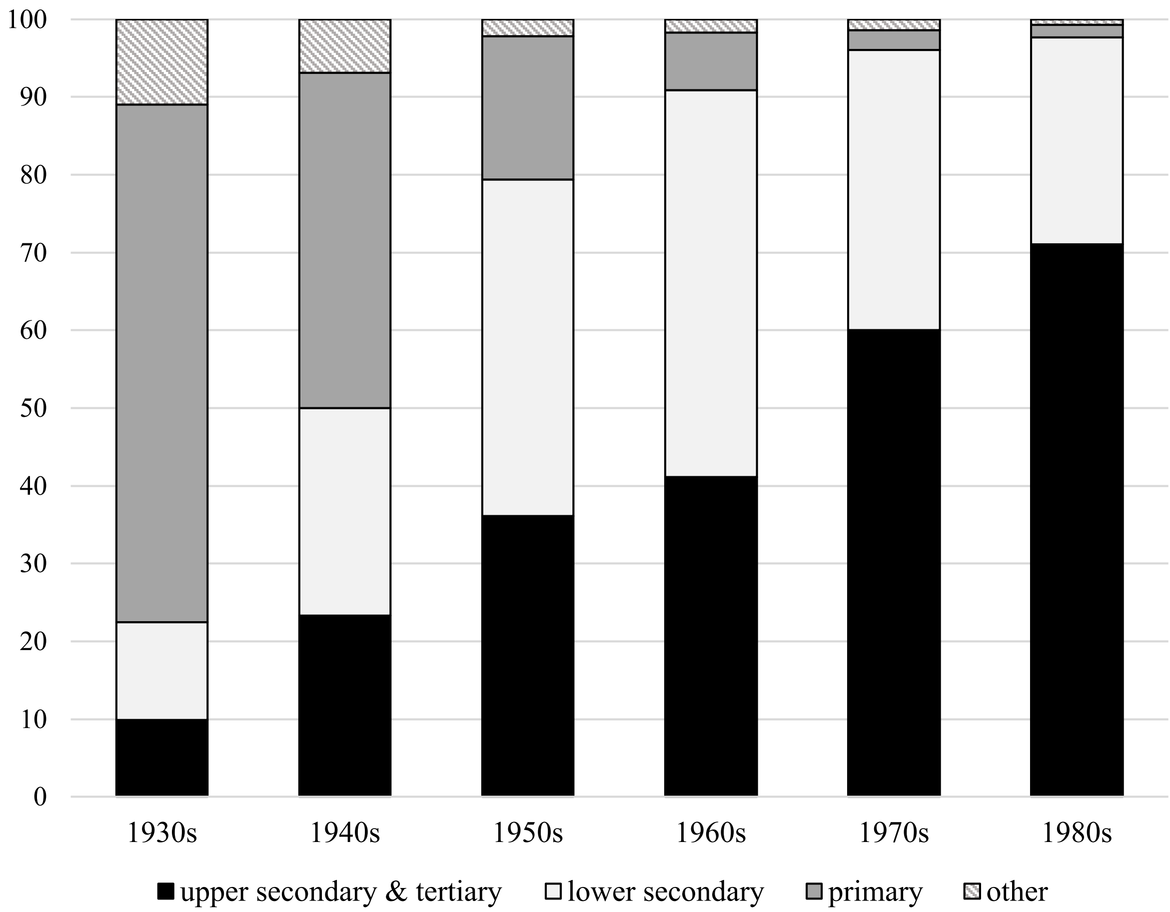


Figure 3.24: Educational attainment by decade of birth

Percentage of population by highest level of education attained and decade of birth. Education attained is identified by the highest leaving school qualification declared at age 19-29. Tertiary education is included with upper secondary education to avoid underestimatation for individuals born in the second half of each decade, who would still be enrolled in university at the time of the census. The 'other' category includes illiterate individuals and literate individuals without school leaving qualifications. Source: own computations on population censuses of 1961, 1971, 1981, 1991, 2001 and 2011—respectively, Istituto Centrale di Statistica (1975, pp. 32-125), Istituto Centrale di Statistica (1984), Istituto Nazionale di Statistica (1994), Istat, *DaWinci.istat.it* available at http://dawinci.istat.it/ (last retrieved June 2022), and Istat, *Censimento Popolazione Abitazioni*, available at http://dati-censimentopopolazione.istat.it/Index.aspx?lang=it (last retrieved June 2022).

Chapter 4

Spatial wage equalization and internal migration

The effect of repealing the wage zone system after 1969

4.1 Introduction

Geographical mobility within countries is a key mechanism for the efficient allocation of labour between local markets. Migration from shrinking regions to booming areas allows to contain aggregate unemployment and its social costs, especially during periods of fast technological change that destroys old jobs and creates new ones, often in different locations (Glaeser, Ponzetto, and Tobio, 2014; T. Berger and Frey, 2016). Moreover, internal migration underpins agglomeration economies, which drive specialisation and growth (Moretti, 2011). However, internal migration has fallen in the past decades across many developed countries (Molloy, C. L. Smith, and Wozniak, 2011; Alvarez, Bernard, and Lieske, 2021), despite the fact that spatial differentials in productivity and income have consistently risen, both in the US and in Europe (Rosés and Wolf, 2019; Gaubert et al., 2021).

This contradicting behaviour causes significant misallocation of labour and a net loss for the economy (Diamond, 2016), and it hinders employment opportunities and life-cycle trajectory for the affected individuals and their children (Ludwig et al., 2013; Nakamura, Sigurdsson, and Steinsson, 2022).

Understanding what factors might reduce the propensity to migrate is thus crucial to designing effective policy interventions that can improve the efficient allocation of labour between areas. Growing attention has been given alternatively to institutions that alter the costs of, or the returns to migration (Jia et al., 2022). This chapter explores the latter type, focusing on wage-setting institutions that aim to increase nominal wages in low-income regions, using the historical case of Italy.

Between the 1950s and the 1960s, Italy's economic miracle was accompanied by large migration flows from low-income areas to the country's industrial core in the North-West (Gomellini and Ó Gráda, 2017). These internal flows sustained economic growth and regional convergence in income per capita and employment levels, reducing spatial divides that dated at least to the unification of the country, in 1861 (Daniele, Malanima, and Ostuni, 2016; Felice, 2019b). However, in the early 1970s, internal migration rates suddenly dropped, despite the fact that unemployment in low-income regions was rising faster than in the industrial core. Internal migration rates remained at historically low levels for the next four decades (Bonifazi and Heins, 2000), while unemployment and income per capita have continued to diverge, erasing the improvements of the Golden Age (Felice and Vecchi, 2015a).

Traditional models of inter-regional mobility predict that migrants flow from low- to high-income areas and from high- to low-unemployment areas to equalize geographical differences (J. R. Harris and Todaro, 1970; Pissarides and Wadsworth, 1989). Hence, the permanent drop in internal migration observed in Italy at a time of rising regional divides has puzzled researchers, spurring several attempts to identify possible causes. A recent review by Piras (2017, pp. 575–578) lists eighteen empirical papers—published between 1977 and 2014—that address this question with a longitudinal approach, even though only a handful include data from before 1970. This stream of research has focused on the estimation of push and pull factors, paying particular attention to labour market variables.[1]

The first conceptualization of the puzzle represented by low internal migration in the presence of high unemployment differentials was proposed by Attanasio and Padoa Schioppa (1991), who argued that workers' low geographical mobility in the presence of widening regional differentials implied significant mismatch in the labour market. The authors listed a series of possible causes, but focused especially on the 1969 reform of the wage-setting system that equalized nominal minimum wages across Italian regions for all manufacturing sectors. During the 1960s, industrial wages were largely set by sectoral collective bargaining, which established minimum wage floors by skill level for both blue- and white-collar workers.

These nominal wage floors, however, were scaled according to regional coefficients, which meant to adjust for differences in local productivity and cost of living, in order to ensure that workers performing the same job tasks within each sector received similar real wages. Following the shift in labour unions' stance with respect to collective bargaining in 1969, the regional scaling system was eliminated, so that sectoral minimum wages became nominally equal across the whole country. According to Attanasio and Padoa Schioppa (1991), this spatial equalization of nominal contractual wages increased the relative standards of living in low-income areas—where price levels were lower—and reduced incentives to migrate. The authors argued that the rise in unemployment differentials was not enough to contrast the shrinking incentives to migrate because destination regions also saw an increase in unemployment rates, while rising housing prices increased the cost of moving.

Even though Attanasio and Padoa Schioppa (1991) did not formally test their hypothesis—relying instead on descriptive statistics for six macro areas—, their argument inspired many of the following studies. In particular, Manacorda

[1]A pioneering analysis by Salvatore (1977) used time series econometrics to explain short-term fluctuations in migration from the South to the North of the country, and found that relative unemployment rates and industrial wages had a strong explanatory power. This research, however, predated the structural break in internal migration, which became evident only after the mid-1970s.

and Petrongolo (2006) argued that the centralization of collective bargaining implied that sectoral wages were set according to the conditions of the labour market in the North of the country, and suggested that up to one third of the high unemployment observed in the South between 1977 and 1998 could be attributed to regional mismatch, represented by an excess of labour supply in the South—see also Pagani and Dell'Aringa (2005) for a comparable argument. Similar results had been obtained by Brunello, Lupi, and Ordine (2000) for a longer time span (1951-1996). However, both papers stopped short of testing the mechanism suggested by Attanasio and Padoa Schioppa (1991).

A longer-term analysis was instead provided by Brunello, Lupi, and Ordine (2001) who, using data for eight Southern regions for the period 1970-1993, showed that real wages in the South since the 1970s had not been affected by local unemployment, as they were tied to labour market conditions in the North. Consequently, the authors argued that the reduction in real wage differentials between the two areas reduced internal mobility. However, since their data only covered the period after the reform of 1969, their analysis did not provide a direct test for the mechanism proposed by Attanasio and Padoa Schioppa (1991).

One of the most recent and explicit analyses of nominal wage equalization for Italy's low internal mobility and high unemployment differentials has been conducted by Boeri, Ichino, et al. (2021). The article compares Italy's wage-setting system with Germany's, using information on wages, prices, productivity, unemployment and migration for 103 Italian provinces and 96 German 'Spatial Planning Regions' from around 2010. The authors show that, in Germany, firm-level bargaining allows wages to adjust to local productivity, which is not possible for most Italian firms. As a consequence, in Germany real wages are higher in high-productivity regions, and migration flows ensure that unemployment rates are similar across all regions. In Italy, instead, the spatial equalization of nominal wages implies that real wages are the same or higher in low-productivity areas, causing greater local unemployment. Boeri, Ichino, et al. (2021) suggest that this mismatch is not compensated by internal migration because individuals in low-income areas rationally choose to queue for a high-paying local job rather than sustain a costly move to a low-unemployment, low-real-wage area. The result is a loss of efficiency in labour markets, with extra aggregate unemployment and lower labour income.

This and previous evidence pointing to the nominal wage equalization as a cause for inefficient labour markets spurs frequent political debates regarding the opportunity to reintroduce elements of geographical variability in nominal wages, either through firm-level bargaining or a new version of the pre-1969 scaling mechanism (Poy, 2015; Poy, 2017). However, very limited research has been conducted on the influence of the previous system on local labour markets.[2] To the best of my knowledge, there is no direct test of the impact of the 1969 reform on internal migration that spans the period before and after. This paper fills the gap in the literature by testing the hypothesis that the nominal equalization of contractual wages in 1969 contributed to the fall in internal migration rates during the 1970s, using newly-digitized data from a range of printed primary sources.

The dataset combines new estimates of contractual and effective wages and of spatial indices of the cost of living with bilateral migration flows for each of Italy's 92 provinces from 1961 to 1981, at annual frequency. The wage data is estimated from twenty manufacturing industries covering over 97% of industrial workers and 63% of all dependent employees in 1971. The focus on the industrial sector is justified by the effect of the institutional reform—for the spatial equalization of nominal wages only affected industrial wages—and by evidence that the search for high-paying manufacturing jobs was a major

[2]The only empirical research on this institution that I am aware of is Blasio and Poy (2017), but the authors studied the introduction of the system in the 1950s, not its repeal, and focused on the impact on employment, not migration. Using a regression discontinuity design, the authors find higher industrial employment in areas with lower nominal wages, suggesting that the differentials were sizeable enough to have significant economic effects. **Mauro2016empty citation** have estimated an endogenous growth model, calibrated using aggregate macroregional data, which finds the repeal of the wage zones one of two permanent institutional shocks that explain the end of regional convergence in the 1970s.

economic motivation for industrial migration in the period under study. A Laspeyres spatial index of the cost of living is computed from official time series of the cost of living for each provinces which I make comparable using a new spatial index of the cost of living for a benchmark year, and I validate the results with reconstructions that use alternative methodologies and sources.

The migration data has been digitized from matrices of residential status changes collected by the National Statistical Institute from municipality registry offices and published in annual statistical demographic reports. By using the complete matrices of migration flows at the province level, the paper can distinguish between long- and short-distance migration, which allows to account for unobservable heterogeneity between the two migration patterns. After harmonization to account for border changes of the geographical units, I have complemented the dataset with a range of control variables including, but not limiting to, resident population, local gdp and unemployment measures. The resulting dataset concerns 8,464 dyads for twenty years, totalling 177,744 observations.

The analysis is divided in two parts. First, I assess whether nominal differentials in contractually-bargained minimum wages represented a pull factor for internal migration. To this end, I estimate a gravity model that is augmented to take into account differences in contractual and effective wages, unemployment rates, price levels, demographic factors and occupational structure. This approach follows several recent examples in the specialist literature which have employed gravity models to study internal migration in Italy in the long run (Etzo, 2011; Piras, 2012; Piras, 2017; Piras, 2021). In contrast to this literature, however, I am able to test separately for the role of contractual nominal wages and average effective wages.

Leveraging the longitudinal dimension of the paper to account for time-invariant omitted variables and common trends, I find that the level of contractual minimum wage in the province of destination was a large and statistically significant pull factor, and that the decline in minimum wage differentials can explain up to 86% of the decrease in internal migration flows between 1962-1968 and 1975-1981. Moreover, I find that nominal minimum wages at destination lost their significance as a pull factor of migration in the latter period.

Secondly, I discuss potential mechanism that would explain these dynamics. Using the new spatial series of wages and cost of living, I show that nominal wages adjusted to local productivity before the reform of 1969—especially in the Centre-North—, but not afterwards. This led to a significant increase in real wages in low-income provinces, while unemployment levels increased. This analysis shows that the current situation, described by Boeri, Ichino, et al. (2021), was in fact the result of the spatial equalization of nominal wages after 1969.

The paper contributes to different streams of literature. First, it provides—to the best of my knowledge—the first explicit test of the influence of minimum wage equalization for internal migration in Italy, a thesis that has been proposed since the 1970s and that maintains contemporary policy relevance. Second, the paper contributes to the broader historiography of the Italian economy in the 20th century, providing an additional explanation for the divergence in regional economic performance since the 1970s. Third, the paper connects to the wider literature on wage-setting institutions and local labour markets, showing that letting wages adjust to local productivity can stimulate internal migration and increase the efficiency of local labour markets. This evidence also speaks to contemporary debates on the opportunity of equalizing nominal wages across distinct locations, debates that are often dominated by fairness considerations over economic fundamentals.

The paper is organized in six sections. section 4.2 provides the historical background, describing secular trends in internal migration and the institutional change of 1969; section 4.3 presents the new dataset with a brief description of the sources and harmonization procedures; section 4.4 tests the main hypothesis of the paper; section 4.5 discusses potential mechanisms; section 4.6 concludes.

4.2 Internal migration and local wage differentials in the long run

Figure 4.1 shows the evolution of gross internal migration rates in Italy from 1902 to 2012 according to the registry offices of the resident population. The graph clearly identifies two long cycles: 1922-1942 (peaking in 1937) and 1952-1978 (peaking in 1963). The first cycle was comparable in magnitude to the second and ended abruptly, possibly due to the chilling effect of the Second World War and to Fascist policies introduced in 1939 to contrast urbanisation—even though their effectiveness in restraining internal migration flows is contested by the prevalent historiography (Treves, 1976).

The second cycle shows consistently high rates between 1957 and 1971, when at least 28 people per 1,000 inhabitants changed their residence every year. The even higher values recorded in 1961-1963 (when the rate peaked at 34.5‰) are often attributed to the repeal of the Fascist anti-urbanisation laws, which had been *de facto* disapplied since the post-war period but might have prevented many economic migrants to formalize their residence status—this 'clandestine' population was estimated at over one million in 1960 (Gallo, 2012, pp. 156-170). However, the years 1963-64 also coincided with a deceleration of GDP growth and with a contractionary monetary policy that led to higher unemployment—possibly forcing the unemployed to move and adding to the migration flows. Nonetheless, once the extra migration of 1963 is accounted for, the drop after 1971 appears even more stark. In fact, Panichella (2014, ch. 2.1) maintains that, once the spurious registrations of 1962-63 are excluded, the peak of internal migrations happened around 1970, and that the 1970s represented the end of the 'golden age' of internal migrations. Migration rates stabilized at low levels through the 1980s and the 1990s, showing a tendency to grow again only in the 2000s.

The drop in internal migration during the 1970s was also accompanied by changes in their geographical composition. Figure 4.2 shows the net immigration rates for the five macroregions of Italy: the migration cycle of the 1950s-1960s

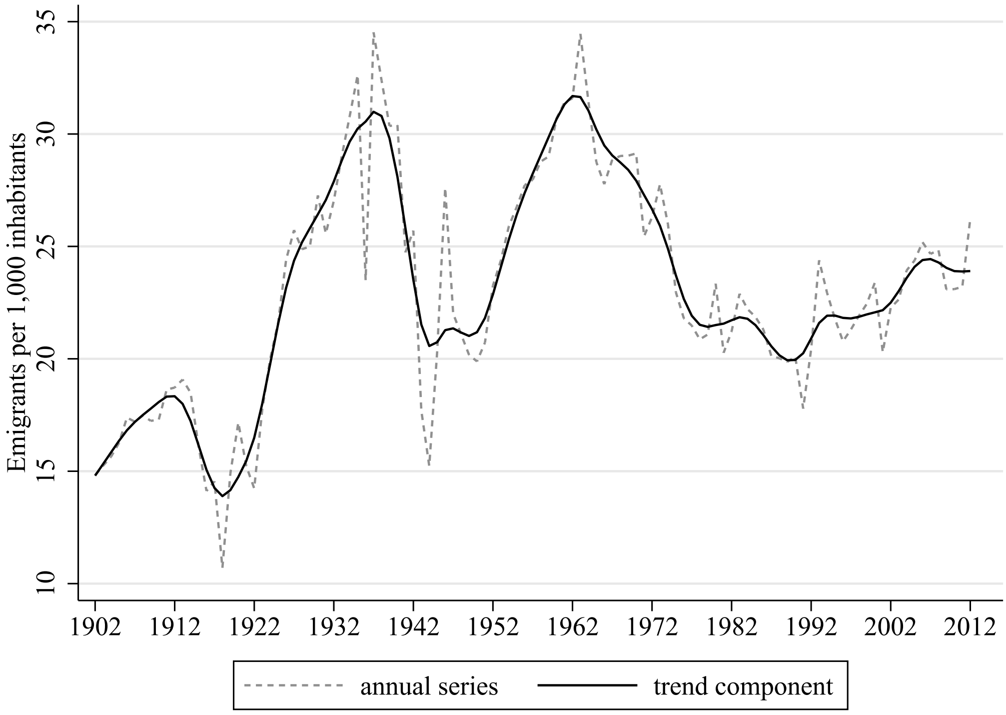


Figure 4.1: Gross internal migration rates

Total number of internal migrants per 1,000 residents at historical borders. The annual series is the number of individuals registering at the municipalities' registry offices every year and is computed from Istat, *Serie storiche*, Tav. 2.11.1, while the mid-year resident population is computed on data from *Ibid.*, Tav. 2.3, both available for download from `https://seriestoriche.istat.it/` (last retrieved July 2022). The trend component is obtained by applying a Hodrick-Prescott filter with a smoothing parameter of 6.25, to account for the annual frequency of the data (cf. Ravn and Uhlig, 2002).

was characterized by massive long-distance migration from the continental South and the Islands to the North-West, where the industrial core was located. In this graph, the extreme value corresponding to the repeal of the Fascist anti-urbanisation laws can be clearly identified around 1961, as well as the large drop in immigration to the North-West during the 1970s, which is mirrored by the recovery of the South and Islands, two areas that had been characterized by negative net immigration in the previous three decades. Another notable evolution is represented by the North-East—which turned from net negative to net positive around 1965—, while regions in the Centre remained net receivers of internal migrants throughout the century, largely due to the continued migration to the capital city of Rome.

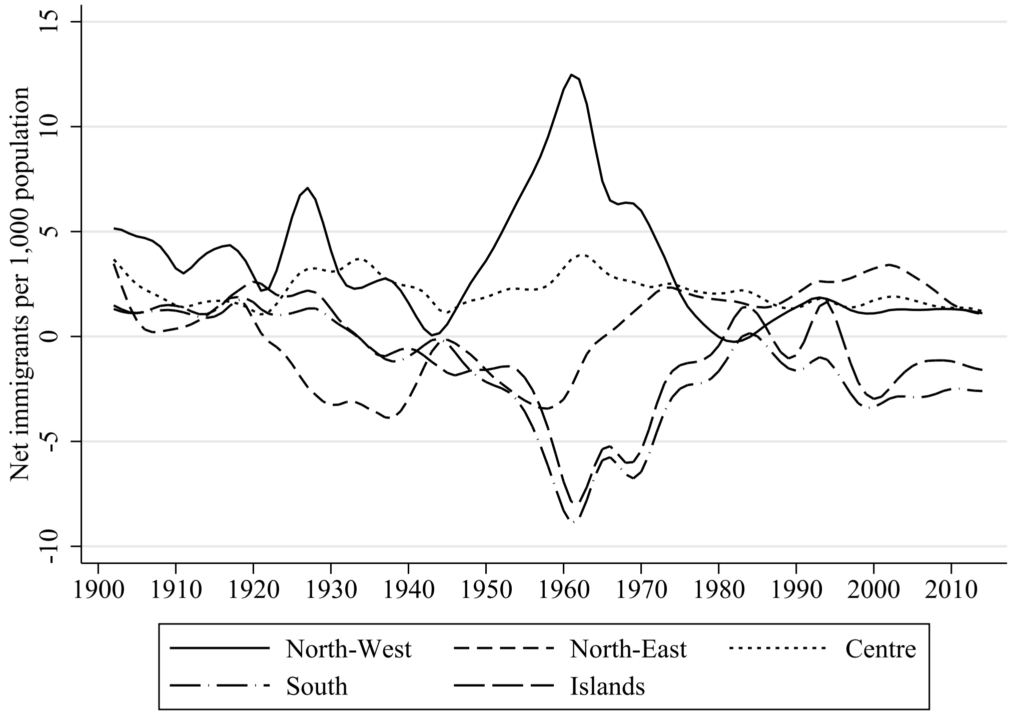


Figure 4.2: Migration rates by macroarea

Total number of internal migrants per 1,000 residents at historical borders, trend component from a Hodrick-Prescott filter with a smoothing parameter of 6.25. For source and methodology see note at Figure 4.1.

This sharp drop in long-distance migration from the South to the North motivated researchers to focus on comparisons at the aggregate level. However, more complete long-term reconstructions show that an even larger drop can be identified for migration rates between provinces in the same regions (-47.1% between 1955 and 1995) and between regions in the same macroarea (-50%). In fact, in the same period migration rates between macroareas declined by 32.1%, while rates within the same province dropped only by 12.8% (Bonifazi and Heins, 2000, p. 114). This suggests that, during the 1970s, Italy underwent a generalized migratory decline between provincial borders at all distances, while migration within provincial borders was not affected to the same extreme.

It is possible that the different evolution of migration within and between provinces is due to distinct push and pull factors. Using data from the 2000s, B. Biagi, Faggian, and McCann (2011) suggest that long- and short-distance migration in Italy respond to different sets of factors: the former appear to be driven by economic fundamentals (income differentials, relative unemployment), while the latter would depend on the quality of life, proxied by the availability of local amenities. Hence, the authors caution against explaining the two types of movements with the same model.

However, it is also possible that the different evolution of migration inside and outside provincial borders is further evidence for the role of the spatial equalization of contractual wage floors. By construction, the equalization of nominal wages could affect only migration between provinces, but not within.[3] Hence, we can hypothesize that some structural factors might have caused a reduction in the Italians' general propensity to leave their place of origin, but the spatial equalization of minimum wages removed a potent economic motivation for longer distance migration.

This hypothesis would also be compatible and separately testable with respect to alternative causes that were originally suggested by Attanasio and Padoa Schioppa (1991) and later assessed empirically by other researchers. This list included a decreasing matching efficiency of the labour market, changing differentials in the cost of living, and shifts in labour demand due to structural transformations. Faini, Galli, et al. (1997) presented a cross-sectional study of mobility choices in 1995 which pointed to two distinct causes: inefficiencies in regional job-matching and high mobility costs, which they attributed to rent controls and house price differentials. Focusing on the role of the housing market, L. Cannari, Nucci, and Sestito (2000) found that differential regional dynamics in housing prices were strongly associated with a reduction in internal migration flows both between the South and the North and within the two macro areas, in 1967-1992, but they also highlighted that a large share of mobility remained unexplained.

[3] Even though we cannot exclude the possibility of spillover effects, for less out-migration from the province can also decrease opportunities for migration within the province.

Focusing on demand factors, Murat and Paba (2002) posited that the structural and technological transformations underwent by the manufacturing sector between the 1970s and the 1980s shifted labour demand in favour of workers already embedded in the local economy—for they would have acquired tacit human capital and more specialist knowledge. However, they also find that wage differentials between locations has a strong predictive power between the 1950s and the 1960s, and much less in the following decades, which would also lend support to our hypothesis. However, their analysis pools data for the two macro-periods and does not account for bilateral migration flows, limiting the possibility to identify causal effects.

Hence, despite taking a centre stage in early interpretations of the migration puzzle, as far as I am aware the role of spatial equalization of contractual wages has seldom been directly tested with historical data. To test the hypothesis that the equalization in spatial minimum wages provoked the structural decrease in internal migration observed in the 1970s, I have assembled a new dataset of bilateral migration flows, contractual and effective wages, and local price indexes, which I will describe in the next section.

4.3 Data and descriptive evidence

4.3.1 Bilateral migration flows

To observe changes in internal migration before and after the reform of 1969, I have digitized and harmonized annual matrices reporting the number of emigrants and immigrants between any couple of Italian provinces from 1961 to 1981. The data originate from a regular publication of the National Statistical Institute (Istituto Centrale di Statistica, 1964a-Istituto Centrale di Statistica, 1985a) and from the supplement to the Monthly Statistical Bulletin for the year 1970 (Istituto Centrale di Statistica, 1972). The resulting dataset contains information on migration flows for 8,464 dyads for twenty years, totalling 177,744 observations, including 1,932 observations regarding intraprovincial migration (i.e. when the province of origin and destination coincide).

The matrices were computed by the National Statistical Institute according to regular communication by all municipalities regarding the number of incoming and leaving residents in the previous year. Changes in residential status were recorded by the municipality's registry office every time an individual declared their residence status in the municipality, and they were transmitted to the previous municipality of residence for confirmation of cancellation.[4] Hence, the data originates from administrative sources, and as such it carries both pros and cons that affect the analysis. According to M. Bell et al. (2015, p. 10), administrative records have the benefit of registering all migration events over time—in contrast to surveys, which have non-complete coverage, and censuses, which typically take snapshots of migrant stocks—, but their reliability is affected by the laws governing resident status.

In the case of Italy, this observation is particularly relevant because of the anti-urbanisation laws limiting changes of residence that had been introduced during the fascist period. As section 4.2 mentioned, the preservation of the regulation during the 1950s did not prevent migration from happening, but it limited its transparency, causing under-reporting for a sizeable share of the migrant population. To avoid introducing biases in the estimations, I refrain from including in the dataset all years previous to the repeal of the anti-urbanisation laws, even though this implies that we cannot check for the potential effect of the first reform of the wage zone system, which happened in the same year.

Caution should also be used with respect to the data recorded after the repeal of the urbanisation laws, for it is possible that they are skewed by the regularisation of the residence status for people that had migrated in previous years. Unfortunately, a distinction between new registration and regularisation is only available for the year 1962, when 27% of all changes of residence was due to regularisation (Istituto Centrale di Statistica, 1965, pp. 282-285). This information, moreover, is only available for the total number of immigrants

[4] Details on the procedure are described by Istituto Centrale di Statistica (1957).

in each province, without information on the province of origin, making it impossible to correct our data. To account for this eventuality, I run robustness check excluding the year 1962, without obtaining qualitatively different (not reported).

The analyses will be performed using both migration flows and migration rates. To compute the latter, I divide the number of emigrants by the mid-year population in the province, as recorded by the residence statistics from the registry offices. This choice ensures that the source of the population and migration data is the same, reducing the risk of introducing external biases. The mid-year population for year t is the arithmetic average of the population registered at time t and at time $t-1$.

Figure 4.3 plots the evolution of gross migration rates for all ninety-two provinces, excluding internal migration, from 1965 to 1981. The graph shows that migration rates did not appear to react immediately to the repeal of the wage zone system, but following the reform's completion in 1972 they quickly dropped by one third, and remained at the new low levels through the decade. This drop is slightly larger than that suggested by aggregate data reported in the previous section, and shows a steeper decrease after 1972.

However, section 4.2 argued that internal migration in this period was a combination of short- and long-distance flows, which were possibly influenced by distinct factors. Hence, it is possible that Figure 4.3 masks some relevant heterogeneity. In order to check for this, we can first disaggregate the migration flows by type of destination. Figure 4.4 shows that the year 1972 marked a structural break in the series for all destinations, with migration dropping by circa 30% in the next three years. However, migration within provinces stabilized and quickly recovered towards the end of the decade. Migration to all other destinations, instead, continued falling throughout the 1970s, with limited sign of stabilization at the end of the period.

It is also noticeable that migration peaked across all destinations in 1972, right around the completion of the spatial equalization of contractual wages. We

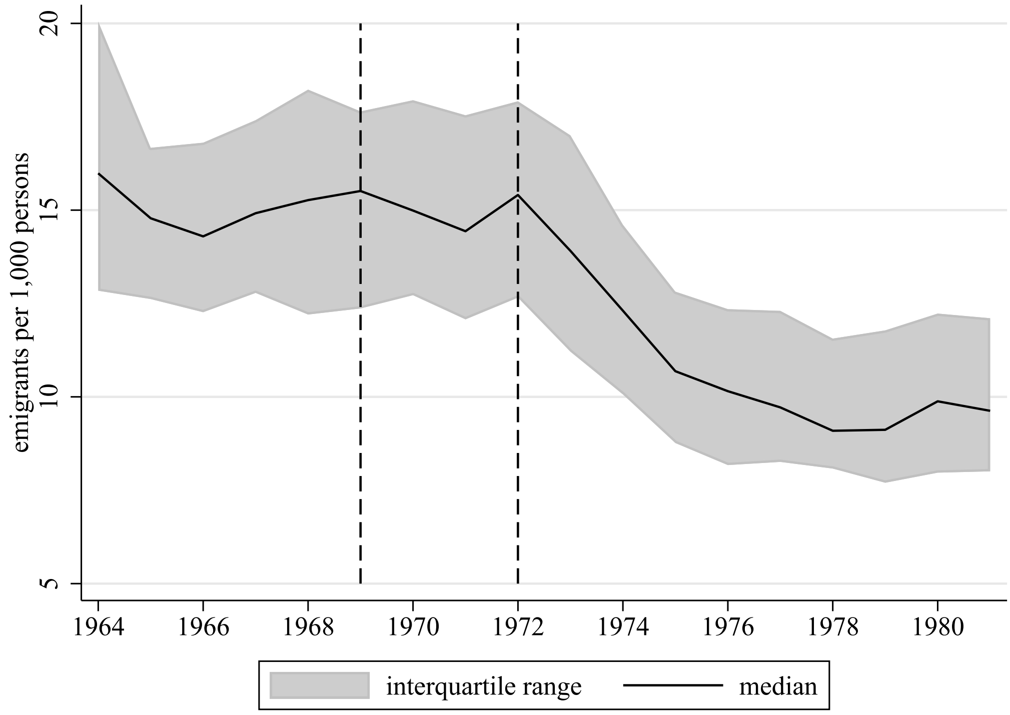


Figure 4.3: Gross migration rates between provinces

The graph reports the median value and the interquartile range of the gross migration rate (number of emigrants per 1,000 persons). Values are computed as the total number of emigrants from each of the ninety-two provinces, divided by the mid-year population of the province. The graph excludes migration within the province. For sources and methodology, see section 4.3.

cannot exclude that this temporary spike was caused by individuals' reacting to the wage equalization by returning to their place of origin or moving to a province which offered higher living standards under the new system. It should also be highlighted that migration within regions had started decreasing immediately after the 1968/69 agreements repealing the wage zone system, while all other flows remained stable throughout the transition period. We could speculate that within-region migration is less costly (both in monetary and non-monetary terms), hence it reacted more quickly to the early phases of the transition. To conclude, we notice that migration between macroareas experienced a temporary decreased between 1964 and 1966 that is unexplained by our hypothesis. Hence, for robustness, the analysis will also separate

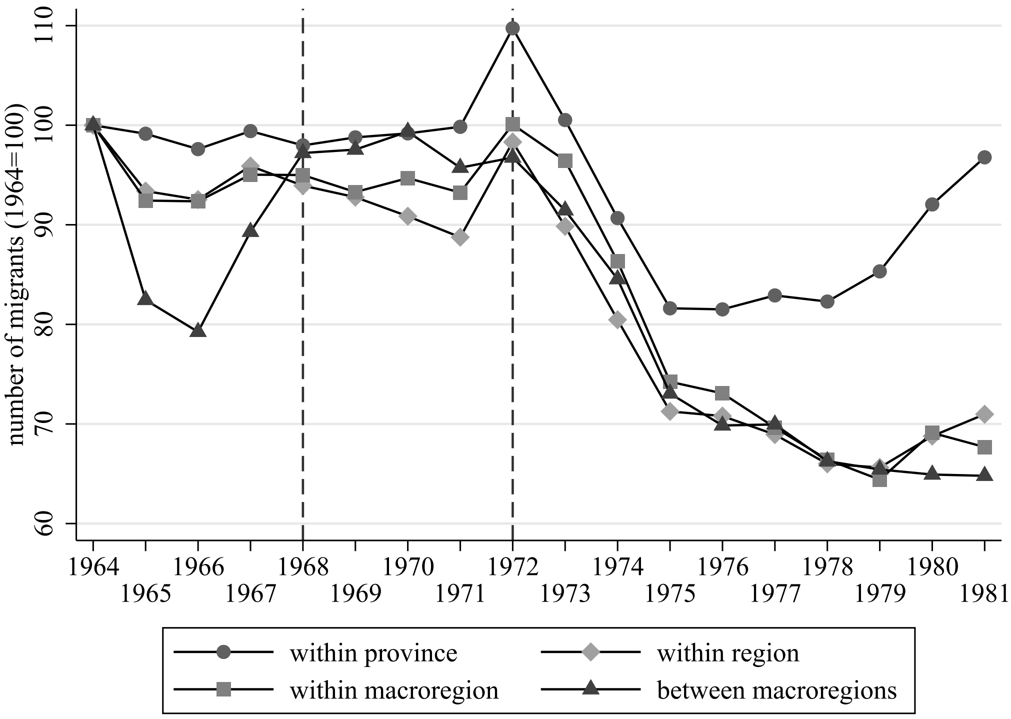


Figure 4.4: Evolution of gross migration by destination

The graph reports the change in the total number of emigrants for all 92 provinces by type of destination, including migration within the province. To ease the comparison, the series are set equal to 100 in 1964. For sources and methodology, see text and section 4.3.

migration flows within and between macroareas.

Type of destination, however, is not the sole possible source of heterogeneity. Another relevant factor concerns how migration figures could be affected by outliers. The underlying data shows that the distribution of bilateral migration flows was right-tailed throughout the period, suggesting that a few provinces showed very high migration rates—about two-times larger than the median value (see Figure 4.21). Hence, it is important to distinguish whether the reduction in migration observed during the 1970s was due to a generalized decrease in migration from all provinces, or to the decline of mass migration from these few outliers. To begin examining this problem, Figure 4.5 plots the kernel density distributions of gross migration rates by period. The figure shows that the distribution of migration rates shifted to the left after the repeal of the wage zone system, which can be attributed to a general decrease in migration rates across all provinces. In addition, however, the right tail of the distribution is less fat after 1972, suggesting that mass migration from the outliers also decreased. In fact, the whole distribution is more concentrated in the period after the repeal of the wage zones. This observation suggests that both phenomena happened at the same time, which sustains our hypothesis that the spatial equalization of nominal wages might have had a broad impact on migration flows.

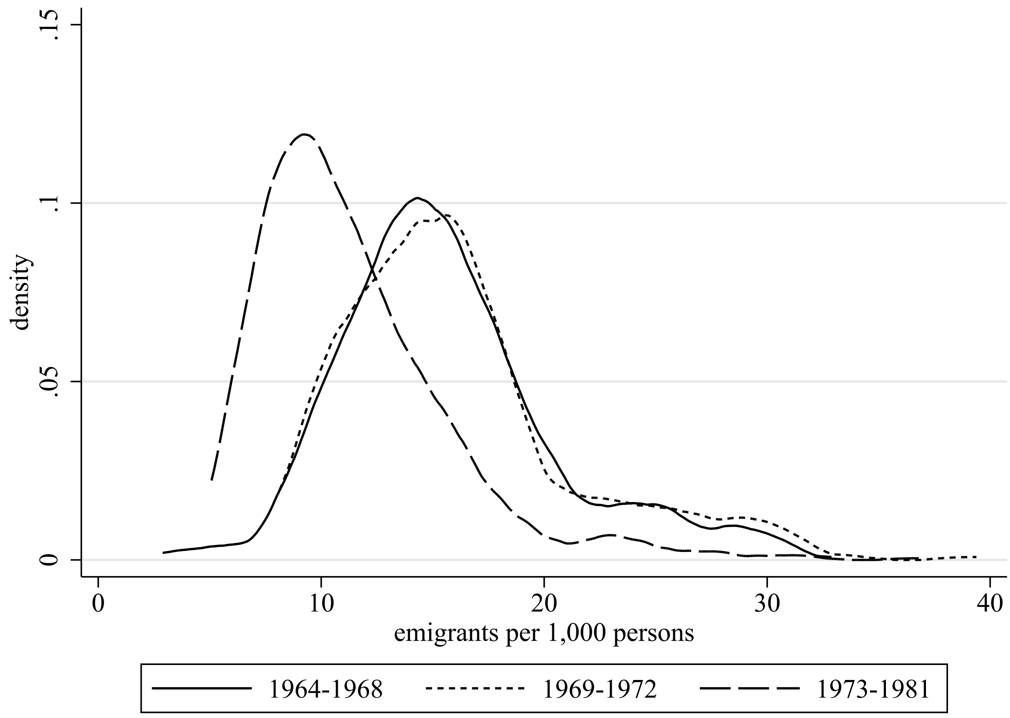
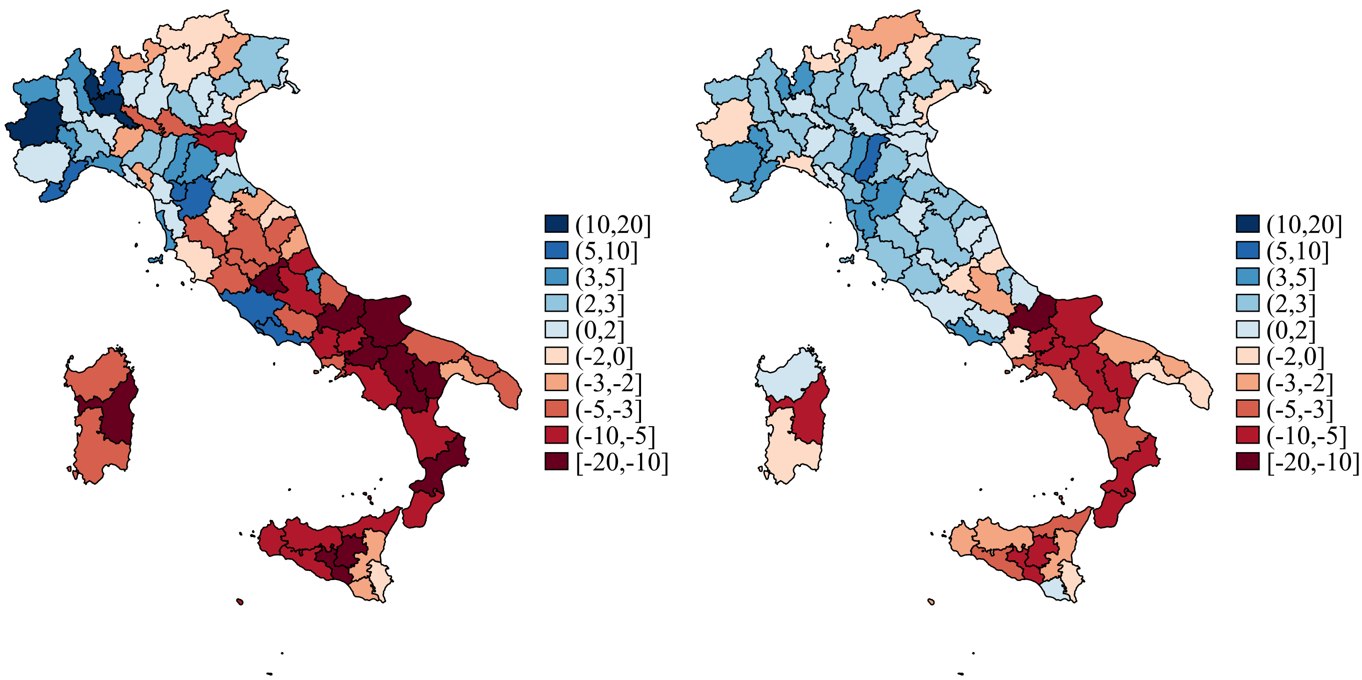


Figure 4.5: Distribution of internal migration rates by period

The graph reports the kernel density distribution of the gross migration rate (number of emigrants per 1,000 persons) for 92 provinces by period. Values are computed as the total number of emigrants from each of the ninety-two provinces, divided by the mid-year population of the province. The graph excludes migration within the province. The periods are defined as before the repeal of the wage zone system (1965-1968), during the phasing out of the system (1969-1972), and after its complete repeal (1973-1981). For sources and methodology, see text and section 4.3.

This evolution also had a spatial connotation. Figure 4.6 shows that 64% of provinces were net senders between 1965 and 1968, but this share dropped to

39% in 1973-1981. This change can be attributed to the decline of emigration from provinces in the Centre and in the North-East: 28 provinces in this areas showed negative net migration rates in the first period, but only 8 in the second. Southern provinces, instead, continued to show negative net migration in the second period, but the rates decreased substantially, with only eleven provinces showing a rate larger than five—in absolute level—, down from 21 in the first period. To account for this heterogeneity, the analysis will control for macroarea trends across specifications.



(a) 1964-1972 **(b)** 1973-1981

Figure 4.6: AVERAGE NET MIGRATION RATES BY PERIOD

The maps show the average net migration rates (number of immigrants minus emigrants per 1,000 persons) for 92 provinces by period. Computations exclude migration within the province. The periods are defined as before the repeal of the wage zone system (1965-1968) and after its complete repeal (1973-1981). For sources and methodology, see text and section 4.3.

4.3.2 Estimates of minimum industrial wages

There have been few attempts to quantify the impact of the nominal equalization on spatial wage differentials, possibly due to limited data availability and the almost contemporaneous occurrence of the wage push that started in the autumn of 1969. An early reconstruction by Dell'Aringa (1976, pp. 91–94) found that the coefficient of variation in average effective wages between regions dropped by 30% between 1966 and 1974 (or by 46%, using different wage series), but not much in the following years. The author interpreted these results as evidence that the repeal of the 'wage zones' was a distinct shock to the wage distribution that predated the wage push of 1969. However, it should also be noted that the regional data used by the author would mask part of the original spatial variation, for most regions were divided into different wage zones, while provinces belonging to two different regions could be assigned to the same wage zone. Moreover, the use of average effective wages rather than contractual minimum wages could bias the computation of the original variation, for this would also depend on spatial differences in workers' skill levels, and on the amount of wage drift accumulated over time in each province.

To evaluate more precisely the potential effect of the spatial equalization on nominal wage differentials across the industrial sector, it is first necessary to observe the variation in contractual wage floors. To this end, I have digitized annual publications from the National Statistical Institute reporting information on the wage floors established by collective agreements for twenty-three industrial sectors (manufacturing proper, mining and utilities, but not construction), employing 97% of industrial workers and 66% of dependent employees.[5] Until 1972, the publication reported the wage floors separately for each wage zone, while afterwards the only the national value for each sector is reported, as by then the repeal of the wage zone system had been completed.

The gradual but quick phasing out of the system can be appreciated from Figure 4.7, which plots both the median value of the wage floor for low-skill

[5] Values estimated on data from Istat (2014) and Istituto Centrale di Statistica (1973, p. 51), for sources and harmonization see section 4.3

workers (i.e. the entry-level minimum wage in industry) and the coefficient of variation between provinces. Looking at the latter, we notice that the coefficient of variation dropped by almost 40% between 1968 and 1969, by 35% the next year, and by over 50% per year until 1972, following closely the stipulations of the 1968/69 agreements. By 1973, all sectors had repealed the wage zone coefficients, leading to effectively no spatial variation in nominal minimum wages across the national territory. Meanwhile, the wage push that started during the Hot Autumn of 1969 provoked a substantial increase of real minimum wages, which continued in the next decades. The comparison between the two series shows that the drop in spatial variation started one year in advance to the acceleration of minimum wage growth, supporting the argument that the reduction of spatial wage differentials predated the Hot Autumn.

However, spatial differentials in wage floors did not depend solely on the variation within sector, but also on the local industrial structure. A potential migrant, in fact, would compare the average wage floor available in the province of origin with that offered in the province of destination, which depends on which sectors are present in the two places and the possibility of employment in any of them. Assuming that the probability of employment in any given sector is proportional to the number of employees, we can compute the weighted average of the entry-level wage floor $\overline{M}$ in province j at time t as:

$$\overline{M_{jt}} = \frac{\sum_{i=1}^{24} M_{ijt} \cdot \overline{S_{ijt}}}{\sum_{i=1}^{24} \overline{S_{ijt}}} \tag{4.1}$$

Where $\overline{S}$ is the share of employees in province j and sector i at time t. Due to the absence of detailed data on sectoral employment by province with annual frequency, $\overline{S}$ is obtained from the linear interpolation of decennial census according to the formula:

$$\overline{S_{ijt}} = S_{ijT} \cdot \frac{(S_{ijT+10} - S_{ijT})/S_{ijT}}{10} \tag{4.2}$$

Where T is the earliest census year in any two consecutive, starting with

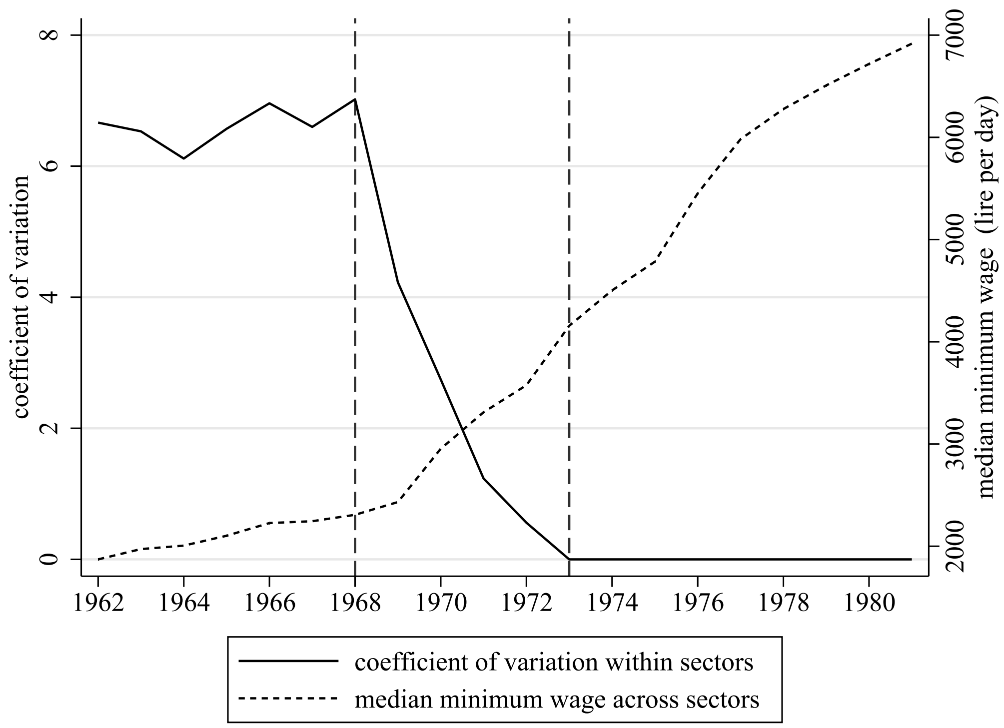


Figure 4.7: Median minimum wage and spatial variation

Median minimum wage for low-skill blue-collar workers in sixteen industries and ninety-two provinces, and median coefficient of variation between provinces, within each sector. The nominal value of the minimum wage is expressed at constant 1968 prices. The coefficient of variation is the median of the coefficients for each sector. Each sector's coefficient of variation is computed as the standard deviation of the minimum wages for low-skill blue-collar workers across the provinces, divided by their mean value and expressed in percentages. For sources and methodology, see section 4.3.

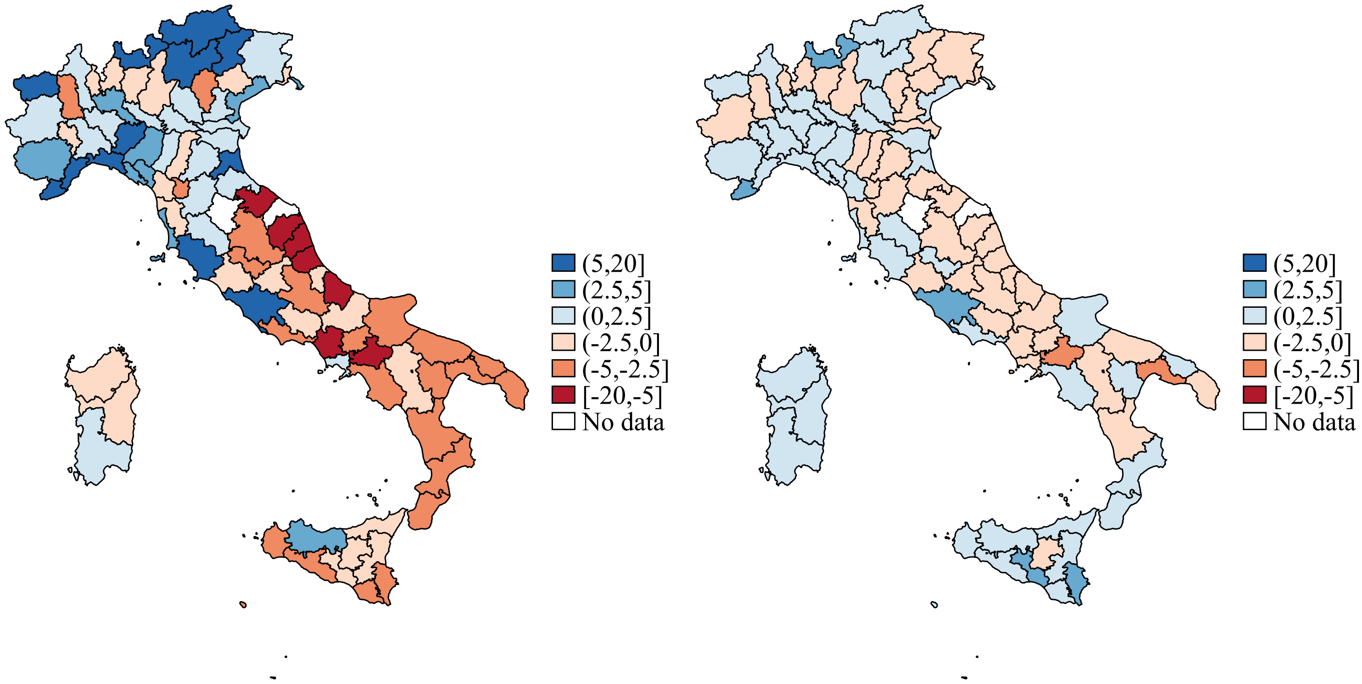
1961. This weighting procedure ensures to capture local long-term trends in sectoral composition. It is worth noticing that the average minimum wage would be particularly relevant for low-skill migrants, who would have limited specialist knowledge and thus would be indifferent to being employed in any of the industrial sectors considered. Skilled workers would instead give greater weight to the sector for which they are trained and close substitutes. However, since our data does not allow to differentiate between low-skill and high-skill migrants, we focus on the weighted mean industrial minimum wage through the rest of the analysis.

Figure 4.22 shows that the coefficient of variation of the weighted mean minimum wage between the Italian provinces also dropped after the repeal of the wage zone system, but some spatial differentials remained during the 1970s, due to the different sector shares in the provinces and the variation in level of minimum wages between sectors. The effect on spatial differentials can be observed from Figure 4.8, which maps the provinces' mean minimum industrial wage with respect to the national average before and after the repeal of the wage zone system. The figure shows that, in 1962-1968, about 20% of the provinces had a minimum wage either 5% higher or lower than the national average. In 1973-1981, no province deviated as much from the national average. In fact, in the latter period, only fifteen provinces deviated more than 2.5% from the national average, down from 57 in the former period. The analysis will test whether this variation was sufficient to pull internal migration in either periods.

4.3.3 Effective wages and the bite of sectoral minima

The hypothesis that the equalization of nominal minimum wages could affect internal migration hinges on their bindingness. If minimum wages were disapplied—or if they were set too low with respect to the wage distribution—, then their influence on the propensity to migrate would be questionable. Researchers agree that wage floors established by contractual agreements have strongly influenced the wage distribution through the decades, even though the partial liberalization of the labour market since the 1990s has decreased their bite in recent years.

Detailed historical assessments, however, are lacking, due to the absence of useful data to estimate the wage distribution. Typical administrative sources (such as matched employer-employee records from social security data) are only available since the mid-1980s. The same limitation applies to common household surveys. The microdata available for the period under study usually cover only a subset of the population or the national territory. To fill this gap, I have digitized aggregate statistics that were originally compiled by the National Institute for Insurance Against Accidents at Work (INAIL), which



(a) 1962-1968 **(b)** 1973-1981

Figure 4.8: Deviation of minimum wages from national average

The maps show the percentage deviation from the national average minimum industrial wage. Provinces' mean minimum industrial wages are the average of the nominal wage floors for low-skill workers in sixteen industries, weighted by the estimated number of employees in each industry. Data are averaged by period. For sources and methodology, see text and section 4.3.

collected mandatory insurance from all dependent workers in the private sector. INAIL gathered information on the workers insured, including their sector of occupation and wage. Annual publications reported the average wage of blue-collar workers in ten industrial macro-sectors, including industries in manufacturing proper, construction, utilities and trucking.

I used this data to compute the mean industrial wage in the province using the estimates of local employees in each sector as weights, using the formula:

$$\overline{W_{jt}} = \frac{\sum_{i=1}^{10} W_{ljt} \cdot \overline{S_{ljt}}}{\sum_{i=1}^{24} \overline{S_{ljt}}} \quad [4.3]$$

Where W is the mean wage in macro-sector l and province j, and $\overline{S}$ is defined as in Equation 4.2, but with employment data aggregated at the macro-sector level.

As before, I assess the evolution of spatial differentials by looking at the coefficient of variation between provinces. Figure 4.9 shows that spatial differentials were stable before the agreements of 1968/69, decreased sharply immediately thereafter (1969-1970) but rebounded in the following two years. Following the complete repeal of the wage zone system in 1972, however, the coefficient of variation started falling continuously. In 1968, the coefficient of variation was 35% smaller than in 1968. In the same period, the average blue-collar hourly wage doubled, in real terms—a significant growth, but not as steep as that of the mean minimum wage, which almost tripled. This would suggest that the weight of the contractual wage floors in determining the wage level increased.

To establish whether the minimum wages were set high enough to influence the wage distribution, I compute its bite as the ratio between the mean minimum wage and the average industrial wage, in each province, expressed in percentage. The mean bite increased from 58% in 1962-1968 to 70% in 1972-1981 (standard devation 6.4 and 7.8, respectively). This increase can be appreciated by the rightward shift of the distribution of the bite values between the two periods, which is represented in Figure 4.23. It is also noticeable the wide dispersion of the distributions, with a range of circa 40 percentage points.

These values are high but not impossible. A reference point is the Kaitz index observed across European countries in recent years, even though two distinctions should be highlighted. First, our bite measure is the ratio between mean minimum wages and mean effective wages of industrial workers, while the Kaitz index is the ratio between the statutory minimum wage and the median wage of the whole distribution. Second, the Kaitz index establishes

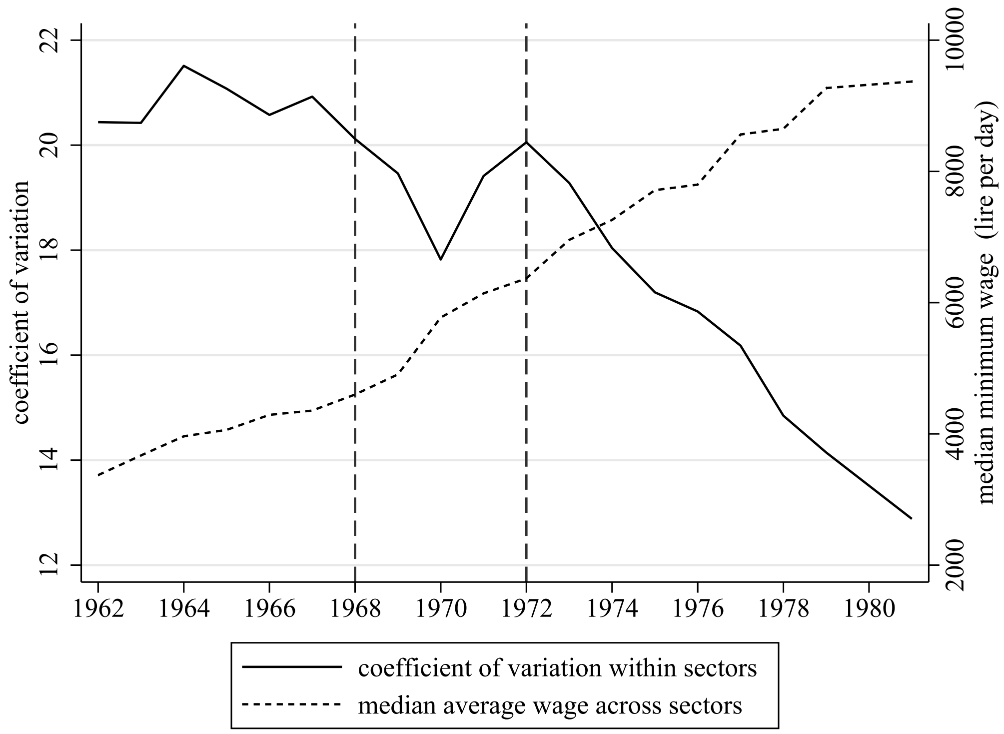


Figure 4.9: Median average effective wage and spatial variation

Median average effective wage for low-skill blue-collar workers in ten macro-sectors and ninety-two provinces, and median coefficient of variation between provinces, within each sector. The nominal value of the minimum wage is expressed at constant 1968 prices. The coefficient of variation is the median of the coefficients for each sector. Each sector's coefficient of variation is computed as the standard deviation of the average wages for blue-collar workers across the provinces, divided by their mean value and expressed in percentages. For sources and methodology, see section 4.3.

the bite of statutory minimum wages, which represent a flat wage floor for all sectors, whilst our measure is the average bite of the wage floors established by national collective agreements in each (industrial) sector. Both features would tend to bias upward our estimate, because 1) our mean wages originate from effectively right-censored distributions (because they are limited to blue-collar workers) and 2) sectoral wage floors are typically set higher than statutory minimum wages with respect to the wage distribution (Boeri, 2012). Keeping these distinctions in mind, we notice that the increase observed is equivalent to a shift from a 'medium' bite—such as the statutory minimum wage in the UK today—to 'very high'—such as the statutory minimum in France or Portugal

(Grimshaw, Dingeldey, and Schulten, 2021, pp. 269-270).

In fact, using data from 2008-2015, Garnero (2018) finds that the bite of sectoral minimum wage floors in Italy today ranges between 74% and 80% of the median wage in each sector, and the average minimum wage floor in manufacturing is equal to 73% of the national median wage (considering also workers in agriculture, mining and services). Our results are very close to these estimates, suggesting that our results are plausible and that the liberalization of the labour market initiated in the 1990s has not attacked the bite but rather the coverage of the contractual wage floors. In other words, the wages of incumbent (covered) workers are as bound by the sectoral wage floors, but those of outsiders (non-covered) workers are not anymore. This interpretation is coherent with the dualistic character of the Italian labour market, which is commonly attributed to the liberalization attempts of the 1990s (Boeri and Garibaldi, 2007).

4.3.4 Productivity, unemployment and cost of living

An analysis of the spatial determinants of internal migration must also take into account differentials in productivity, cost of living and unemployment levels, for they all contribute to the decision to migrate. With low labour mobility, higher local productivity increases wages, which in turn pulls migration from low-productivity regions. With high labour mobility, instead, local productivity is capitalized into rents and, more generally, can increase the cost of living. Finally, the effective wage at destination depends on the level of local average wages and the probability of finding a job, which is the inverse of unemployment. Since rational migration decisions are based on spatial differentials in real effective wages and the opportunity to get them, these factors need to be included in the analysis.

4.3.4.1 Productivity

Productivity differentials are typically attributed to agglomeration economies, which in the case of Italy present a strong historical persistence and are typically cast in terms of a North-South divide. The period under consideration, however, coincides with significant transformations in regional divides. The 1960s continued a process of historical convergence between the South and the rest of the country that had started in the postwar period, but this success was only temporary and the South drifted away in the following decades. The 1970s, instead, saw the acceleration of economic growth in the North-East, traditionally a low-income area, and some central regions. The expansion of small manufacturing led to a stable convergence with the North-West, the traditional industrial core of the country. Several hypotheses have been proposed for this evolution, including the effect of labour market reforms on small businesses, the emergence of industrial districts, and the crisis of large companies.

To account for these dynamics, I have produced original estimates of the value added per worker in the industrial sector and gdp per capita, with annual frequency. Data on value added by macrosector and gdp per capita has been digitized from annual publications by Guglielmo Tagliacarne and, later, the namesake institute. Tagliacarne's estimates are the only reconstructions of national accounting data available at the provincial level in the long run. They used province-level data originating from a range of statistical sources, some unpublished. Even though some reservations have been expressed with respect to their accuracy, Tagliacarne's estimates have been shown to be compatible with recent regional-level estimates that have been produced with current standard methodology for a few benchmark years.

Tagliacarne's data only provides information on the total value added in industry. To compute the value added per worker I have estimated the number of industrial employees in each province-year cell. The estimate has been performed by allocating the number of industrial employees in each region (NUTS 2) to the contituent provinces (NUTS 3) using benchmark census data as weights (for a detailed description see section A.5).

In addition, I use Tagliacarne's data on total value added by sector (including agriculture, industry, commerce, and banking) to control for structural changes in the provinces' labour markets.

4.3.4.2 Unemployment

Annual estimates of unemployment are not available at the province level for the period under study. To overcome this limitation, I have combined two proxy measurements. The first measurement, which is available at the province level with annual frequency, is the number of individuals registered as unemployed at local job centres, that I have digitized from annual publications of the Ministry of Labour and the National Statistical Institute. Throughout the period under study, the Italian government maintained a centralized system of public placement whereby all individuals seeking work were required to register with local job centres, providing information on their age, education, experience and sector of previous or preferred employment. Employers would hire from the local lists of registered unemployed, filtered by selection criteria. Exceptions were allowed for high skill jobs and for small firms (Musso, 2004, pp. 300-309).

The effectiveness of the centralized placement system was highly questioned, as a large share of hires continued happening through private transactions (Musso, 2004, pp. 332-344). However, the economic and legal incentives to register means that the source can be used as a reasonable proxy for unemployment over time, especially after we control for province fixed effects which would capture time-invariant heterogeneity in the propensity to register.[6]

The number of individuals registered as unemployed, however, does not allow to compute unemployment rates—not only because of the source's limitations, but also because we lack a suitable estimate of the active population. Hence, for discussing mechanisms, I produce an original estimate of local unemployment rates by combining the data from the registrations with data from labour force surveys. The surveys are available at the regional level, one degree of statistical aggregation higher than the province level. The regional data has

[6] For a detailed discussion of the sources on labour market statistics and their limitations for the period under study see Ioly (1978).

been digitized from annual publications of the National Statistical Institute, which averaged across quarterly data.

I use this source for two purposes. First, I compute the active population in the province by assuming that the participation rate differed between provinces belonging to different regions but was the same within regions. Hence, I estimate the active population L in province i of region I as:

$$L_{it} = \frac{L_{It}}{P_{It}} \times P_{it} \qquad [4.4]$$

Where the population P of region I is obtained as $P_{It} = \sum_{i=1}^{n} P_{it}$ with $n \in I$. In robustness checks, I also adjust for the age structure by multiplying the population by the province's dependency ratio, which is interpolated from decadal census data.

The second purpose for using the labour force surveys consists in adjusting the number of unemployed people registered at local job centres to filter out potential heterogeneity in the propensity to register within each region. To do so, I assume that the undercounting or overcounting of unemployment in the job centres' lists differs between regions but is constant for provinces in the same region. Hence, the adjusted number of unemployed people $\widehat{U}$ in province i of region I is:

$$\widehat{U}_{it} = U_{it} \times \frac{U_{It}}{S_{It}} \qquad [4.5]$$

Where S is the number of individuals classified as currently jobless and seeking work in region I according to the labour force surveys. It is important to notice that labour force surveys started in 1959 and changed the definition of unemployed over time, most significantly in 1977, 1984 and 1992. The first definition counted as unemployed all jobless individuals over fourteen who, in the week of the survey, were actively seeking work and willing work. The survey distinguished between properly unemployed (i.e., individuals who had lost their previous job and were looking for a new one, including previously self-employed) and first job seekers. The 1977 reform counted also jobless individuals who were already offered a job which would start at a later date, individuals who would start self-employment at a later date, and individuals who declared to be inactive (students, 'housewives,' retirees) but were in fact seeking work.

To ensure that the data is comparable over time, I have systematically excluded all individuals who declared to be inactive. The resulting series thus include properly unemployed individuals and, for the perios 1977-1982, also currently unemployed individuals who would start employment at a later date. To exclude this second category, I have computed alternative unemployment rates using the microdata from the quarterly labour force surveys, which are available since 1977. To compute the unemployment rates excluding the individuals who would start employment at a later date, I only count as unemployed those actively seeking work (either previously employed or first time seekers) in the past thirty days. These alternative unemployment definitions are used for robustness checks, and do not modify the results significantly. The adjustments performed make the resulting series not directly comparable with official time series of unemployment at the national and (since 1977) macroregional level, which are computed by Istat using the current definition of unemployed. Nonetheless, the trends observed match between my estimates and the official series.

I finally use the estimate of the active and unemployed population to compute the unemployment rate u in the province as:

$$u_{it} = \widehat{U}_{it}/L_{it}$$

Figure 4.24 shows that unemployment rates were always higher in the South and Islands than in the rest of the country, but the divide increased in the 1970s. Unemployment also rose in the North-West, while it decreased in the

North-East, matching the evolution in the spatial distribution of manufacturing activities. Because the analysis terminates at 1982, it excludes the period of high unemployment in the 1980s, thus avoiding a potential confounding factor for our hypothesis.

4.3.4.3 Cost of living

Despite evidence that prices vary significantly between regions, estimates of the local cost of living are very difficult to obtain for Italy due to data limitations (Vecchi and N. Amendola, 2017). Since the interwar period, Istat has tracked inflation at the province level using indexes of the local cost of living which were standardized to a common benchmark year for each province. Because of this standardization, the available series allow to compare prices' rates of change between provinces but not their levels. Official estimates of local cost of living have been published only since the late 2000s, and their representativity is limited (Istat, 2009).

Few methods have been proposed to circumvent this data limitation. An early attempt was provided by Campiglio (1986), who obtained access to the unpublished prices that Istat collected to estimate the provincial indexes. The analysis focused only on the prices of foodstuff and was limited to 21 provinces. The author found significant spatial variation in the cost of living, reaching almost 30 percentage points between Milan (in the North West) and Bari (in the South). The estimates, however, were only limited to the year 1986.

An explicit analysis of cost of living differentials over time was instead provided by Caruso, Sabbatini, and Sestito (1993), who used time-series analysis to decompose the Istat indexes between short-term deviations in the inflation rate and long-term changes in the cost of living relative to the national average, aggregating the indexes for eight groups of regions. They found evidence of strong convergence between Northern and Southern regions during the 1950s, stability in the 1960s, and divergence through the 1970s and the 1980s. However, their methodology could only identify the long-term dynamics, but could not quantify the differentials. Alesina, Danninger, and Rostagno (2001), instead, assumed that cost of living differentials were small at the beginning of the series (1947) and computed the 'cumulative price divergence' between the North and the South using the indexes of the cost of living from six and seven provinces, respectively. A limitation of this method is that the underlying assumption is untested and the result—a maximum range of 14 percentage points in 1993—appears smalller than contemporary computations.

The most precise estimate of cost of living differentials with a cross-sectional approach was provided L. Cannari and Iuzzolino (2009) for the year 2006. Extending Istat's official estimates using information on a wider range of goods and services, the authors found a sizeable differential in the cost of living between the South and the Centre-North, averaging between 15% and 17% but reaching as much as 30% for some regions. These more precise estimates were then used by N. Amendola, Vecchi, and Al Kiswani (2009) to reconstruct the cost of living differentials between Italy's twenty regions and five macroregions from 1947 to 2011. The methodology proposed by the authors uses the official series of provincial deflators to project back in time the spatial differentials estimated by Istat (2009) and L. Cannari and Iuzzolino (2009) for 2006.

The authors found that the differential in the cost of living between the Centre-North and the South was already large in the 1940s (circa 10%), decreased briefly in the 1950s, stabilized in the 1960s, grew even larger through the 1970s and the 1980s, peaked in the 1990s at just below 20%, and finally decreased somewhat in the late 2000s. These trends, however, masked significant regional heterogeneity: between the 1970s and the 1980s the relative cost of living increased in the North-West and especially in the North-East, while it decreased in the Centre and especially in the Islands, which converged to the low and stable levels of the continental South.

To my knowledge, the estimates by N. Amendola, Vecchi, and Al Kiswani (2009) represent the best attempt to reconstruct cost of living differentials in the long term with the data available for Italy. However, two limitations prevent us from using directly their estimates for our purposes. First, the estimates are aggregated at the regional, not the provincial level, which is too coarse for our purposes. Second, by projecting back in time the spatial differentials for 2006, the authors explicitly assume that the structure of relative prices and that of national consumption remained stable in the long run. While this choice is motivated by considerations of data availability and by the aim of linking the historical evolution to the current differentials, for our purposes it would appear more appropriate to use a historical consumption structure.

To this end, I have computed a new spatial index of the cost of living for Italy's 92 historical provinces in the year 1966. The price data has been digitized from Istituto Centrale di Statistica (1968c) and covers twenty-one consumer goods and services, which account for circa 40% of the household budget estimated by Istat to build the original indexes of the cost of living. The resulting basket is largely determined by the price of foodstuffs (16 products, 34.3 % of the budget), hence it is most representative of the consumption of low-income households. While a greater coverage would be best, this data limitation should not excessively bias our estimates. First, our research question concerns the propensity to migrate of workers earning close to the minimum wage, so the focus on the cost of living for low-income households is not inappropriate. Second, it aids comparisons with estimates by other authors, who have faced similar data constraints—such as Campiglio (1986), Istat (2009) and one of the indexes by N. Amendola, Vecchi, and Al Kiswani (2009). Nonetheless, for a subset of provinces (51) I have also estimated the price of rents, which raises the representativity of the basket to 47% of the reference household budget. I use this augmented spatial index for robustness tests.

Following N. Amendola, Vecchi, and Al Kiswani (2009), the prices for each product j of the sixteen in the basket are used to estimate the spatial index L for each province i in the year 1966, using the formula:

$$L_{i,1966} = \sum_{j}^{16} w_{j,1966} * \frac{p_{i,j,1966}}{\hat{p}_{j,1966}} \quad \forall i \in [1, 92] \qquad [4.6]$$

Where w is the weight of the product j in the national representative household budget, and $\hat{p}$ is the average price of product j across all ninety-two provinces. I then use the annual indexes of the cost of living at the province level to project this spatial index backwards to 1961 and forward to 1981, using the formula:

$$L_{i,t} = L_{i,1966} * \frac{P_{i,t}}{P_{i,1966}} * \frac{\widehat{P}_{1966}}{\widehat{P}_t} \quad \forall i \in [1, 92] \wedge \forall t \in [1961, 1981] \qquad [4.7]$$

Where t is the year, P is the index of the cost of living in province i and $\widehat{P}$ is the average price index across all provinces. Further details on the construction of the indexes of the provincial cost of living are provided in the appendix (see section A.9).

Figure 4.25 shows the resulting time-varying spatial index, aggregated at the macroregional level for easier interpretation. The North-West showed the highest cost of living throughout the period, with a tendency to increase in the second half of the 1970s. The North-East started close to the national average and lower than the Centre, but started increasing rapidly after 1974. The Centre shows the opposite evolution to the North-East, stabilizing on the national average by the end of the 1970s. In the continental South the cost of living was lowest than in any other area, and it remained stable over time. The cost of living in the Islands was as high as the national average at the beginning of the period, but decreased significantly in the 1970s.

These dynamics are very similar to those estimated by N. Amendola, Vecchi, and Al Kiswani (2009) for the period under study (especially using their food index), but they differ in levels: we find a larger differential between the North-West and the South (30% instead of 15%), and a faster convergence between the Islands and the continental South. It is possible that the greater differential between the North and the South is due to the use of historical rather than present-day consumption structure. Nonetheless, our results support the authors argument that no significant improvement towards greater convergence between the North and the South was made during this period.

4.4 Analysis and results

4.4.1 Were nominal minimum wages pull factors of migration?

The first test for the hypothesis that the repeal of the wage zone system affected internal migration consists in estimating the economic and statistical significance of nominal wage differentials as a pull factor for migration flows, using a gravity model approach. The gravity model is a workhorse of applied economic research for the analysis of dyadic flows—most notably bilateral trade (Head and Mayer, 2014). Its application to migration data is almost as old as its general formulation (Hua and Porell, 1979), but in recent years it has received growing attention thanks to the development of stronger theoretical foundations, improvements in computational capability, and greater data availability (J. E. Anderson, 2011; Ramos, 2016).

Traditional applications augment the gravity model originally introduced by Lowry (1966) to account for push factors of migration in sending areas and pull factors in receiving areas. A common specification takes the following form (Etzo, 2011, p. 954; Poot et al., 2016, p. 64):

$$m_{jkt} = G^{\alpha_0} \frac{P_{jt}^{\alpha_1} P_{kt}^{\alpha_2}}{D_{jk}^{\alpha_3}} \prod_{h=1}^{n} \frac{X_{hkt}^{\beta_h}}{X_{hjt}^{\gamma_h}} \qquad [4.8]$$

Where m is the gross (or net) migration flow from origin j to destination k at time t, G is a context-specific constant, P is the size of the population at origin j and destination k, D is the distance between the two places, X_{hk} indicate any of n factors that pull migration to destination k, X_{hj} any factor pushing migration out of origin j. Setting $ln(G)$ equal to one, we can linearize Equation 4.8 as:

$$ln(m_{jkt}) = \alpha_0 + \alpha_1 ln(P_{kt}) + \alpha_2 ln(P_{jt}) - \alpha_3 ln(D_{jk}) + \sum_{h=1}^{n} \beta_h X_{h,k} - \sum_{h=1}^{n} \gamma_h X_{h,j} \qquad [4.9]$$

This basic equation can be estimated with OLS. We start the analysis by regressing the log of gross (alternatively net) migrants on the traditional gravity variables (population size and distance), and then we progressively augment the model with the economic and labour market variables shown in Table 4.4. In our baseline specification, population at the origin is included as an independent variable, so the dependent variable is the total number of emigrants from province j going to province k at time t. As a robustness check, I also standardize emigrants by population of origin, without reaching qualitatively different results. The distance between provinces is computed as the crow flies between centroids (in kilometres).

The economic and labour market variables include the level of the mean nominal minimum wage M in the province of origin and destination, the number of unemployed people U in the province of origin and destination (alternatively, the unemployment rate), the level of effective average industrial wages W in the province of origin and destination, and the level of GDP per capita (alternatively, value added in manufacturing per worker), all expressed in logarithms, and the log difference in the cost of living C between destination and origin. As is common in applications, the economic and labour market variables enter the regressions separately for the origin and the destination, which allows for heterogeneous effects of the same variable as either a push or a pull factor. In addition, I control for origin fixed effects ϕ, destination fixed effects ψ and time fixed effects τ. Standard errors are clustered both at the origin and destination, to account for serial autocorrelation. Hence, the augmented gravity model to be estimated takes the following form:

$$\begin{aligned} ln(m_{jkt}) = \alpha_0 + \alpha_1 ln(P_{kt}) + \alpha_2 ln(P_{jt}) - \alpha_3 ln(D_{jk}) + \beta_1 ln(M_{kt}) + \gamma_1 ln(M_{jt}) + \\ \beta_2 ln(U_{kt}) + \gamma_2 ln(U_{jt}) + \beta_3 ln(W_{kt}) + \gamma_3 ln(W_{jt}) + \beta_4 ln(GDP_{kt}) + \gamma_4 ln(GDP_{jt}) + \\ \delta[ln(C_{kt}) - ln(C_{jt})] + \tau_t + \psi_k + \phi_j + \epsilon_{jkt} \end{aligned} \tag{4.10}$$

We hypothesize that the nominal minimum wage at the destination is a pull factor for internal migration, after controlling for the minimum wage at the origin, the level of effective wages and the cost of living differentials. Hence, our null hypothesis is that the coefficient β_1 is not statistically significant from zero. We are instead agnostic about the association between nominal minimum wage at the origin and migration, even though we might expect a negative sign for γ_1.

Columns 1-6 in Table 4.1 show the estimates for the baseline specification when we additively include the control variables. Column 1 estimates the basic gravity model and finds the expected signs: the coefficient for distance is negative and statistically significant with an elasticity close to one, which is common for migration studies; the coefficient for the population of origin is positive and statistically significant, as we expect since we do not normalize the migration flow by the size of the population; population at destination, instead, is not statistically significant, which is not uncommon in similar studies.

Column 2 augments the basic model with the nominal mean minimum wage at origin and destination. Our estimate for the coefficient of the minimum wage at the destination ($\hat{\beta_1}$) is positive and economically significant: a 1% increase in the nominal minimum wage at the destination is associated with an increase in migration by circa 1.7%, keeping minimum wage at the origin constant.

Column 3 adds unemployment to the gravity model. This is a necessary control because it can be a source of omitted variable bias, for instance because unemployment can be caused by setting the nominal minimum wage too high with respect to the market clearing rate ($Corr(M_{jt},U_{jt})>0$), which in turn increases the pressure to emigrate ($Corr(m_{jt},U_{jt})>0$). The coefficients are found to be statistically significant and with the expected sign both at the origin and at the destination, even though the size of the effect is not very large: a 1% increase in the level of unemployment in the province of origin is associated with a 0.18% increase in emigration; the same increase in unemployment at the destination, instead, decreases immigration by 0.13%.

Notice that controlling for unemployment at destination increases by 20% the estimate for the minimum wage ($\hat{\beta}_1$). However, care should be taken in this case, for controlling for unemployment at the destination could open the way to a collider bias if this variable is independently affected by both immigration and the minimum wage level, as is in fact plausible (Schneider, 2020).

Column 4 adds the level of the effective average wage for blue-collar workers in manufacturing. This variable controls that $\hat{\beta}_1$ captures only the specific pull effect of minimum wages on migration, and not firms' greater ability to pay in the province of destination. As can be expected, a higher average wage at destination acts as a significant pulling factor which increases migration, while at the origin it decreases it (even though the estimate is not statistically significant in this case). Its inclusion also partially reduces the size of $\hat{\beta}_1$, but not its statistical significance. Moreover, the response is smaller for the average effective wage than the minimum wage, which suggests that migrants were more sensitive to the tail of the wage distribution than to its average. This reinforces our argument that the minimum wage was a crucial influence for internal migration flows in the period.

So far, all variables have been expressed in nominal terms. Column 5 indirectly controls for real values by augmenting the gravity model with the cost of living differential between destination and origin. The estimated coefficient, however, is small and not statistically significant, and its inclusion does not significantly alter the rest of the estimated coefficients. Column 6, instead, has a more consequential impact by including the level of GDP per capita, which proxies for income in the province. As expected, GDP per capita is a significant pull factor, but it has limited effect as a push factor. Its inclusion, nonetheless, partly modifies the estimates, reducing the size of $\hat{\beta}_1$ and of most other coefficients, albeit not in an extreme way.

The GDP per capita, however, could be affected by the large income differentials between macroareas. To account for this eventuality, column 7 includes macroregion time trends, which increase slightly the size of $\hat{\beta}_1$. Finally, column 8 substitutes the origin and destination fixed effects with dyadic fixed effects. This is the most conservative of the specifications because it de-means the data cross-sectionally for every combination of origin and destination. In conjunction with the time fixed effects, this procedure performs the estimation only on dyadic-specific time variation.[7] Despite the high saturation of the model, the coefficients are almost unaffected.

[7] Notice that time-invariant, dyadic-specific variables, such as the distance, cannot be estimated for this specification.

Table 4.1: Augmented gravity model with OLS (1962-1981)

	ln(emigrants)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(Distance km)	-0.837***	-0.837***	-0.839***	-0.839***	-0.839***	-0.839***	-0.839***	
	(0.0576)	(0.0576)	(0.0578)	(0.0578)	(0.0578)	(0.0578)	(0.0578)	
ln(Population)$_D$	-0.355	0.166	0.337	0.317	0.329	0.447	0.454	0.456*
	(0.335)	(0.306)	(0.298)	(0.284)	(0.281)	(0.275)	(0.274)	(0.273)
ln(Population)$_O$	1.170***	1.303***	1.089***	1.095***	1.083***	1.083***	1.189***	1.193***
	(0.289)	(0.278)	(0.268)	(0.268)	(0.272)	(0.254)	(0.222)	(0.222)
ln(M)$_D$		1.595***	1.950***	1.288***	1.311***	1.220***	1.234***	1.231***
		(0.292)	(0.297)	(0.279)	(0.275)	(0.261)	(0.260)	(0.260)
ln(M)$_O$		0.408	0.0400	0.217	0.194	0.200	-0.149	-0.155
		(0.256)	(0.236)	(0.247)	(0.245)	(0.253)	(0.188)	(0.188)
ln(Unemployment)$_D$			-0.144***	-0.134***	-0.133***	-0.113***	-0.112***	-0.112***
			(0.0441)	(0.0417)	(0.0415)	(0.0390)	(0.0391)	(0.0391)
ln(Unemployment)$_O$			0.164***	0.161***	0.161***	0.160***	0.113***	0.112***
			(0.0328)	(0.0332)	(0.0330)	(0.0359)	(0.0277)	(0.0278)
ln(W)$_D$				0.749***	0.749***	0.613***	0.613***	0.609***
				(0.146)	(0.147)	(0.135)	(0.135)	(0.135)
ln(W)$_O$				-0.200*	-0.199*	-0.197*	-0.190*	-0.193*
				(0.112)	(0.112)	(0.115)	(0.102)	(0.101)
log difference					0.0801	0.0641	0.114	0.115
cost of living					(0.134)	(0.133)	(0.120)	(0.120)
ln(GDP pc)$_D$						0.338***	0.337***	0.337***
						(0.0993)	(0.0997)	(0.0997)
ln(GDP pc)$_O$						-0.00644	0.0642	0.0656
						(0.158)	(0.130)	(0.131)
Constant	-2.566	-28.29***	-27.79***	-28.46***	-28.46***	-30.63***	-28.05***	-32.75***
	(5.700)	(6.706)	(6.599)	(6.408)	(6.377)	(6.238)	(9.984)	(9.926)
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Dyad FE	No	No	No	No	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroregion trends	No	No	No	No	No	No	Yes	Yes
Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.662	0.663	0.663	0.664	0.664	0.664	0.665	0.870
N	160002	160002	158044	158044	158044	158044	158044	158064

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.4.2 Did the repeal of the wage zones reduce internal migration?

The previous section has shown that, throughout our panel, higher nominal wages at destination pulled greater migration, after controlling for the level of the minimum wage in the province of origin. This implies that a reduction in the nominal *differential* between the minimum wage at the destination and the minimum wage at the origin could reduce migration on the intensive margin.

In fact, minimum wage differentials between provinces dropped, on average, by 75% after the repeal of the wage zones. The reason for such a large drop is clearly depicted by Figure 4.26: in the period prior to the abolition of the wage zones, the average differential in nominal wages between dyads was 8% (median 7%), and for one quarter of the dyads the difference was greater than 12%. The repeal of the wage zone system led to a significant compression of the wage differentials: in 1975-1982, the mean differential had dropped to 1.7% (median 1.4%), and for 99% of the dyads it stood at less than 5%.

Could this strong compression of nominal minimum wage differentials between provinces explain the drop in internal migration flows? To quantify this effect, we regress the log difference of the emigrants on the log difference of the minimum wages within each dyad, controlling for all the other variables included in Equation 4.10, and using dyadic fixed effects and macroregion trends. The specification thus takes the following form:

$$\begin{aligned} ln(m_{jkt}) - ln(m_{kjt}) = \alpha_0 + \alpha_1 \, ln(P_{kt}) + \alpha_2 \, ln(P_{jt}) - \alpha_3 \, ln(D_{jk}) + \\ \rho \, [ln(M_{kt}) - ln(M_{jt})] + \sum_{h=1}^{n} \beta_h \, X_{h,k} - \sum_{h=1}^{n} \gamma_h \, X_{h,j} + \tau_t + \chi_{kj} + \eta_{jkt} \end{aligned} \qquad [4.11]$$

Where X include all controls in Equation 4.10, except for the level of the minimum wage at destination and at the origin, which are absorbed by the new regressor of interest. The rationale for this specification maintains that migration flows between two comparable provinces (i.e. similar under all characteristics other than minimum wages) depend only on the individuals' idiosyncratic preferences, hence in the aggregate they would net to zero. The existence of a positive wage differential between the two provinces would thus create an extra migration flow from the low-wage to the high-wage province. The coefficient $\hat{\rho}$ recovers the marginal increase in the net migration flow for a one percent change in the difference between the minimum wages.

The results, reported in column 1 of Table 4.2, imply that a 1% decrease in the difference between the minimum wage at destination and the minimum wage at the origin was associated with a reduction of the net migration flow by 0.699%. Hence, our estimate would predict that the mean 75% drop in minimum wage differentials observed after the repeal of the wage zones would be followed by an average decrese in net migration by 48%. This is close but lower than the actual drop in net migration flows between dyads, which averaged 56% between 1962-1968 and 1975-1982.

One possible explanation for why the drop in net migration was even greater than predicted by our model is that wage differentials became altogether irrelevant for migration decisions after the repeal of the wage zones. After all, most of the remaining spatial variation in nominal minimum wages after 1972 was caused by differences in the industrial composition of the provinces, so a potential migrant would need not only to change residence, but also sector of occupation if she wanted to receive the higher minimum wage rate. This could reduce the salience of nominal wage differentials to the mind of the migrants.

To test the hypothesis that nominal minimum wages became ininfluential for migration decisions after the repeal of the wage zones, we can interact our regressor of interest with an indicator I that takes value zero for the period before the repeal of the wage zones and one thereafter. We estimate two specifications. First, we adapt Equation 4.11, to test whether the differential in nominal minimum wages lost significance in explaining extra migration between provinces after 1972. This specification takes the following form:

$$ln(m_{jkt}) - ln(m_{kjt}) = \alpha_0 + \alpha_1\, ln(P_{kt}) + \alpha_2\, ln(P_{jt}) - \alpha_3\, ln(D_{jk}) + \rho_1\, [ln(M_{kt}) - ln(M_{jt})] + \rho_2\, [ln(M_{kt}) - ln(M_{jt})] \times Post_{1972,t} + \sum_{h=1}^{n} \beta_h\, X_{h,k} - \sum_{h=1}^{n} \gamma_h\, X_{h,j} + \tau_t + \chi_{kj} s + \eta_{jkt} \quad [4.12]$$

The results are reported in column 2 of Table 4.2. The estimate for ρ_1 is 0.706, close to the result obtained in the previous specification, and is statistically significant at the 99%, which supports the hypothesis that nominal wage differentials pulled migration before the repeal of the wage zones. The estimate for ρ_2 is, instead, much lower (0.218) and statistically insignificant even at the 90% level. Hence, we cannot reject the null hypothesis that nominal minimum wage differentials were irrelevant for migration flows after the repeal of the wage zones.

Additional confirmation that nominal minimum wages lost their role of pull factors for internal migration after 1972 can be obtained by estimating again Equation 4.10 (with dydadic fixed effects and macroregion trends), this time separately adding the interaction between the indicator I and the nominal wage at origin and at destination. The results are shown in column 3 of Table 4.2. The new specficiation finds a similar coefficient for the minimum wage at destination before 1972 to our baseline specification. We fail instead to reject the null hypothesis that the minimum wage at destination had any influence on migration flows in the period after 1972.

Table 4.2: Minimum wage differentials and migration flows

	ln(emigrants)-ln(immigrants)		ln(emigrants)
	(1)	(2)	(3)
$\ln(M)_D - \ln(M)_O$	0.698***	0.706***	
	(0.195)	(0.195)	
$\ln(M)_D - \ln(M)_O$ $\times$ Post1972 = 1		0.218	
		(0.438)	
$\ln(M)_D$			1.240***
			(0.259)
$\ln(M)_D \times$ Post1972 = 1			0.181
			(0.628)
$\ln(M)_O$			-0.149
			(0.191)
$\ln(M)_O \times$ Post1972 = 1			-0.419
			(0.396)
$\ln(\text{Population})_D$	-0.778**	-0.788**	0.432
	(0.311)	(0.312)	(0.272)
$\ln(\text{Population})_O$	0.770***	0.780***	1.188***
	(0.275)	(0.274)	(0.221)
$\ln(\text{Unemployment})_D$	-0.249***	-0.248***	-0.110***
	(0.0377)	(0.0378)	(0.0393)
$\ln(\text{Unemployment})_O$	0.241***	0.240***	0.113***
	(0.0349)	(0.0349)	(0.0279)
$\ln(W)_D$	0.910***	0.904***	0.597***
	(0.195)	(0.198)	(0.137)
$\ln(W)_O$	-0.572***	-0.566***	-0.196*
	(0.158)	(0.159)	(0.102)
log difference cost of living	0.225	0.223	0.115
	(0.149)	(0.149)	(0.118)
$\ln(\text{GDP pc})_D$	0.453***	0.441***	0.310***
	(0.134)	(0.133)	(0.102)
$\ln(\text{GDP pc})_O$	-0.170	-0.159	0.0597
	(0.152)	(0.152)	(0.130)
Constant	-17.32*	-17.79*	-25.66**
	(9.087)	(9.051)	(10.50)
Dyad FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Macroregion trends	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes
Adjusted R2	0.320	0.320	0.870
N	158,064	158,064	158,064

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.4.3 Falsification test: the influence of scaling coefficients before and after the repeal of the wage zones

To further corroborate our hypothesis that the repeal of the wage zone system modified the flow of internal migrants, we can regress the net migration flow on the differece between the scaling coefficients of the wage zone at destination and at origin. The scaling coefficients determined the spatial differentials for minimum wage floors within each sector, and they were largely equal across all sectors, for they had been established by an intersectoral agreement, last updated in 1961 (see again Table 4.3). Hence, we would expect that, before the repeal of the wage zones, migration flows were significantly larger between provinces with a greater difference in scaling coefficients, but not thereafter. If we fail to reject this hypothesis, we would falsify our previous argument that the drop in minimum wage significance for internal migration was caused by the repeal of the wage zone system.

To perform this test, I regress the net emigration flow on the difference between the scaling coefficient C at destination and origin, both computed as logpoint differences. To allow the estimate for the scaling coefficient to vary between periods, I interact the variable with an indicator I that takes three values representing respectively the period before (1962-1967), during (1968-1972) and after (1973-1981) the repeal of the wage zones. Due to the fact that the scaling coefficient were time-invariant, we cannot control for both origin and destination fixed effects. Since what matters most is the coefficient at destination, relative to that of the origin, I control for origin fixed effects only. Not controlling for destination fixed effects, however, might lead to biased estimates because our results would not account for differences between long and short distance migration: given the spatial distribution of wage zones, most migration between macroregions was be from a low-scaling coefficient province to a high-scaling coefficient one. If long-distance migration decreased for reasons other than the repeal of the wage zones, we would find a spurious correlation with the scaling coefficients. To address this threat, I include a triple interaction between the log-difference of the scaling coefficients, the period indicator I, and a variable R taking value one if the migration happened within the same macroregion or between macroregions.

$$ln(m_{jkt}) - ln(m_{kjt}) = \alpha_0 + \alpha_1\, ln(P_{kt}) + \alpha_2\, ln(P_{jt}) - \alpha_3\, ln(D_{jk}) + \rho_1\, [ln(C_k) - ln(C_j)] + \rho_2\, [ln(C_{kt}) - ln(C_{jt})] \times I_t + \rho_3\, [ln(C_{kt}) - ln(C_{jt})] \times I_t \times R_{jk} + \sum_{h=1}^{n} \beta_h\, X_{h,k} - \sum_{h=1}^{n} \gamma_h\, X_{h,j} + \tau_t + \phi_j + \eta_{jkt} \tag{4.13}$$

The results for the coefficients of interest are reported in Figure 4.10. They show that, before the repeal of the wage zones, migration sorted to provinces with greater scaling coefficients (i.e. where nominal minimum wages where higher) than at the origin, irrespective of whether the destination was inside the same macroregion or outside. These results are also economically significant: comparing migration from the same origin to two otherwise similar destinations, if one destination had a scaling coefficient 10% greater than the other, the net migration flow to that destination was between 10% and 11% larger. The average percentage difference in scaling coefficients between dyads was 6% (median 7.13%), and one quarter of the dyads had a percentage difference greater than 11.5%.

During the repeal of the wage zones (1968-1972), the estimate for migration within wage zones halved, while that for migration between wage zones remained constant. This suggests that short-distance migration was very reactive to the repeal of the wage zones, while long-distance migration continued to sort into provinces that originally had higher scaling coefficients. However, by the end of the period both types of migration appeared to have lost any association with the original scaling coefficients: for both cases, we cannot reject the null hypothesis that the difference in pre-1968 scaling coefficients had no association with net migration flows in 1973-1981. This result allows us to pass the falsification test, which corroborates our argument that the wage zones were a significant pull factors of internal migration, sorting net migration flows both in the short and in the long distance.

Figure 4.10: WAGE ZONE COEFFICIENTS AND MIGRATION SORTING

OLS estimates regressing net emigrants (log-point difference of emigrants and immigrants) on the triple interaction between the log-point difference of the wage zone coefficient between destination and origin, an indicator for time period, and an indicator distinguishing migration within and between macroregions. The regression adjusts for time and origin fixed effects and a vector of time-varying controls including distance between the provinces and population, unemployment, average industrial wages and GDP per capita both at province and destination, and the difference in the cost of living. The solid vertical lines indicate 95% confidence intervals from standard errors clustered at the origin and destination.

4.5 Mechanisms and discussion

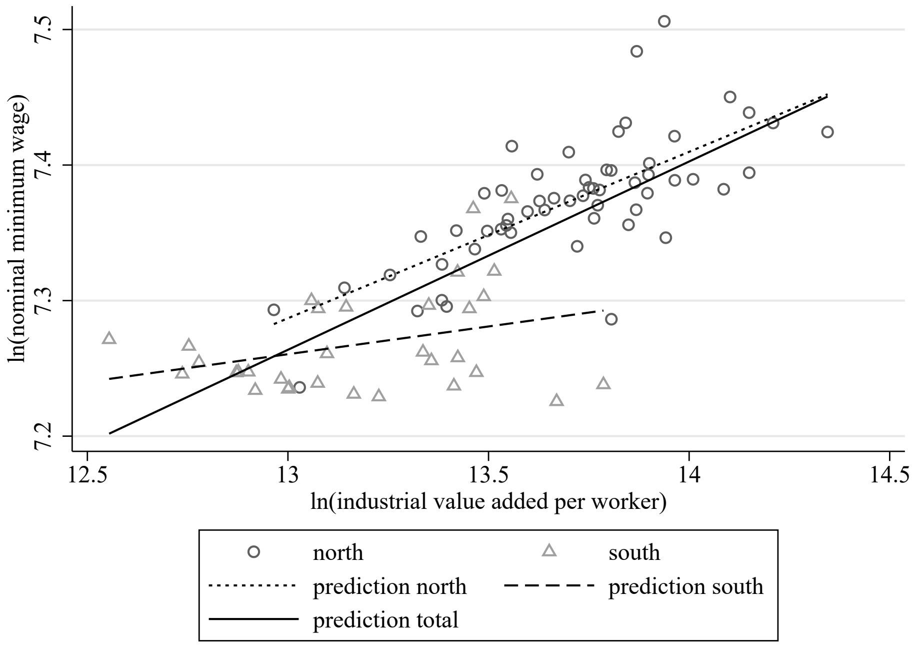
The previous section has shown that an augmented gravity model of internal migration is able to closely predict the drop in internal migration caused by the decrease in minimum wage differentials between Italy's provinces between 1962-1981. Moreover, interacting the minimum wage differentials with an indicator for before and after 1972 has shown that nominal minimum wages lost their role of pull factors for internal migration after the repeal of the wage zones, and migration stopped sorting into high-minimum wage provinces shortly thereafter. This section discusses the potential mechanisms that explain this behaviour, and tests whether the repeal of the wage zones can be considered a root cause for Italy's characteristic spatial mismatches in the labour market.

4.5.1 The decoupling of minimum wages and productivity

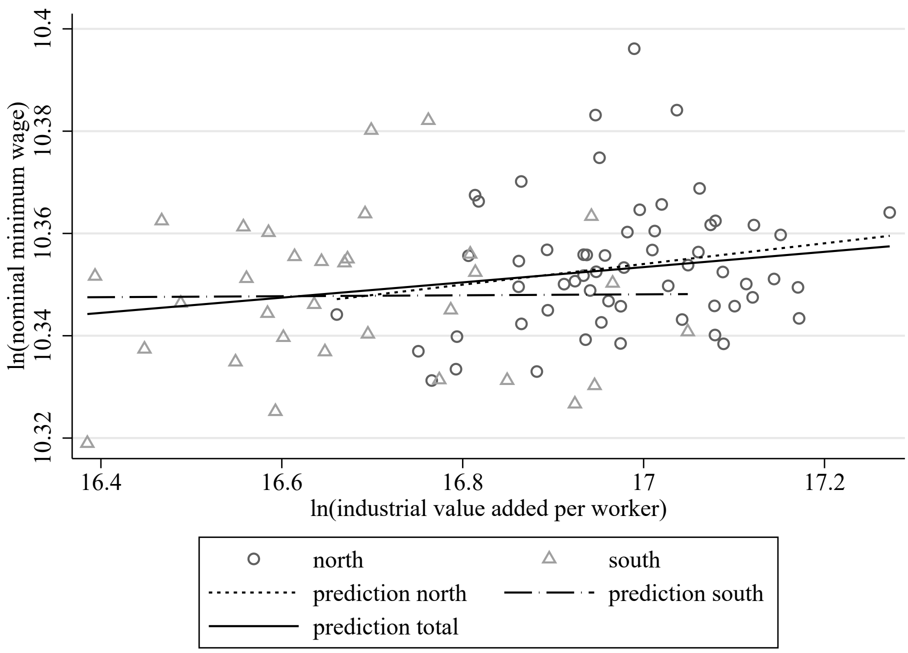
The hypothesis that the spatial equalization of nominal minimum wages causes spatial mismatches hinges on the argument that it decouples wages from productivity. An explicit test of this hypothesis has been provided by Boeri, Ichino, et al. (2021), using a comparison with Germany today. However, no study has ever tested whether this decoupling was originally caused by the repeal of the wage zones. Our dataset allows to perform such a test.

First, I provide some descriptive evidence on the relationship between nominal wages and productivity at the beginning and at the end of our period. Throughout this section, productivity is computed as the value of industrial value added per worker according to the procedure described in section 4.3.4.1. Figure 4.11 describes the relationship between the nominal minimum wages and productivity in 1962 and in 1981 by separately plotting the scatterplots at the province level and fitting both the whole graph and the two groups of provinces in the Centre-North and in the South with linear predictions.

The graph for 1962 shows a strong positive relationship between the two variables at the national level (the solid line), suggesting that the wage zones were effective in adapting nominal wages to productivity differentials on a national scale. In 1981, after the repeal of the wage zones, we find instead a very weak correlation, illustrating how the spatial equalization of nominal minimum wages created a disconnect with respect to local productivity differentials. In fact, by construction, all remaining correlation between minimum wages and productivity in 1981 is due to differences in the industrial structure between the provinces. Looking at the sub-national level, we notice that the disconnect between nominal wages and productivity holds particularly for the provinces in the Centre-North. Provinces in the South, instead, already showed a lower correlation between nominal minimum wages and the local industrial productivity. Whilst the dataset does not include information on the nominal



(a) 1962



(b) 1981

Figure 4.11: Nominal minimum wage and value added

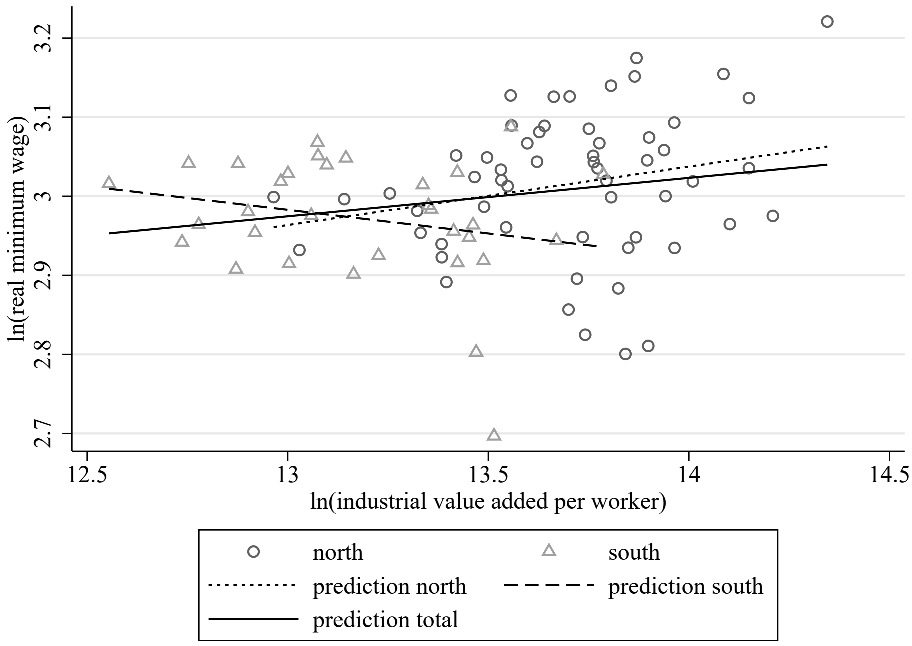
Scatterplot of nominal minimum industrial wages and value added per employee in industry, in ninety-two provinces. For sources and methodology, see text and section 4.3.

minimum wages *before* 1962, we can speculate that the 1961 reform of the wage zones—which reduced the number of wage zones in the South—already produced an excessive compression of wage differentials within this area prior to their repeal in 1968.

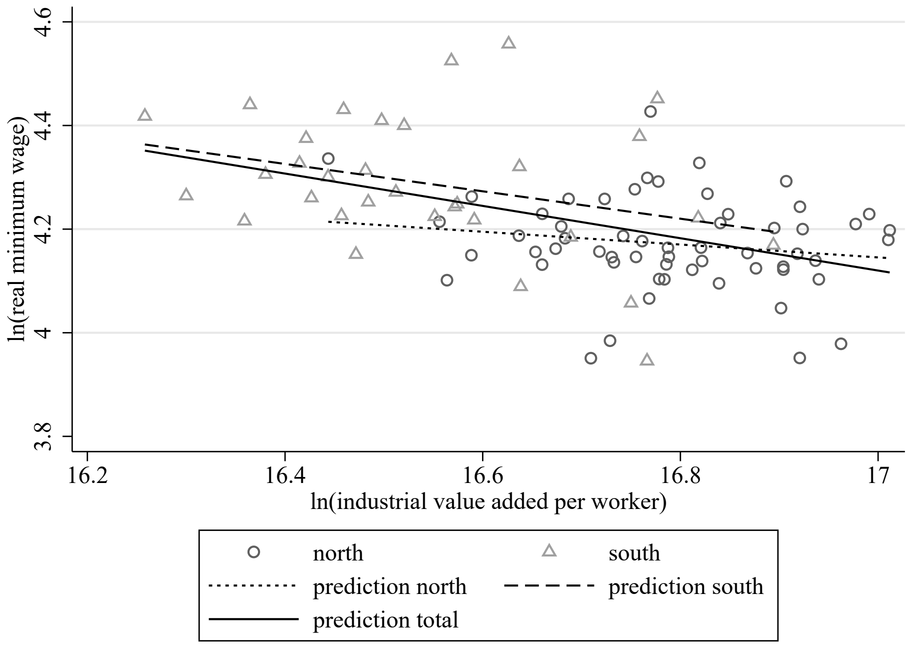
These graphs, however, simply show that the repeal of the wage zones was effective in eliminating the majority spatial variation in nominal contractual wages between Italian provinces. What was the effect on their *real* value? Figure 4.12 presents the correlation between the real value of the local minimum wages and local productivity. The real value is obtained by deflating the nominal minimum wages using the spatial price indexed described in section 4.3.4.3. The data for 1962 show a positive correlation at the national level, even though this is less steep than in the case of nominal differentials. However, this is to be expected, since higher productivity is commonly not entirely passed through to real wages but rather partly captured by greater rents. The data from 1981, instead, show an overall negative correlation between real wages and local productivity, similarly to the situation described by research on present time data. The inversion of this relationship implies a crucial modification in the spatial equilibrium of the Italian labour market, hinting to the 1970s as the period when the current disconnect between real wages and productivity first appeared.

Distinguishing between provinces in the Centre-North and in the South, nevertheless, suggests a more complex interpretation: the correlation between real minimum wages and local industrial productivity was positive in the Centre-North in 1962, but negative in the South, reinforcing our argument that the wage zone system had already provoked an inversion of the relationship within Southern provinces. This distinction would carry over to the end of the period, when the correlation between real minimum wages and productivity remained strongly negative within Southern provinces and became mildly negative within provinces in the Centre-North.

The simple correlations depicted in the graphs for the beginning and the



(a) 1962



(b) 1981

Figure 4.12: Real minimum wage and value added

Scatterplot of real minimum industrial wages and value added per employee in industry, in ninety-two provinces. For sources and methodology, see text and section 4.3.

end of the period, however, can be influenced both by changes in the spatial variation of minimum wages within sectors, and by changes in the sectoral composition of industrial employment within provinces. Moreover, it is unclear whether these two years are representative of the period before and after the repeal of the wage zones, respectively. Hence, to formally test the the hypothesis, I regress the nominal minimum wage M on the value added V in the province i, interacted with an indicator variable for the year. Moreover, I control for the local cost of living and for the number of workers employed in each of the sectors that I used to compute the mean minimum wage in the province.[8] Thus, we estimate by OLS the following two specifications, which include also province and time fixed effects.

$$ln(M_i) = \alpha + \sum_{y=1962}^{1981} \beta_y \, ln(V_i) \times 1(Year = y) + X_{it}'\gamma + \tau_t + \phi_j + \sigma_{it} \qquad [4.14]$$

Figure 4.13 shows the coefficients β_y estimated for each year. It shows that, during the wage zone system, there was a positive and statistically significant association between the minimum wage and industrial productivity in the province, which disappeared during the transition period and turned negative after 1972. This dynamic evolution clearly shows the inversion of the relationship between minimum wages and productivity that we had discussed previously by comparing 1962 and 1981. Moreover, controlling for the sectoral composition of industrial employment ensures that the effect is driven by the compression of spatial differentials within sectors, rather than by changes in the industrial composition. Controlling for the local cost of living ensures that our estimates are not biased by the different evolution of the cost of living between provinces.

[8]The number of workers employed in each industrial sector is obtained from the census of 1961 at the province level and extrapolated using the annualized rate of growth of each sector at the national level, obtained from the decadal rate of growth with respect to the census in 1971 and in 1981. This procedure, in contrast to a simple linear interpolation between census years, allows to filter out the local endogenous response in employment to minimum wage changes. Using the linear interpolation, however, does lead to qualitatively different results.

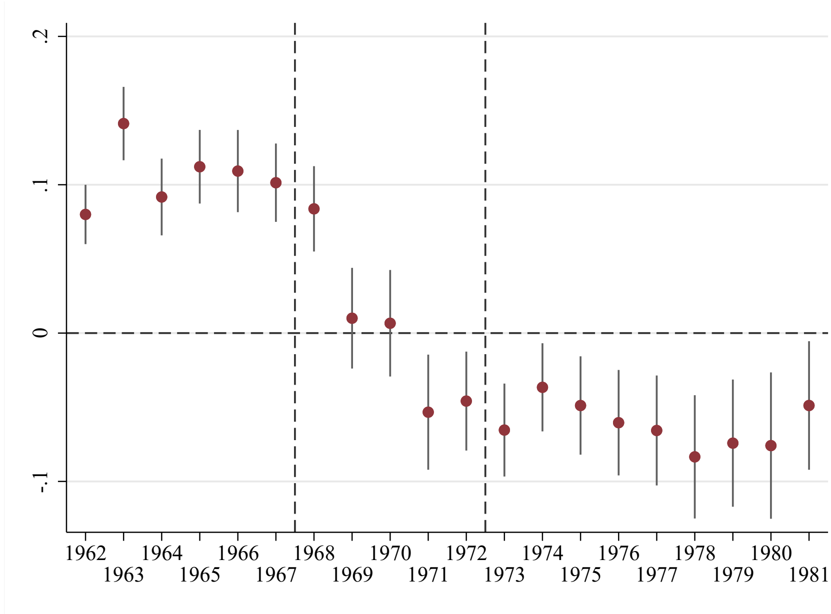


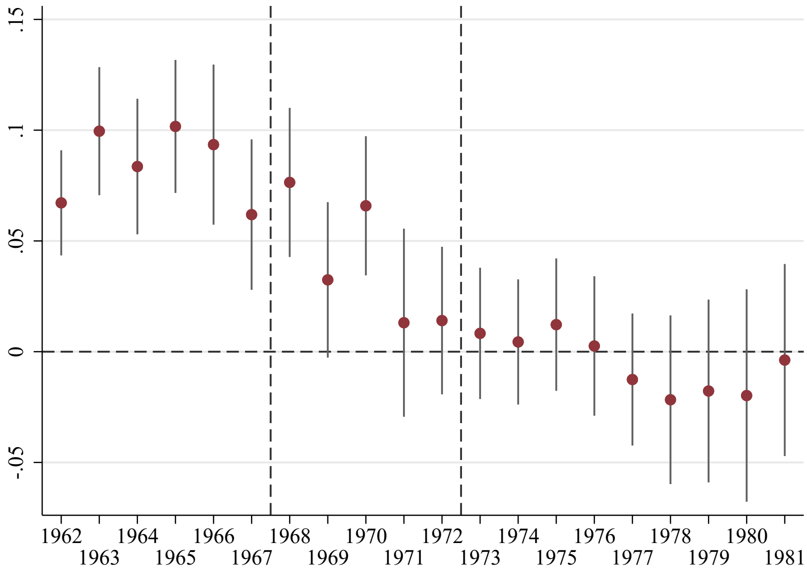
Figure 4.13: MINIMUM WAGES AND PRODUCTIVITY

Association between the nominal minimum wage and value added per employee in manufacturing, controlling for province and time fixed effects, composition of industrial employment in the province by subsector and local cost of living. Vertical solid lines represent the 95% confidence intervals obtained from standard errors clustered at the province level.

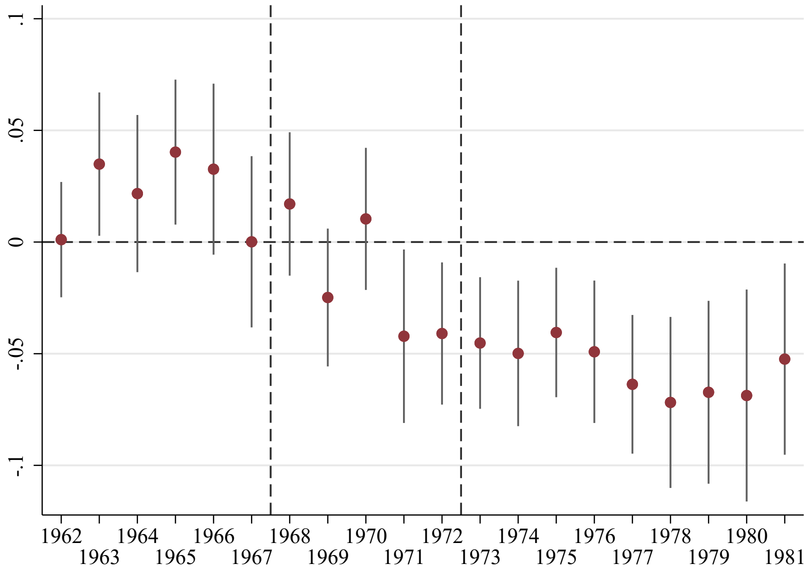
However, our descriptive analysis suggested that results at the national levels could obfuscate different dynamics between macroregions. To check whether this is the case, we run a similar estimation, this time including an indicator S for whether the province was located in the Centre-North or in the South.

$$ln(M_i) = \kappa + \sum_{y=1962}^{1981} \lambda_y ln(V_i) \times 1(Year = y) \times S_i + X'_{it}\mu + \tau_t + \phi_j + \varsigma_{it} \quad [4.15]$$

Figure 4.14 plots the coefficients λ_y separately for provinces in the Centre-North and in the South. These estimates largely support our interpretation: with the wage zones, there was a stable positive association between minimum wages and productivity in the Centre-North, which quickly disappeared after their repeal; in the South, instead, there was a much weaker association in the first period, and the spatial equalization after 1968 established a negative association, whereby provinces with greater value added per employee offered lower entry-level minimum wages.



(a) Centre-North



(b) South

Figure 4.14: Minimum wages and productivity, by macroregion

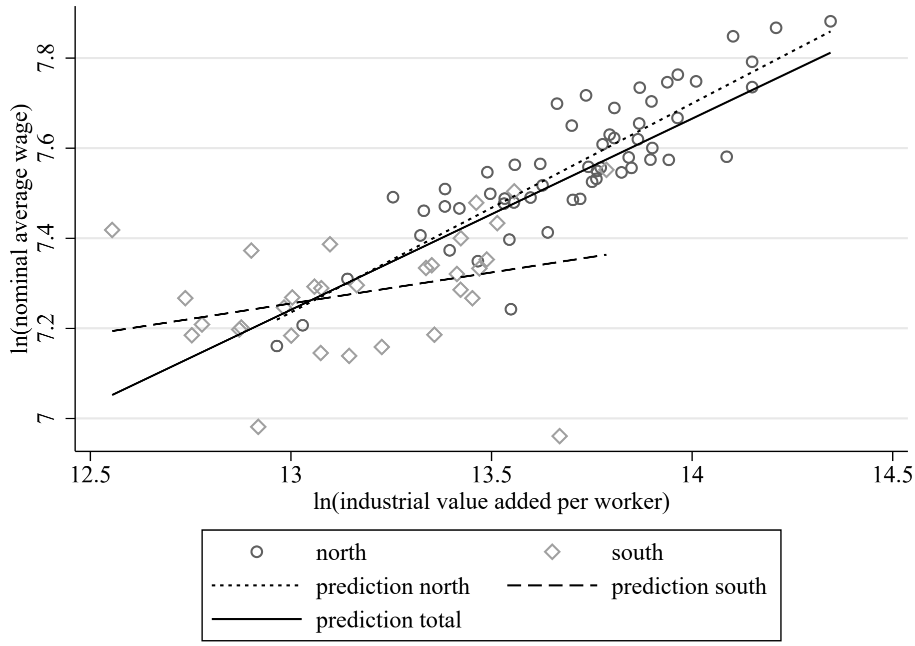
Association between the nominal minimum wage and value added per employee in manufacturing, interacted with an indicator for whether the province is located in the Centre-North or in the South, controlling for province and time fixed effects, composition of industrial employment in the province by subsector and local cost of living. Vertical solid lines represent the 95% confidence intervals obtained from standard errors clustered at the province level.

4.5.2 Did wage equalization create spatial mismatches in effective wages?

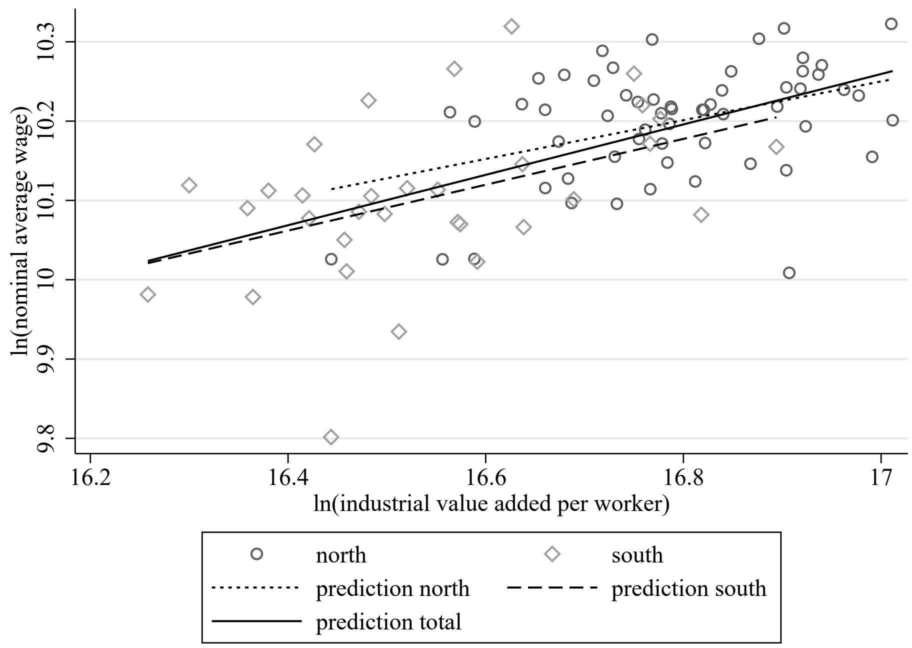
The previous analysis has shown that the wage zone system already influenced wage rates both within and between macroregions, and that its repeal caused a complete disconnect between productivity and minimum wages. This evolution would explain the drop in mobility for the marginal low-skill worker. However, were contractual minimum wages set high enough with respect to the wage distribution to force the same dynamics on average wages—potentially modifying the mobility of a larger share of workers?

To answer this question, I first describe the correlation between average effective wages for blue-collar workers and value added per-employee in manufacturing at the beginning and at the end of the period. Figure 4.15 shows that, in 1962, there was a strong positive association at the national level between the nominal average industrial wage and productivity. At the end of the period, in 1981, the association was still positive but apparently weaker. Distinguishing between macroregions, it appears that the South underwent the opposite trajectory, as it shows a stronger correlation in 1981 than in 1962. At a superficial level, these correlations might seem to disprove our argument: the relationship between nominal effective wages and productivity does not seem to be disrupted by the repeal of the wage zones.

However, plotting the same graphs with real wages hints to a different conclusion: Figure 4.16 shows that a strong positive relationship between effective wages and productivity was present in 1962, but it disappeared entirely in 1981. Moreover, the figure shows that the disconnect between effective wages and productivity was already present within Southern regions in 1962 (represented by the flat dashed line in panel 4.16a). Hence, the repeal of the wage zones impacted most strongly the wage rates within the Centre-North and between the two macro-areas. By the end of the period, it appears that an average blue-collar workers would obtain no systematic gains from moving between a low-productivity and high-productivity province. This observation



(a) 1962



(b) 1981

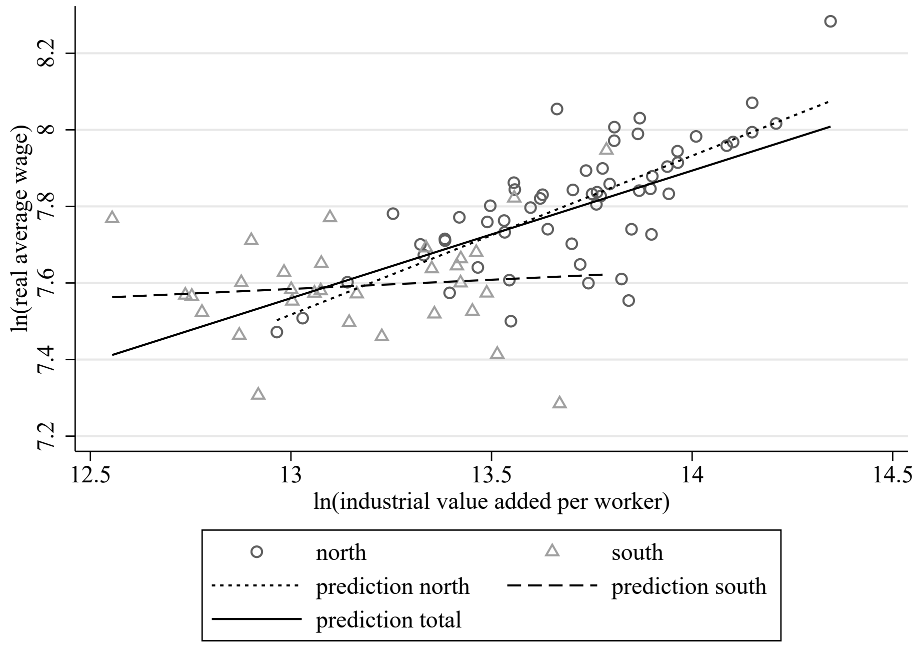
Figure 4.15: Average nominal wage and value added

Scatterplot of nominal average industrial wages and value added per employee in industry, in ninety-two provinces. For sources and methodology, see text and section 4.3.

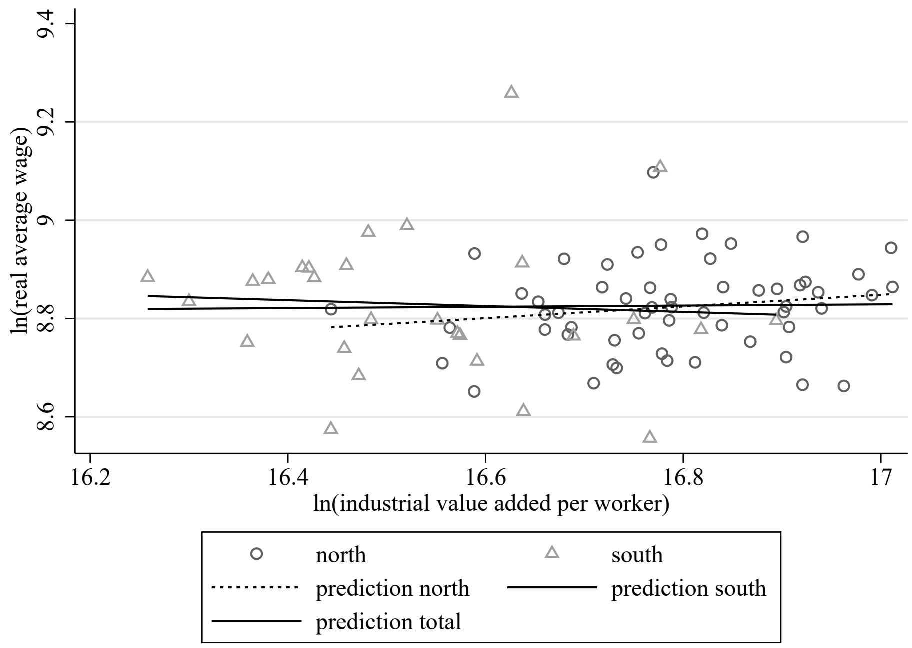
would support our argument that the repeal of the wage zones removed a large monetary incentive for internal mobility, especially for long-distance migration.

To test whether this hypothesis holds throughout the time period, I estimate Equation 4.15 substituting the level of the minimum wage in the province with that of the average effective wage. In addition to the previous variables, I also control for the *skill* composition of the industrial workers in 1966, before the repeal of the wage zones, interacted with a linear trend. This control is necessary because, contrary to our measure of minimum wages (which was computed as the mean minimum wage for low-skill workers only), effective wages average different skill levels. Hence, provinces where the share of high-skill blue-collar workers is higher would show a greater average effective wage.

Figure 4.17 plots the estimated coefficients separately for the Centre-North and the South. As was the case with the minimum wages, we find a positive and statistically significant relationship in the Centre-North before the repeal of the wage zones, and a weaker one in the South. Following the completion of the repeal, in 1972, we observe the disappearance of the relationship in both macroareas, with the South potentially drifting towards negative coefficients, even though the confidence interval at the 95% level includes the zero. Thus, the results largely confirm the descriptive analysis: the wage zone system allowed real effective wages in the Centre-North to vary with productivity, but less so in the South, possibly due to the already significant compression in minimum wage differentials.The repeal of the wage zones exacerbated the situation in the South and decoupled average wages from productivity in the North, too. This conclusion appears to suggest that the labour unions were successful in their bid to make wages an 'independent variable' with respect to productivity, at leas at the aggregate level. The next section discusses the consequences for unemployment and spatial mobility.



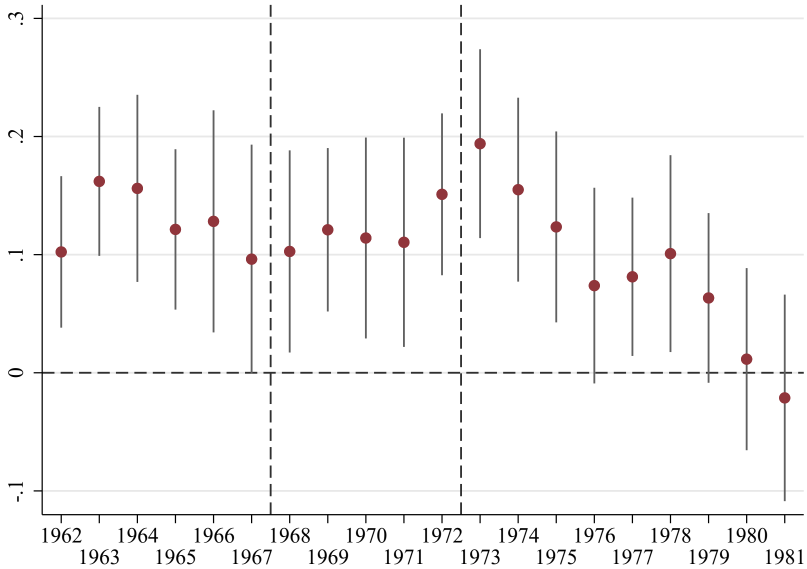
(a) 1962



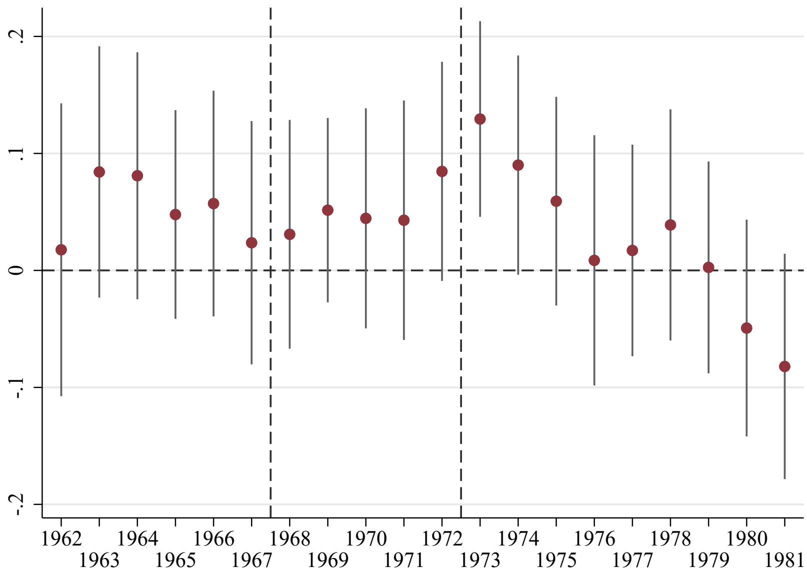
(b) 1981

Figure 4.16: AVERAGE REAL WAGE AND VALUE ADDED

Scatterplot of real average industrial wages and value added per employee in industry, in ninety-two provinces. For sources and methodology, see text and section 4.3.



(a) Centre-North



(b) South

Figure 4.17: Real wages and productivity, by macroregion

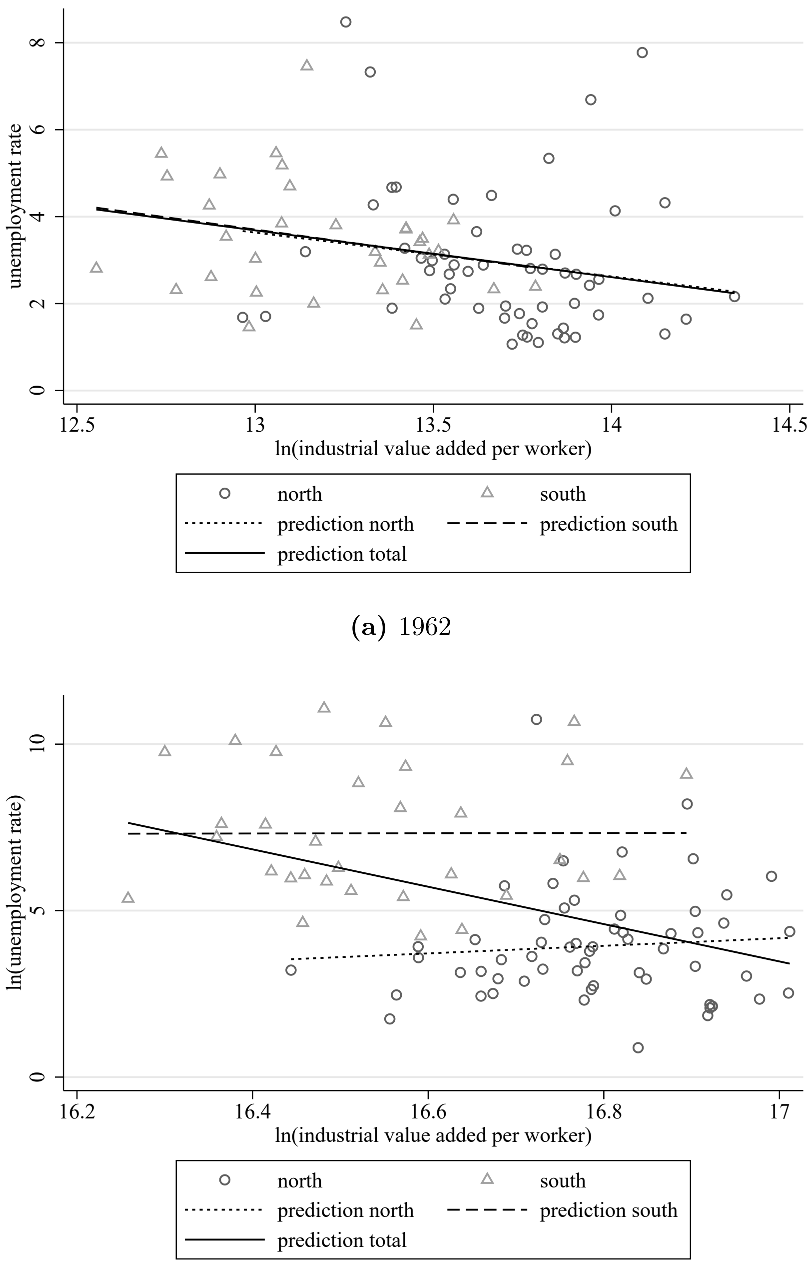
Association between the real minimum wage and value added per employee in manufacturing, interacted with an indicator for whether the province is located in the Centre-North or in the South, controlling for province and time fixed effects, composition of industrial employment in the province by subsector and local cost of living. Vertical solid lines represent the 95% confidence intervals obtained from standard errors clustered at the province level.

4.5.3 The polarization of unemployment and the slowdown of macroregional mobility

A common argument in the literature maintains that the spatial equalization of minimum wages causes excessive unemployment in low-income regions as inviduals prefer to queue for local jobs rather than move to high-income areas that offer the same, if not lower, real wages. To test whether this mismatch was instigated by the repeal of the wage zones, Figure 4.18 plots the scatterplot between the unemployment rate in the province and the industrial value added per employee, separately for the beginning and the end of the period. It shows that, in 1962, there was a negative correlation, meaning that unemployment was highest in low-productivity provinces. However, the correlation was relatively weak, as it is supposed to be in a competitive labour markets where unemployed individuals are allowed to move freely and the supply of housing in high-income provinces is allowed to adjust to positive shifts in local demand.

The data from 1981 shows, instead, a more complex picture (panel 4.18b). The negative correlation at the national level became much stronger, while the correlation within macroregions disappeared entirely. These dynamics are characteristic of a polarized and disconnected labour market: unemployment is systematically higher in Southern regions than in the Centre-North—irrespective of local productivity. The local labour markets within the two macroareas, instead, appear in equilibrium—even more so than at the beginning of the period.

Could this polarization be connected to changes in migration patterns? A comparison with migration rates appears to corroborate this hypothesis: Figure 4.19 shows that net emigration rates were negatively correlated with productivity in 1962, both at the national level and within macroregions. Most noticeably, a sizeable number of provinces in the Centre-North with lower-than-average productivity were net senders of migrants, while high-productivity regions in the South had comparatively lower emigration rates. The situation was much more polarized at the end of the period, even though mobility in



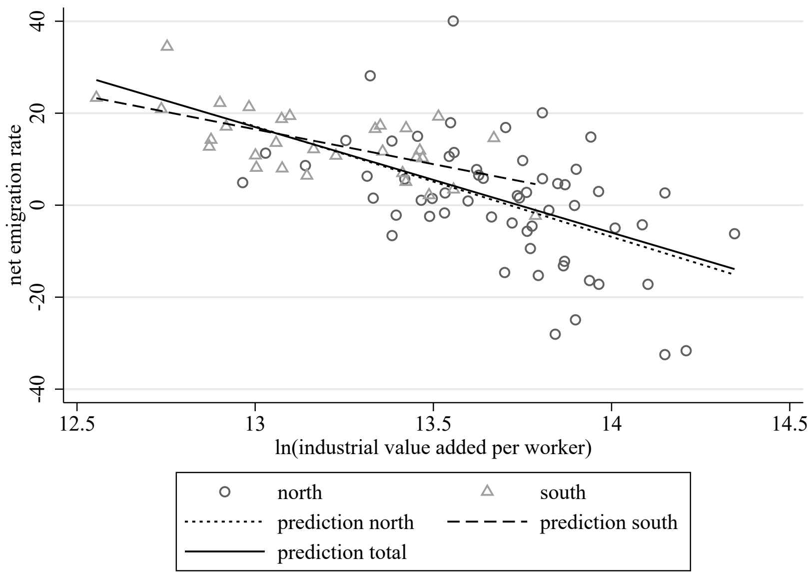
(a) 1962

(b) 1981

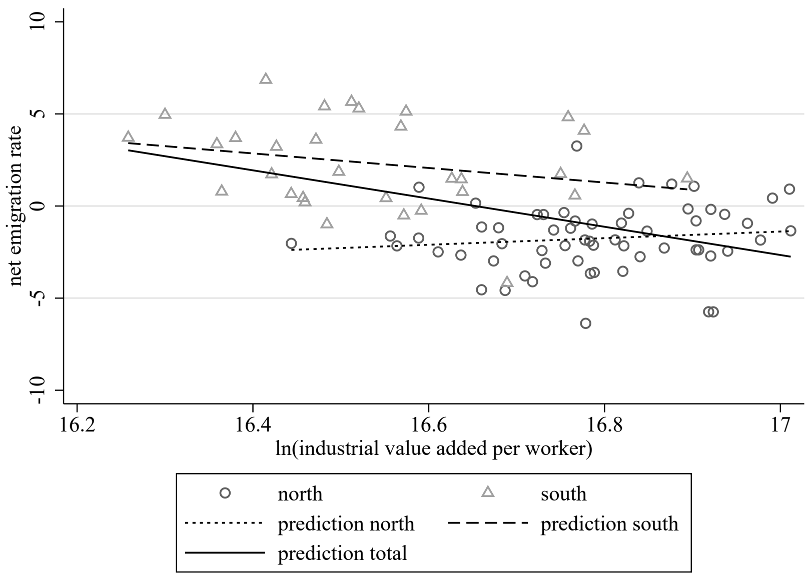
Figure 4.18: UNEMPLOYMENT RATE AND VALUE ADDED

Scatterplot of unemployment rate and value added per employee in industry, in ninety-two provinces. For sources and methodology, see text and section 4.3.

general was significantly reduced. In 1981, almost all provinces in the South were net senders, irrespective of productivity. In the Centre-North, instead, medium- and low-productivity provinces were just as likely to receive immigrants than high-productivity provinces. This situation is compatible with present-day studies which find that local amenities, rather than labour market factors, explain migration within macroregions.



(a) 1962



(b) 1981

Figure 4.19: Net migration rates and value added

Scatterplot of net migration rates and value added per employee in industry, in ninety-two provinces. For sources and methodology, see text and section 4.3.

The timing of the inversion in the relationship between emigration and unemployment can be tested by regressing the net emigration rate e (computed as emigrants minus immigrants over mid-year population) on the unemployment rate u interacted with an indicator for the year, according to the following specification:

$$ln(e_i) = \pi + \sum_{y=1962}^{1981} \omega_y \, ln(u_i) \times 1(Year = y) + X_{it}'\xi + \tau_t + \phi_j + \zeta_{it} \qquad [4.16]$$

The specification uses province and time fixed effects and a vector of controls including the province's population, the economic structure (annual value added in agriculture, industry, commerce, services), the sectoral composition within the manufacturing sector (interpolation of employees in 18 subsectors between census years) and skill distribution in manufacturing (shares of workers classified as high skill, medium-high, medium-low, low skill, apprentices and other).

Figure 4.20 shows the annual estimates for the interacted coefficient. The graph clearly identifies a positive association between unemployment and net emigration before the repeal of the wage zones, which however turned negative at the end of the period. The transition between the two regimes happened exactly during the gradual introduction of spatial equalization in nominal minimum wages. This evidence reinforces the argument that the current spatial mismatches in the Italian labour market—i.e. the low propensity to migrate from low-income, high-unemployment areas—are not a traditional historical feature but rather a recent acquisition, which can be linked to the repeal of the wage zone system in 1968-1972. The same pattern can be identified both within the North and within the South (Figure 4.27).

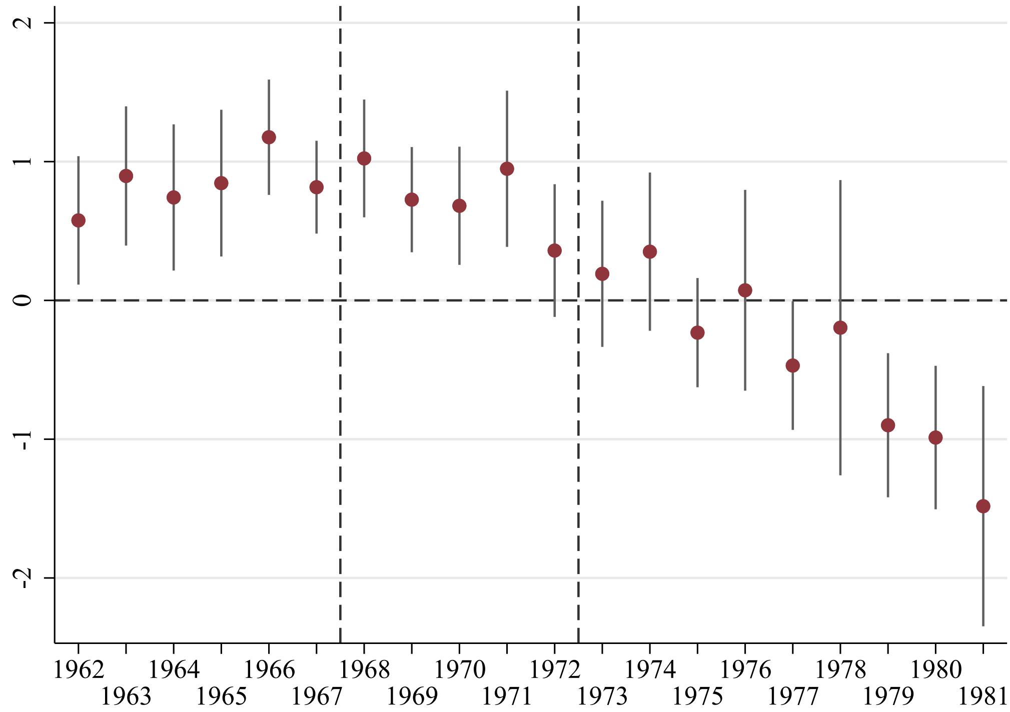


Figure 4.20: NET EMIGRATION AND UNEMPLOYMENT

Association between the net emigration rate and the unemployment rate, estimating by OLS including province and time fixed effects and a vector of time-varying controls. Vertical solid lines represent the 95% confidence intervals obtained from standard errors clustered at the province level.

4.6 Conclusions

Italians historically showed great propensity to internal mobility, which was particularly high between the 1950s and the 1960s. In the early 1970s, however, internal migration rates fell by one third, and remained at low levels for the following decades, despite widening spatial differentials in unemployment and income levels. Searching for the possible causes of these spatial imbalances, economists have often stressed the role of labour market institutions—most importantly, the spatial equalization of nominal minimum wages established by sectoral collective agreements. In the most common argument, these agreements incentivize individuals to stay in low-income areas—where real wages are high due to the low cost of living—and queue for local jobs, rather than move to high-income areas which offer greater chances of employment but lower real wages.

This paper has provided the first historical test for this hypothesis by comparing the current wage-setting regime with the previous system, which allowed nominal wages to vary between provinces according to fixed coefficients that proxied for differences in local productivity and price differentials. The paper has done so by reconstructing a range of labour market statistics at the province level from 1962 to 1981, with annual frequency. In particular, the paper has presented new of minimum and average wages of blue-collar workers in the manufacturing sector, and original estimates of local industrial productivity, cost of living and unemployment. All sources have been specifically digitized from printed primary sources and harmonized to allow intertemporal and spatial comparisons. These statistics have been merged with a new dataset of bilateral internal migration flows between Italian provinces, for the same time span.

The analysis has first presented an augmented gravity model of internal migration which tested for the role of nominal minimum wages as a pull factor. After having established a strong pull effect of nominal minimum wages on migration flows, the analysis has found that the model provides good predictions of the fall in internal migration after the spatial equalization of nominal wages.

The analysis also found that nominal minimum wages lost their influence as pull factors of migration around the same time.

Discussing potential mechanisms, the paper has shown that the transition from the old to the new wage-setting regime inverted the relationship between real wages and productivity, from positive to negative. This shift also affected average industrial wages: while originally real wages were higher in high-productivity areas, by the end of the period they lost all association with local productivity. This evolution appears to have caused a polarization of the labour market the Centre-North and the South. In particular, unemployment rates appear systematically higher than in the Centre-North, irrespective of productivity.

The paper has wider relevance and policy implications. With respect to the international literature, the paper connects to recent research exploring the causes for falling internal mobility and rising spatial misallocation between local labour markets across developed countries. While research on the United States has stressed the role of constraints to housing supply in high-income areas, this paper highlights the role of wage-setting institutions in altering the monetary incentives to migrate from low-income areas. These results have important policy implications: with growing political pressure to ensure fair wages and higher living standards for disadvantaged groups—including the push for higher statutory minimum wages and a more central role of collective bargaining—, it is necessary to consider the second-order effects of these interventions on local labour markets and on their aggregate performance.

Additional figures

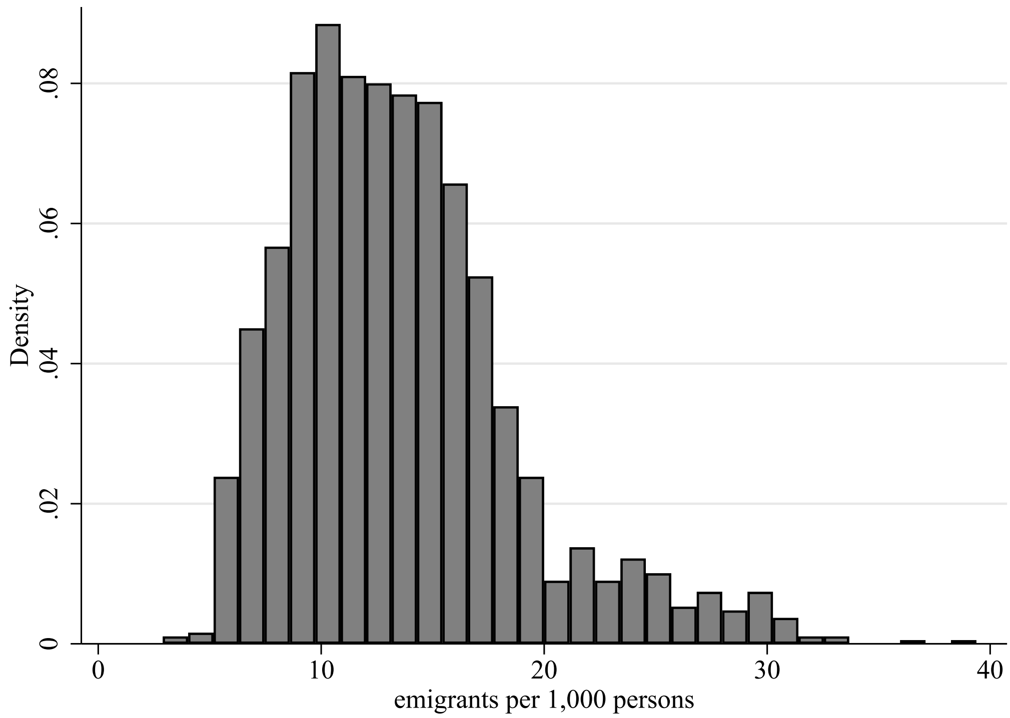


Figure 4.21: Distribution of gross migration rates (1964-1981)

The graph reports the distribution of gross migration rates from 92 provinces (excluding internal migration) for the whole period 1964-1981. For sources and methodology, see text and section 4.3.

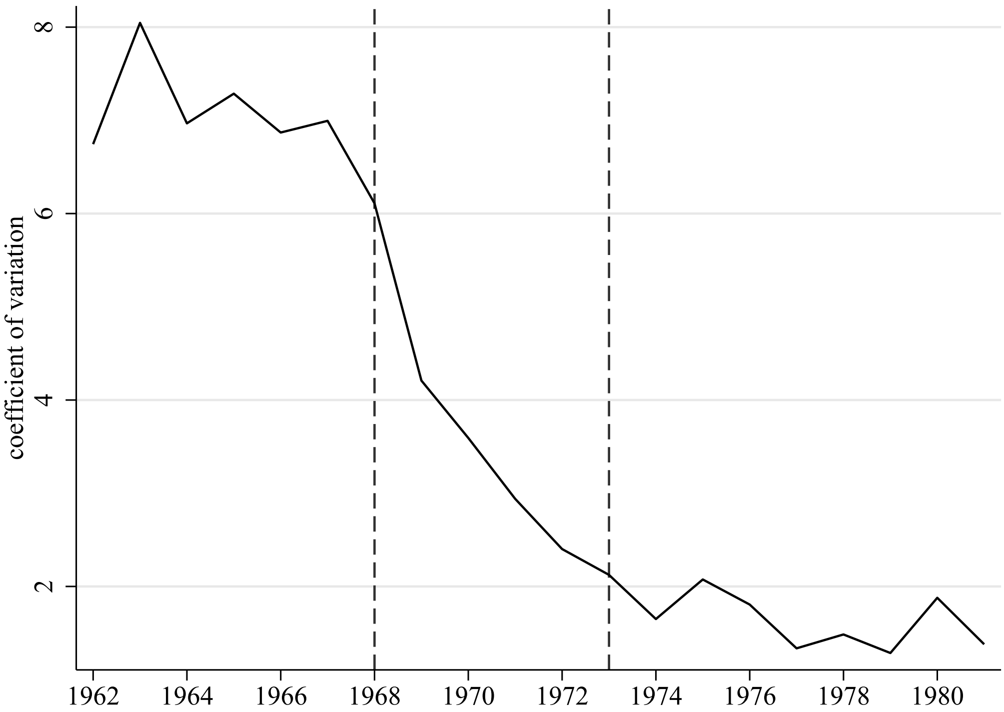


Figure 4.22: Spatial variation of mean minimum wages

Coefficient of variation for the mean minimum industrial wage for the 92 provinces. The coefficient is computed as the standard deviation of the mean minimum wage for low-skill blue-collar workers across sectors (weighted by the local industry shares), divided by the mean value and expressed in percentages. For sources and methodology, see section 4.3.

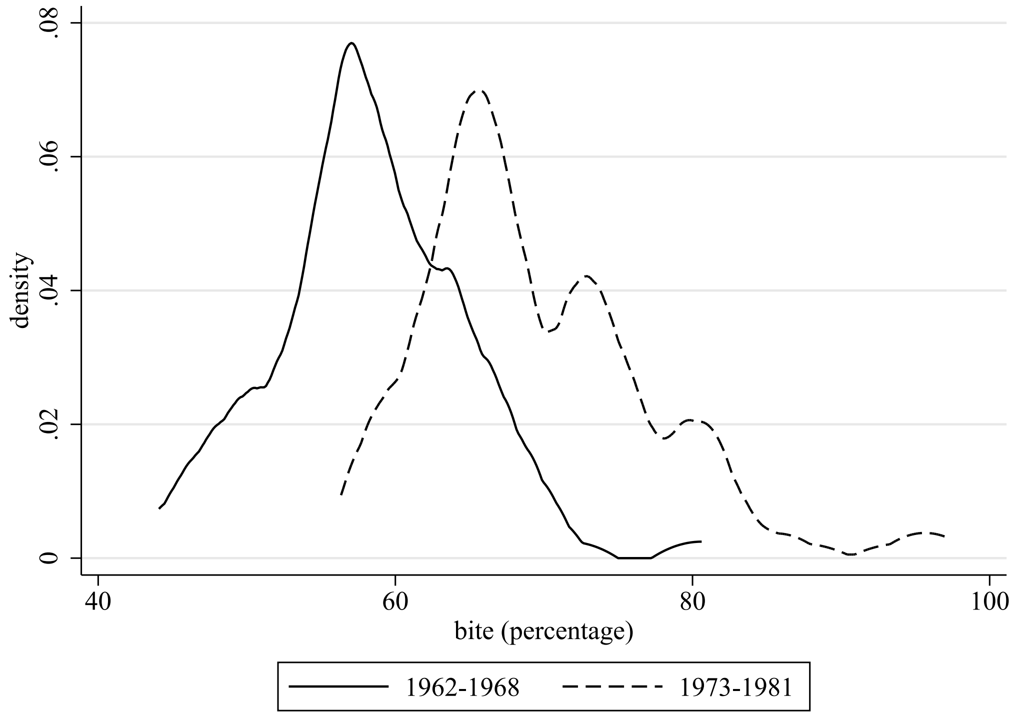


Figure 4.23: Distribution of minimum wage bite across provinces

Kernel density distribution of minimum wage bite across ninety provinces, by period. The bite is computed as the percentage ratio between the local mean minimum wage and the mean average effective wage, obtained according to Equation 4.1 and 4.3, with annual frequency. Results are then averaged by period. For sources and methodology, see text and section 4.3.

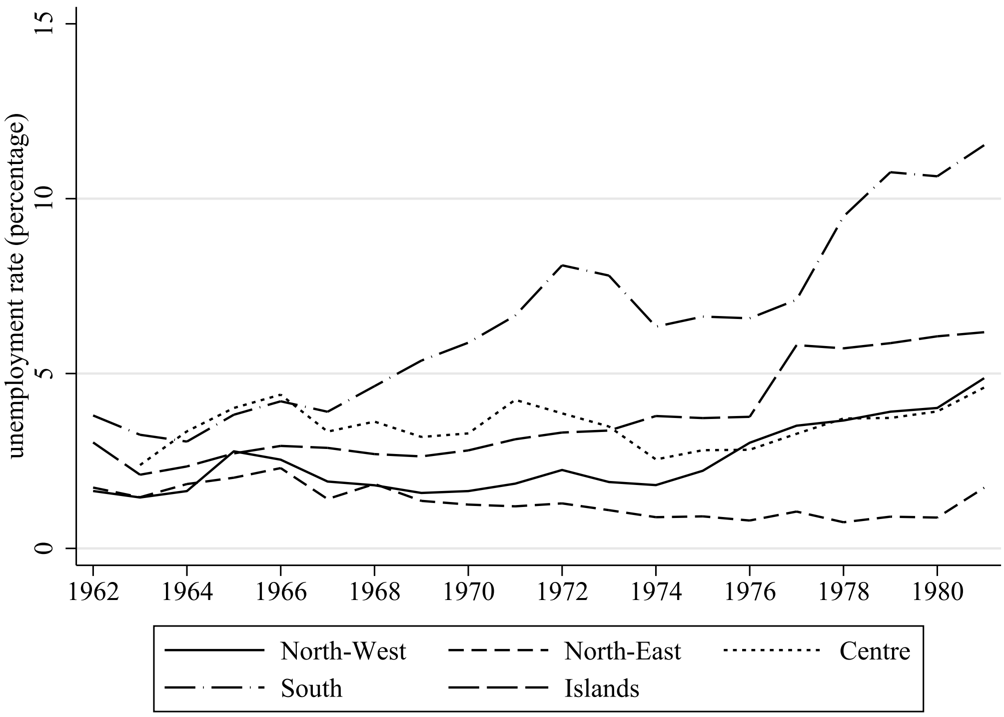


Figure 4.24: UNEMPLOYMENT RATE BY MACROREGION

Average unemployment rate (percentage) by macroregion. Number of unemployed people estimated from registrations at local job centres and labour force surveys, active population estimated from labour force surveys only. For sources and methodology, see section 4.3.

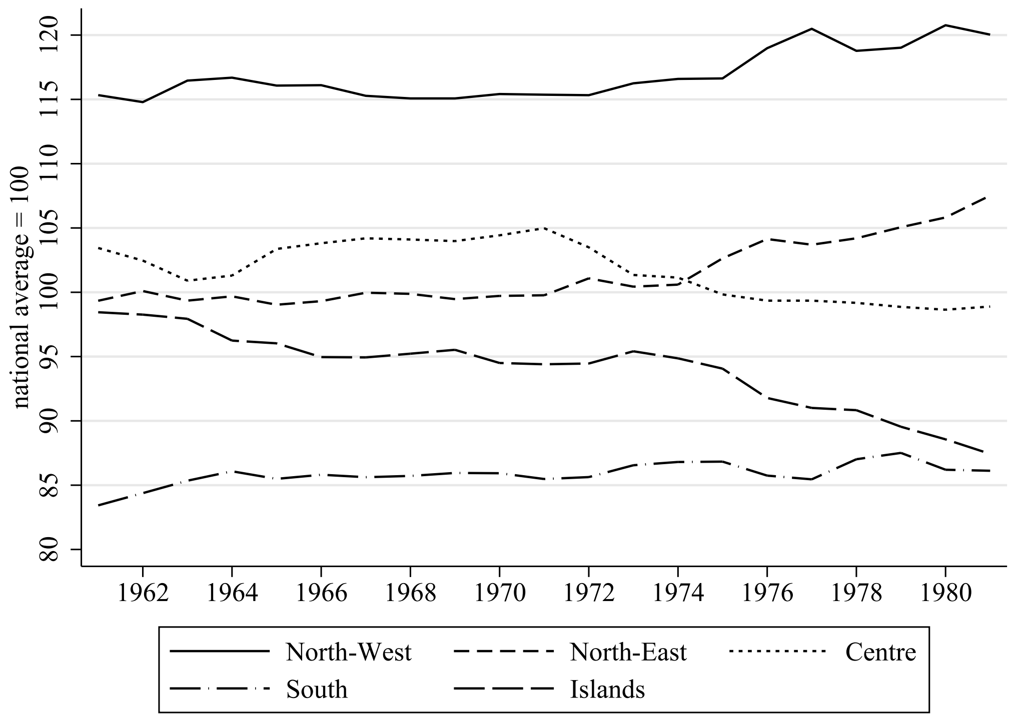


Figure 4.25: Cost of living by macroregion

Index of the cost of living by macroregion (national average equal to 100). For sources and methodology, see text and section A.9.

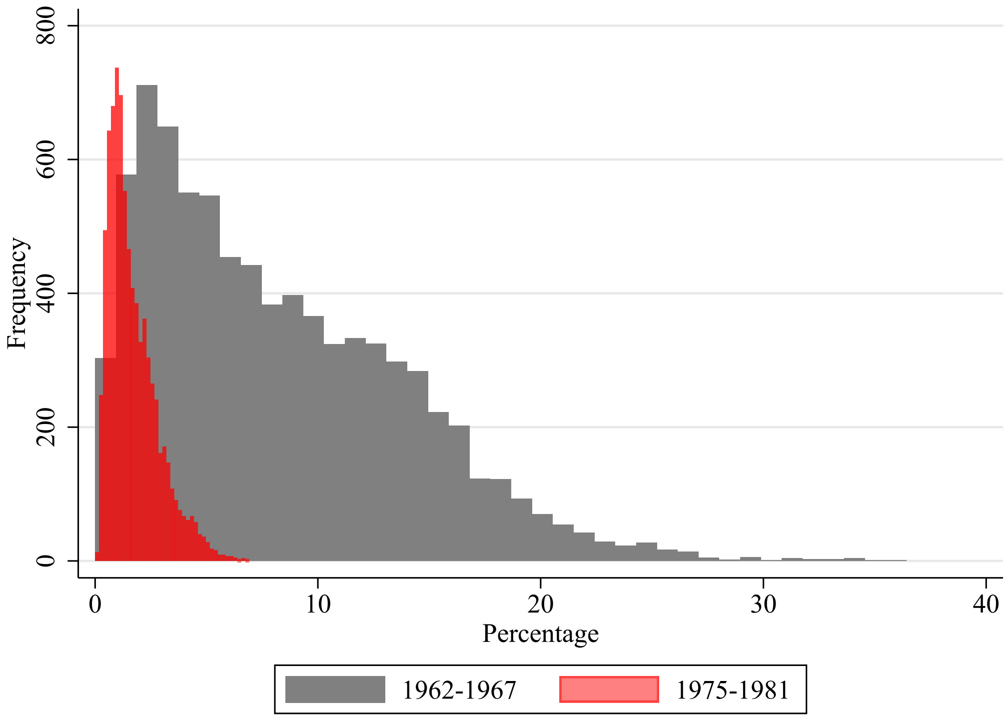
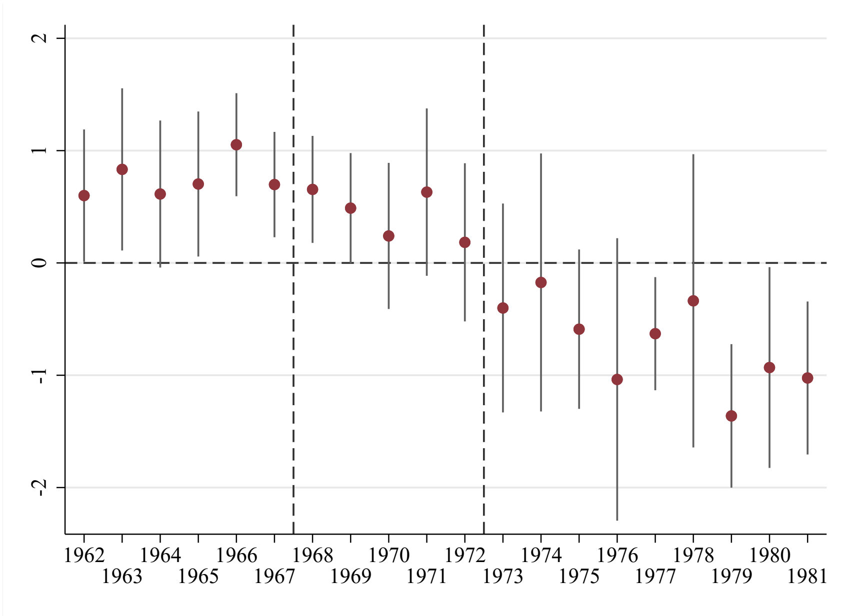
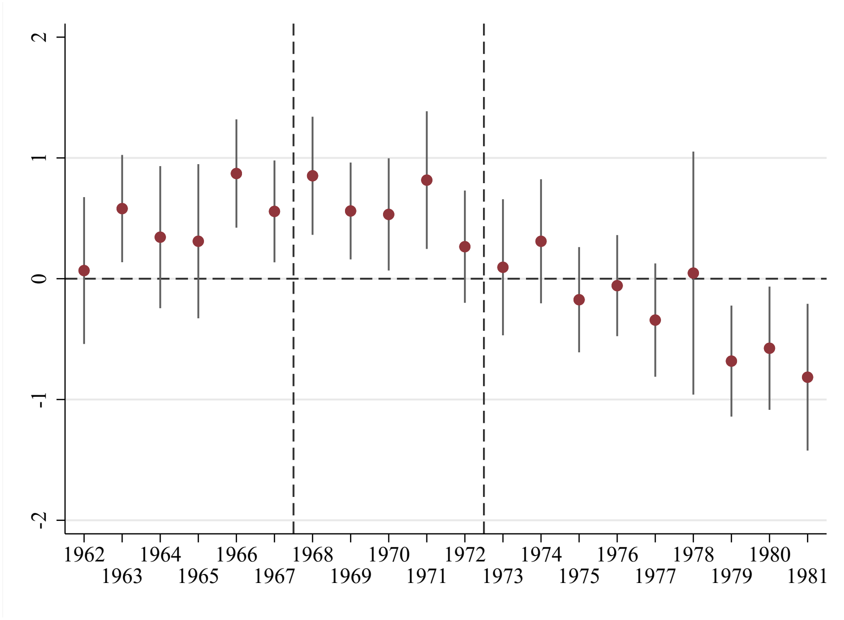


Figure 4.26: Percentage differential in nominal minimum wages within dyads

Distribution of percentage differences between the nominal minimum wage at destination and at origin, for all 8,100 province dyads, averaged across the period 1962-1967 and 1975-1981.



(a) Centre-North



(b) South

Figure 4.27: Net emigration and unemployment, by macroregion

Association between the net emigration rate and the unemployment rate, estimating by OLS including province and time fixed effects and a vector of time-varying controls. Vertical solid lines represent the 95% confidence intervals obtained from standard errors clustered at the province level.

Additional tables

Table 4.3: MINIMUM WAGE COEFFICIENTS BY INTERCONFEDERAL AGREEMENT

zone	province	coefficient (%)
0	Milano	100.00
	Torino	100.00
	Genova	98.50
	Roma	98.50
I	Como, Firenze, Sondrio, Verbania	97.00
	extra: Crema	99.16
	Biella	97.95
	Varese	97.89
II	Aosta, Bergamo, Bolzano, Brescia, Cremona, Gorizia, Imperia, Livorno, Massa Carrara, Novara, Pavia, Pisa, Savona, Trento, Venezia, Vercelli, Trieste	95.00
III	Alessandria, Belluno, Bologna, La Spezia, Mantova, Modena, Padova, Parma, Piacenza, Ravenna, Reggio Emilia, Verona, Vicenza	92.00
	extra: Napoli	93.50
IV	Ancona, Asti, Cuneo, Ferrara, Forlì, Grosseto, Pistoia, Rovigo, Siena	89.00
	extra: Udine	91.00
	Palermo	90.50
	Lucca	90.00
	Treviso	90.00
V	Ascoli Piceno, Cagliari, Catania, Frosinone, Latina, Lecce, Messina, Perugia, Pesaro, Pescara, Rieti, Salerno, Viterbo	84.50
	extra: Arezzo	87.00
	Bari	87.00
	Taranto	87.00
	Terni	87.00
VI	Agrigento, Avellino, Benevento, Brindisi, Caltanissetta, Campobasso, Caserta, Catanzaro, Chieti, Cosenza, Enna, Foggia, L'Aquila, Macerata, Matera, Nuoro, Potenza, Ragusa, Reggio Calabria, Sassari, Siracusa, Teramo, Trapani	80.00

Wage zone coefficients for the minimum wages of low-skill blue-collar workers (*manovale comune*) established in 1961. Source: attachment to the Interconfederal agreement of 2 August 1961 (*Accordo interconfederale per la revisione dell'assetto zonale delle retribuzioni e il conglobamento della contingenza 2 Agosto 1961*), available on the website of CNEL (National Council for Economics and Labour) at https://www.cnel.it/Archivio-Contratti (last retrieved July 2021).

Table 4.4: **Descriptive statistics**

	(1) 1962-1971		(2) 1972-1981	
	mean	sd	mean	sd
ln(emigrants)	3.27	1.53	3.03	1.54
ln(Distance km)	5.87	0.74	5.87	0.74
ln(Population)$_D$	13.03	0.64	13.06	0.67
ln(M)$_D$	7.76	0.27	9.41	0.64
ln(Unemployment)$_D$	8.58	0.72	8.81	0.81
ln(W)$_D$	8.30	0.33	9.79	0.59
log difference cost of living	0.00	0.13	0.00	0.15
ln(GDP pc)$_D$	6.43	0.44	7.89	0.69
% North-West	0.22	0.00	0.22	0.00
% North-East	0.22	0.00	0.22	0.00
% Centre	0.20	0.00	0.20	0.00
% South	0.22	0.00	0.22	0.00
% Islands	0.13	0.00	0.13	0.00
Observations	79,556		79,556	

Chapter 5

Contractual minimum wages and industrial establishments

Small manufacturing and the establishment size distribution after the Hot Autumn

5.1 Introduction

The Italian economy is characterized by the prevalence of small size firms in the manufacturing sector. The implications of such a skewed firm-size distribution for the country's economic performance have been long debated.[1] Small firms are often found to be less productive, innovative, resilient and well managed than the rest (Pellegrino and Zingales, 2017; Antonioli and Montresor, 2019). Hence, the prevalence of small firm size is often considered a proximate cause for Italy's sluggish productivity performance.

The proponents of this pessimistic view maintain that the small size is partly due institutions that reduce incentives to grow, particularly, more lenient employment protection laws and a weaker enforcement of legislation—from taxation to the application of collective agreements—for firms with few workers (Nardis, M. Mancini, and Pappalardo, 2003; Kugler and Pica, 2008; L. Amendola, 2014; Bobbio, 2016). According to this view, the prevalence of

[1] For an overview on the different perspectives of the recent literature see see chapter 2.

small-size manufacturing is a contingent characteristic that can be solved with appropriate institutional reforms (Bugamelli et al., 2018, pp. 62–66).

However, other researchers argue that small size is not a a good indicator of competitiveness, for Italian firms are often embedded in informal networks of technical and commercial relations which produce valuable external economies (Brusco and Paba, 2010). The epitome of this model is the industrial district, where firms are deeply embedded in the local community and are able to share tacit knowledge that produces innovation, tap into a common pool of highly skilled workers, and support each others' efforts reaching outside of the local economy (Becattini, 1991; Dei Ottati, 1994). Hence, the prevalence of small firms in the Italian economy should not be considered an aberration from an efficient size distribution, but it should rather be viewed as a variety of Italian capitalism which has deep cultural roots (Carnevali, 2005, pp. 66-81; Zamagni, 2018, p. 7-10).

Understanding when and why today's firm-size distribution originated can help discriminate between these contrasting arguments. Historical research has in fact recognized the ancient roots of some industrial districts (Brusco and Paba, 2010; Perugini and Romei, 2010), but it has also noted that today's firm size distribution is highly dependent to transformations in the 1970s-1980s, when the fulcrum of Italian manufacturing shifted from large factories owned by large companies and state-owned enterprises to small establishments (Colli, 2010; Amatori, Bugamelli, and Colli, 2013b; Nuvolari and Vasta, 2015).

One contemporary theory proposed that the shift was due to the steep increase in labour costs due to the contractual wage hikes that started during the Hot Autumn of 1969 and continued in the next decade. Contemporaries argued that large firms suffered a stronger shock, whilst small firms were largely shielded from it thanks to favourable legislation and accommodating politics (FLM di Bergamo, 1975; Brusco, 1977; Graziani, 1977; Brunetta, 1980). On the other hand, other contemporaries argued that the expansion of small manufacturing in the 1970s was largely independent from the wage hike and driven by external factors, such as the reduction of the minimum efficient scale of production thanks to the diffusion of flexible specialisation technologies and the change of consumers' taste from mass-produced goods to variety (Brusco, 1982).

The former argument has been largely accepted by historians of labour relations (Franzosi, 1995, pp. 332-335; Petrini, 2010), and continues to be used as an interpretative lens by economic and business historians. For instance, Colli, Rinaldi, and Vasta (2016, p. 37) argue that, during the 1970s, 'large companies in capital intensive industries were heavily affected by the crisis in their cost structure. In order to gain more flexibility, minimise control costs, dilute tensions in labour relation (and in some cases to proceed more easily with plant closures) most vertically-integrated companies followed a strategy of decentralisation and fragmentation of the production chain,' creating vast networks of subsidiary firms.

However, recent literature in labour economics finds that raising minimum wages—either through legislation or by extending the coverage of collective agreements—forces marginal firms to exit the market (D. L. Luca and M. Luca, 2019; Martins, 2021). These are usually smaller establishments, for larger firms commonly pay a wage premium which can absorb the shock the hike. Moreover, large firms are on average more productive and/or enjoy rents, which allows them to withstand the reduction in profits resulting from the shock (B. Bell and Machin, 2018; Garnero, Rycx, and Terraz, 2020). Furthermore, minimum wages can also influence the number of small firms by reducing entry rate in the longer term (Draca, Machin, and Van Reenen, 2011; Meer and West, 2016). All these reasons would anticipate a negative effect of the minimum wage hike on the number of manufacturing establishments, particularly of small size.

Whether the 1969 wage shock provoked decentralisation because small firms escaped its bite, or the increase in labour costs depressed firm creation in what would have been an otherwise conducive environment, is ultimately an empirical question. This chapter contributes to the historiographical debate by testing this specific hypothesis: whether the increase in contractual minimum wages after 1969 was associated with a greater number of manufacturing establishments or vice versa, and whether it influenced the firm-size distribution in the long term.

The chapter is organized in six sections. After this introduction, section 5.2 presents stylized facts on manufacturing establishments and their size distribution before and after 1969, and surveys the academic debate on alternative interpretations. Section 5.3 presents the data used for the analysis and their sources and describes the harmonization procedures. The chapter uses data at the municipality level on the number of manufacturing establishments and employees for 15 sectors, at decadal benchmark years. Section 5.4 describes the identification strategy, which exploits spatial variation in the intensity of the wage hike and heterogeneity between areas, sectors and size classes. Section 5.5 presents the analysis and finds that the minimum wage hike was associated with a reduction in the number of establishments—contrary to contemporary observations—, but this reduction was mostly concentrated in small and medium-size firms. The section speculates that the minimum wage hike alone might not be the cause for the shift from large to small manufacturing, but it might have contributed to the polarisation of the firm-size distribution. The section also discusses heterogeneity between macroareas and sectors, and provides robustness checks. Section 5.6 concludes.

5.2 Historical background and hypotheses

The 1970s were characterized by a major restructuring of industrial production from large factories to smaller establishments, which interrupted a trend of concentration and vertical integration that had been undergoing during the economic miracle (Federico, 2003; Giannetti and Vasta, 2010; Amatori, Bugamelli, and Colli, 2013b). In the decade 1971-1981, the number of employees in establishments with less than fifty workers increased by 22%, while the number in establishments with over 500 employees decreased by 5%, destroying almost sixty-thousand jobs. This performance was in stark contrast to the previous decade, when the rates of growth had been, respectively, 13% and 26%.[2]

Under 50 employees, the steepest growth between 1971 and 1981 was in the size bracket 10-50, where employment increased by almost 36% and accounted for over 400 thousand employees, 72% of all new jobs in manufacturing. A sizeable contribution came also from micro-businesses (establishments with less than ten employees), which added 130 thousand jobs (+10.2%) and increased by over 81,500 units between 1971 and 1981 (+18.5%). Moreover, official statistics only partially capture the extent of the restructuring, as microbusinesses often did not register all their employees and tapped into homework production, which caused the rapid growth of the informal labour market (B. Contini, 1979). It is also important to note that, even though average firm size decreased also in other European countries at the same time due to the crisis of large industrial companies after the oil shocks, the inception of deindustrialization, and the diffusion of technologies that reduced the minimum efficient scale of production (Sabel and Zeitlin, 1985; Giannetti and Vasta, 2005, pp. 43-50; Congregado, Golpe, and Van Stel, 2014), in the Italian case the shift was also caused by this extraordinary efflorescence of small businesses, and not only by the compression of the manufacturing sector (Traù, 2003, pp. 70-76).

The growing weight of small businesses can also be identified from aggregate balance sheets. According to Giannetti and Vasta (2010, p. 25), the total assets of the top-200 firms had risen from 34% of the GDP in 1956 to 62% in 1971, following a positive trend established in the 1920s. In the 1970s, however, the trend reverted, and by 1981 the total assets of these firms only amounted to 46% of the GDP. The change in trend can be entirely attributed to manufacturing firms, whose assets in percentage of GDP continued declining through the 1980s and into the 1990s. Using similar sources Bragoli et al. (2019) show that, had large firms continued to grow at the same rate as they did before 1967, today Italy's firm size distribution would be similar to comparable Western economies.

[2]Here and next paragraph, my computations on data from Giannetti and Vasta (2005, Tab. 2.5, p. 39 and Tab. 2.9, p. 45).

A key element in the expansion of small manufacturing was the increase in subcontracting practices across sectors. According to computations on a representative sample of firms surveyed by Mediocredito Centrale, only 5% of the firms surveyed in 1968 acted as subcontractors, but by 1984 the percentage of firms producing for other businesses was 30%. The increase was strong in traditional sectors (see Figure 5.1). In the textiles industry over 27% of firms employing between eleven and twenty workers reported producing for other firms in 1968. In 1984, the percentage was 61%. In the clothing industry, this share increased from 12% to 46%. In the leather industry, the share of small firms producing for other businesses rose from 8% to 35%. But strong increases were also found modern sectors. In metalworking and engineering, the share increased from about 20% to around 40% between 1968 and 1984.

Contemporary observers proposed a connection between the post-1969 egalitarian wage hike and the restructuring of industrial production. According to this literature, such *decentramento produttivo* (decentralisation of production) was the rational reaction of entrepreneurs to the rise in labour costs and the mounting workers' militancy inside the largest factories (Brusco, 1977). Facing a more rigid and increasingly costly labour factor, the largest businesses in particular would abandon efforts to extend mass production and vertical integration, and would shift instead to flexible processes and outsourcing (cf. Graziani, 1975, pp. 33-50, Sabel, 1982, pp. 220-227).

Between the 1950s and early 1960s, Italian firms had in fact acquired technologies that made intensive use of the labour factor; starting in the 1970s, however, Italian firms focused on adopting labour-saving technologies, including numeric-control machines in small factories and robotized systems in large establishments (Giannetti, 1998; Mariotti, 1999).[3] This shift in the direction of technical change has been attributed to a modification in the relative price of production factors, as the increase in labour costs and labour market rigidity

[3]The paradigmatic example of this change was Fiat—a pioneer of Fordist mass-production methods in Italy since the 1930s—which started implementing robotized production after 1972 (Maielli, 2005).

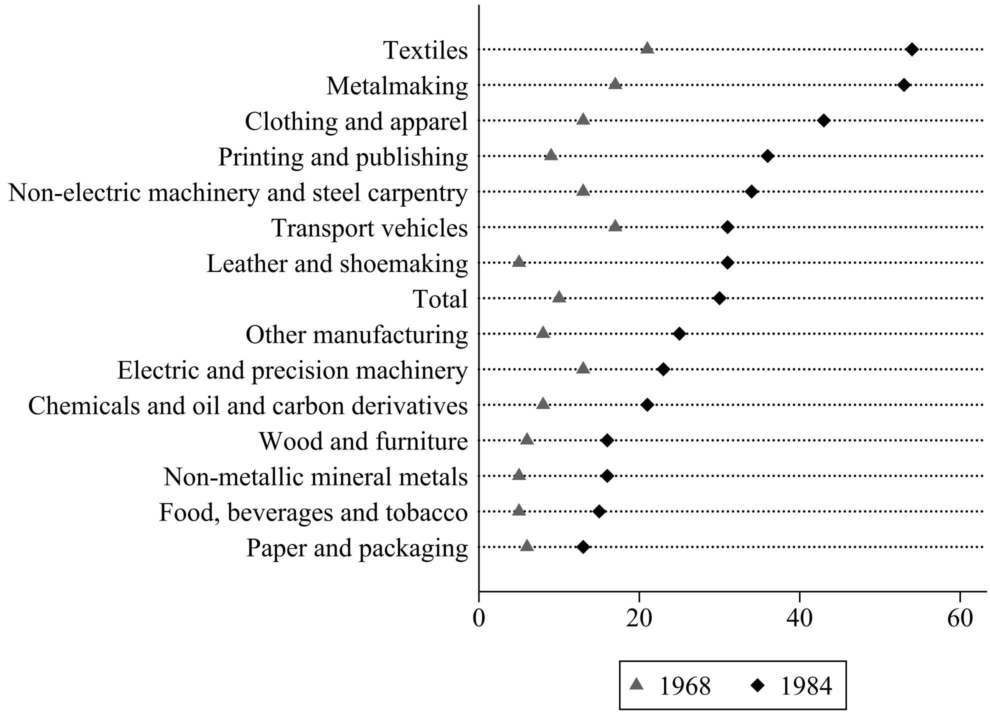


Figure 5.1: Firms producing as subcontractors

Share of firms producing as subcontractor (*subfornitori* and *conto terzi*) in a representative sample of manufacturing firms (for 1968, 31,317 firms employing 1,888,776 workers; for 1984, 49,277 firms employing 3,490,632 workers). Source: own elaborations on aggregate balance sheets from Mediocredito Centrale, *Indagine sulle imprese industriali al 31 dicembre 1968*, vol. II, Roma, 1971, tav. 18, pp. 64-75; *Id.*, *Indagine sulle imprese manifatturiere*, vol. II, Roma, 1986, tav. 34, pp. 112-113.

since the late 1960s would incentivize firms to substitute capital for workers (Brusco, 1977, pp. 92-93; Antonelli and Barbiellini Amidei, 2007, pp. 259-277).

The outsourcing of production phases fed a growing pool of specialised small and medium-sized firms, which were less impacted by the Hot Autumn thanks to the weaker reach of labour unions inside the workshops, to the employment of a less combative workforce, and to favourable laws—e.g. the exclusion of firms with fewer than 15 workers from employment protection rules introduced in 1970 by the *Statuto dei lavoratori* (Mazzotta, 1979). According to traditional views, small firms were by definition technologically backward (Brunetta, 1980, pp. 7-30), hence the *decentramento produttivo* was considered a pathological evolution which could lock the comparative advantage of the

Italian economy into medium-quality, standardized production in traditional sectors (Del Monte and Raffa, 1977, pp. 28-32).

A contrasting view, however, was developed by industrial economists who carried out case studies on specific sectors and territories. According to their findings, the assumption that small firms were technologically backward was largely untenable: many small firms used technologies which were at least as recent as those adopted in the largest factories, and in many cases the outsourced production processes were the most technologically advanced (Varaldo, 1979). Taking into account the level of technological and organizational complexity, the quality of the product, the skills of the workers employed, and the degree of the firm's dependency from larger customers, Gianni Lorenzoni proposed an influential classification of small firms in the metalworking sector, which highlighted how labour costs were only a minor factors for the decentralization of production (Lorenzoni, 1979, pp. 184-200). Small firms could often provide high-quality components that were tailored to the customer's requests, thanks to new production technologies that reduced the minimum efficient scale of production and to an industry-wide division of labour that allowed specialisation in niche markets (Brusco, 1975; Barca and Magnani, 1989). According to this approach, the decentralization of production was not a reaction to the rise in labour costs, but rather the natural consequence of technological change and the growing division of labour at the industry level (Mariti, 1979).

An influential proponent of this alternative view was Giacomo Becattini, who maintained that decentralization was an altogether alternative model of production to the Fordist system, not its complement (Becattini and Coltorti, 2004). Decentralization was, in Becattini's view, mainly driven by the evolution of consumers' demand, who sought increasing variety and distinction (Becattini, 1991). Decentralized production was made economically feasible thanks to the typical cooperative relationships that emerged between firms in the industrial districts, and more generally to their characteristic external economies originating from deep social bonds (Dei Ottati, 1994; Brusco and

Paba, 2010, p. 296-299). Thus, small firms in industrial districts would have developed independently from large businesses, building their own market space and stimulating innovative activity based on the sharing of tacit knowledge and the employment of a skilled workforce (Belussi and Pilotti, 2003; Antonelli and Barbiellini Amidei, 2013, pp. 180-185).

The rest of the paper aims to provide a partial test of the hypothesis that the contractual wage growth after 1969 was a contributing factor to the efflorescence of small manufacturing firms in the 1970s-1980s. Testing all possible channels would require detailed wage and balance sheet data at the micro level for a large sample of firms, including small and micro establishments, which is difficult to attain for a long time span. However, we can observe whether, in the aggregate, places and sectors that experienced a steeper increase in contractual wages also recorded a larger number of manufacturing establishments after 1969, and whether this increase was concentrated in small size classes. Finding the opposite result, instead, would suggest that the first-order effect of raising labour costs prevailed, expelling marginal firms from the market, reducing the total number of establishments and possibly of employees.

5.3 Data and harmonization

5.3.1 Industrial census data at the municipality level

The most comprehensive and systematic sources of information on the number of manufacturing activities and their employees in Italy in the long run are the industrial censuses. Considering the period since the end of the Second World War, industrial censuses have been conducted regularly at ten-year intervals since 1951 (Cainelli and Stampini, 2002; Federico, 2003). Planned and coordinated by the National Statistical Institute, the census questionnaires were circulated by public officials in each of the country's eight thousand municipalities, and were addressed to all economic activities in the manufacturing sector proper, plus the extractive industries, energy and utilities, construction, and later to firms in some sub-sectors of agriculture (timber, hunting and fishing, livestock farming, other activities connected to agriculture) and services such as banking and transport (Istituto Centrale di Statistica, 1954, p. 6; Istituto Centrale di Statistica, 1962, p. 5).[4]

The microdata of the industrial censuses are not available prior to the edition of 1981, which precludes the possibility of performing analyses at the individual level for our period of interest.[5] Consequently, the most granular level of spatial disaggregation for historical analysis is the municipality, Italy's smallest administrative division—which corresponds to LAU 2 according to Eurostat's nomenclature of territorial units for statistics. Data on the number of establishments and employees by sector is available at the municipality level from the original published volumes of the censuses.

Two main factors, however, prevent us from directly using the published data for historical comparisons: changes to the sectoral classification of economic activities, and changes to municipalities' boundaries. With respect to the former, Istat modified the number and definition of economic sectors at every new edition of the census, in order to better capture the evolving nature of the economy and to adopt international standards in the production of national statistics (Istat, 1998, pp. 13-16). With respect to municipalities' borders, it is important to note that the number of municipalities did not stay constant over time, for new ones were created (by breaking up existing municipalities) and old ones suppressed (by merging them) over the years depending on local requests

[4]The censuses distinguished two units of analysis: firms (*ditte* or, since 1961, *imprese*) and factory establishments (*unità locali*). A firm was defined as an 'autonomous entity organized for the production or the selling of goods or services;' a factory establishment, instead, was defined as the plant (or group of plants) where the production effectively took place (Istituto Centrale di Statistica, 1976a, pp. vi-viii). The publications reported the responses separately for both definitions. However, data for firms was imputed to the municipality where they maintained the legal address, which would lead to an inaccurate representation of the geographical distribution of industrial employment (Istituto Centrale di Statistica, 1962, p. 6-7). The inaccuracy was caused especially by firms that operated multiple production plants located in different municipalities. For instance, if a firm operated two plants, one in the North and one in the South, the firm's employees would be counted as if they were all located in the North. For factory establishments, instead, data were imputed to the municipalities of effective location. In our example, the employees would be separately recorded in the North and in the South, depending on the plant of employment. Hence, to avoid inaccuracies, the analysis will only focus on data on factory establishments.

[5]For a list of the microdata available electronically see Istat's website at https://listarilevazioni.istat.it/ (last retrieved September 2022).

and governments' preferences. In order to conduct historical comparisons it is thus necessary to rearrange the data in order to keep these two dimensions constant over time, using a common benchmark year.

This problem was partly addressed by Istat, which over the years has reclassified the information from the original volumes and published new datasets that would allow to perform intertemporal comparisons at the municipality level. The first of such datasets is the Datawarehouse CIS, which was created in the early 2000s to allow comparisons between the then latest industrial census (2001) and previous editions, starting with that of 1951.[6] Considering that older sectoral classifications were coarser than recent ones, the Datawarehouse CIS projected forward in time the sectors of 1951 (three digits) or, alternatively, those of 1961 (four digits). Thus, using the three-digit classification, it is possible to compare the evolution of the number of establishments and employees in 30 sub-sectors—15 of which are proper manufacturing activities, other two pertain to the mining industry, another two to utilities, and the remaining sectors include construction and commercial services.

However, the Datawarehouse presents the information at historical borders, meaning that the data cannot be directly used for geographical analyses over time. To solve this issue I have harmonized the data to 1991 municipality borders using information on administrative changes from 1951 to 2001 from a range of online resources.[7] In the case of new municipalities established after

[6]This database was in fact an update to an earlier reconstruction, spanning the industrial censuses from 1951 to 1991, which was published as Istat (1998). The volume was accompanied by a CD-ROM containing the electronic database. A copy of the volume with its own CD-ROM is preserved at the LSE Library. Notice that the CD-ROM requires legacy software to be executed. The second edition was instead available online through a dedicated website which was available at the address `http://dwcis.istat.it/index.html` (last retrieved 26/11/2019). However, since September 2020, the website has been disabled. After formal enquiry through Istat's Contact Centre, I have received confirmation that the platform has been deactivated (16/01/2023). Nonetheless, information on the dataset, including sources and methodology, can be obtained from the archived snapshots at the Internet Archive through the WayBack Machine (see for instance `https://web.archive.org/web/20161110223356/http://dwcis.istat.it/cis/index.htm`. The archived version does not allow to download the data at the municipality level due to the failure of the login procedure, but I can provide the raw files upon request.

[7]The identification of administrative changes was first based on the official list originally published by Istat through Sistat—Sistema Informativo STorico sulle Amministrazioni

1951 with the aggregation of two or more municipalities, I projected the new municipalities back in time by summing the number of establishments and employees in each sub-sector from their historical components. For the case of new municipalities created later in time by breaking one historical municipality, I projected back in time the new municipalities by attributing to each a share of the establishments and employees of the historical municipality using the new municipalities' population as weights. Suppressed municipalities could then be removed from the dataset. The result is a longitudinal dataset of 8,072 municipalities and 30 sectors for six census years, for a total of 1,598,256 observations.[8] However, for the purposes of this chapter I will focus on sectors in manufacturing proper (15 sectors), which reduces the number of relevant observations to 726,480.

Figure 5.2 shows the distribution of industrial establishments and their employees across all 15 manufacturing sectors, by year, in natural logarithms. Municipalities without any industrial establishment are represented by the logarithm of 0.1 for computational reasons (i.e. -2.3 on the graph), even though the whole analysis will be performed on untransformed values (see section 5.4.2). The graphs show that the vast majority of municipalities had at least one industrial establishment throughout the 1951-2001 period. The centre of the distribution did not shift significantly over time (the median municipality had

Territoriali—, which was available at the website https://www.istat.it/it/archivio/48427 (last retrieved January 2019). The website appears offline since 2020, but a legacy list can be downloaded from the independent website *Storia dei Comuni* available at the address http://www.elesh.it/storiacomuni/documentazione.asp (last retrieved January 2023). In addition, I have double checked the administrative changes for municipalities in ordinary regions from the *Gazzetta Ufficiale*, where the relevant government decrees were published (available on the *Normattiva* website at the address https://www.normattiva.it/, last retrieved January 2023), and from the independent website *Comuni e Città*, which among other information chronicles administrative changes for all Italian municipalities since 1861 (available at the address https://www.comuniecitta.it/). Residual changes were cross-checked on the individual municipalities' Wikipedia pages.

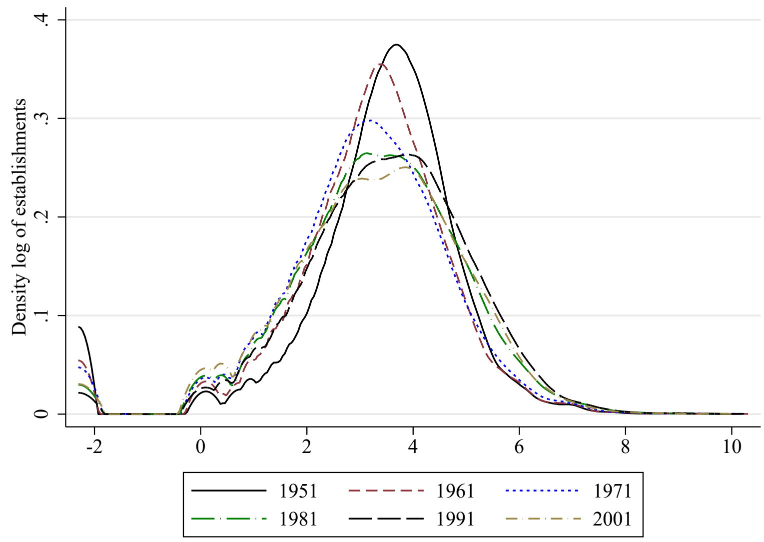
[8] It is important to note that by construction the Datawarehouse CIS only provided records for municipality-sector pairs for which the number of establishments was larger than zero for at lease one period. This means that the original number of records is only 1,065,150, due to the fact that some sectors were never present in some municipalities. Nonetheless, to exclude that this selection criteria might bias the estimates, I have extended the dataset to all possible municipality-sector pairs, setting the missing records equal to zero for all periods. This procedure allows to obtain a strongly balanced panel dataset.

35 establishments in 1951 and 29 in 2001), but its spread increased consistently and particularly since the 1970s, when the interquartile range increased by 36%. The distribution of the employees, instead, shows a clear shift to the right, with the median value doubling between 1951 and 2001 and 75% of the growth being recorded in the 1970s. The distribution became also considerably less concentrated, with the interquartile range increasing by over 50% between 1971 and 1981.

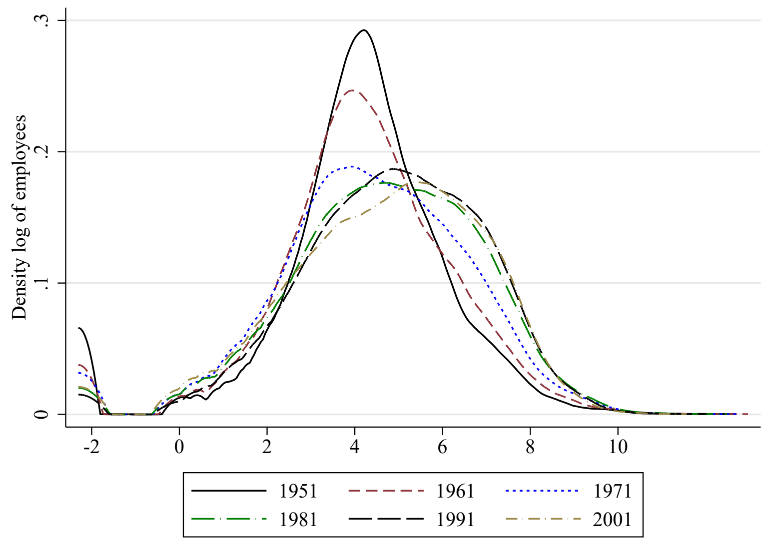
These dynamics summarize the evolution of the Italian industry that was described above. However, not all sectors followed the same pattern. Figures 5.11-5.13 show the kernel distribution separately for the 15 subsectors in the dataset, by year. The figures first suggest that the degree of spatial concentration varied significantly between sectors: those present in most municipalities were food and beverage, clothing and footwear, wood and wooden furniture and engineering; the most concentrated subsectors were the tobacco industry, paper and packaging and metalworking. The largest growth in terms of the median number of establishments was experienced by the engineering sector, while traditional sectors such as clothing and footwear shrank over time, particularly after 1971. The number of employees (reported in figures 5.14-5.16) show a similar evolution, even though the distribution was considerably more spread in the case of smaller sectors. Given the different spatial concentration and evolution over time, the analysis will account for potential heterogeneity between subsectors.

5.3.2 Time-varying control variables and local labour markets

Industrial censuses are the most complete sources of information on the evolution of manufacturing activities in the long run, but they provide only a limited range of details on local labour markets. A separate but comparable source of additional historical information are the population censuses, which were conducted with the same frequency as their industrial counterpart but addressed households rather than firms. The population censuses queried individuals on a



(a) Establishments



(b) Employees

Figure 5.2: MUNICIPALITY DISTRIBUTION OF INDUSTRIAL ESTABLISHMENTS AND EMPLOYEES

Kernel density distribution of the manufacturing establishments and employees in 8,072 municipalities, across 15 industrial sub-sectors, by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.

broad range of subjects, including their demographic characteristics, educational level, and occupational status, among other traits. Economic historians have long compared and combined these two sources, both to complement and correct the information conveyed by each—for a notable discussion on an earlier period, see Fenoaltea (2015) and Zamagni (2016).

As in the case of the industrial censuses, however, population censuses cannot be directly used for historical comparisons due to the microdata being missing prior to 1971 and changes to the design of the questionnaires. Nonetheless, as in the case of the industrial census, Istat has harmonized the responses to a subset of the questions to allow historical comparability since 1951. The resulting dataset, which is provided at the municipality level, has been published online on the platform *8milaCensus*, available at the address https://ottomilacensus.istat.it/ (last retrieved January 2023).

The full dataset contains 56,280 records pertaining to 8,148 municipalities for seven census years, from 1951 to 2011 (with ten-year intervals). For each municipality-year cell, the dataset provides information on 96 variables, which include information on the municipalities' population and other demographic characteristics, housing quality, education and information on the local labour market and economic structure. Of these, 22 variables are consistent across the whole period and include: For demographic variables, the size of the resident population in the municipality, the share of residents living outside of urban areas, the population density, the sex ratio (share of women over men), the aged (and child) dependency ratio is,[9] the aging index (the ratio of the population over 64 to the population under 15); Education variables include the secondary school gender gap (number of male per 100 female students) and the illiteracy rate (share of population over six with no literacy); Labour market variables include the participation rates (separately for men and women and total),[10] the employment rates,[11] and the share of people employed in each of four macrosectors (agriculture, industry, commerce, and other services). The dataset also includes the share of homeowning, i.e. is the ratio of the number

[9] Computed as the ratio of population over 64 (under 15) to the population between 15 and 64 years old

[10] Shares of the relevant active population over the resident population older than 10 years old (until 1961) and 15 years old (after 1971).

[11] Shares of relevant population with employment over the relevant total population

of houses owned by the occupiers over the total number of occupied houses.

As in the case of the Datawarehouse CIS, however, this dataset is not immediately usable for historical comparisons because the data is provided at historical borders—meaning that it requires similar adjustments. Using the same sources mentioned above, I have standardized municipality borders to their 1991 definitions, so to ensure compatibility with the harmonized Datawarehouse CIS. The result is a dataset of 8,072 municipalities for six years (at ten-year intervals from 1951 to 2001), totalling 48,432 observations. This dataset was then merged one-to-many to the dataset obtained from the Datawarehouse CIS (which has one additional dimension due to the sectoral disaggregation). I was able to match between 7,940 municipalities for the year of 1951 (98.4% of the municipalities) and 8,070 municipalities (99.98%) for the year 2001, possibly due to some missing data in either repository.

Table 5.1 presents the summary statistics of the merged dataset. The number of establishments and employees is calculated across all 18 manufacturing sectors. The summary statistics are line with the known trends of the Italian society and economy. In particular, the demographic variables capture changes in fertility and mortality over the decades, with the aging index jumping from 42 elders for 100 children in 1951 to 183 in 2001, and the mean family size decreasing from 4.12 to 2.53. The variables on education capture improvements in human capital, with illiteracy dropping from 12.4% to 1.7% in fifty years, and the number of females in secondary education closing the gap with males (Reyneri, 1996, pp. 113-119). The female participation rate decreased during the 1950s but increased in the following decades. However, this was not sufficient to compensate for the declining male participation rate, which dropped from 83% to 59% as greater shares of men stayed longer in education and retired earlier (Pugliese and Rebeggiani, 2004, pp. 87-96). Finally, the variables on the occupational structure show that employment in the manufacturing sector peaked sometime between 1971 and 1981, while the share in agriculture decreased and the share in services increased continuously between 1951 and

2001—which is in line with recent reconstructions that use other sources, such as those by Giordano and Zollino (2015).

Table 5.1: SUMMARY STATISTICS OF INDUSTRIAL AND POPULATION CENSUS DATA BY YEAR

	(1) 1951 mean	sd	(2) 1961 mean	sd	(3) 1971 mean	sd	(4) 1981 mean	sd	(5) 1991 mean	sd	(6) 2001 mean	sd
Establishments	125.62	790.60	178.82	1,156.02	219.17	1,405.17	280.37	1,533.65	284.84	1,534.01	348.73	2,231.86
Employees	412.72	4,347.23	604.29	6,271.17	702.82	7,394.32	877.88	8,058.77	937.94	8,218.71	1,054.28	9,113.87
Population	6,521.65	35,556.29	6,702.86	39,480.74	6,744.66	45,810.22	7,017.75	45,463.29	7,035.77	42,545.62	7,057.06	39,835.95
Share rural pop	31.20	25.45	28.19	24.32	23.29	22.19	20.66	20.65	19.03	19.45	18.03	18.64
Pop. density	203.41	358.60	215.01	443.15	236.75	556.47	257.64	622.36	267.98	622.61	277.83	619.21
Sex ratio	98.56	7.45	98.82	7.15	98.48	6.80	97.09	6.49	96.54	6.22	96.46	6.08
Share pop under six	10.98	2.87	9.37	2.76	8.92	2.45	6.87	2.05	5.55	1.70	5.19	1.35
Aged dependency ratio	13.02	4.06	16.38	5.48	22.00	8.27	26.43	11.30	28.18	12.18	33.54	13.56
Child dependency ratio	35.11	8.99	34.02	10.12	36.27	9.92	31.10	7.61	22.80	6.10	20.63	4.51
Aging index	42.04	24.59	56.11	35.89	71.13	52.04	99.10	82.25	144.49	119.77	183.39	155.74
Mean family size	4.12	0.69	3.71	0.55	3.37	0.47	2.96	0.39	2.74	0.37	2.53	0.31
Share homeowning	55.84	20.72	62.11	18.50	68.76	15.88	73.31	12.28	76.86	9.13	77.30	7.18
Sec. school gender gap	199.15	136.45	172.04	88.80	151.98	66.74	125.94	41.25	108.92	24.24	104.12	16.36
Illiteracy rate	12.37	11.41	8.39	8.00	5.78	6.15	3.54	4.09	2.52	3.14	1.66	2.13
Male participation rate	83.25	4.22	75.43	5.09	71.97	6.49	66.80	7.55	64.11	6.55	59.41	7.01
Female participation rate	28.16	16.17	25.15	13.62	27.06	10.08	32.36	8.11	33.86	6.95	36.04	7.59
Tot participation rate	55.42	8.60	50.07	7.58	49.16	6.58	49.17	6.73	48.60	5.97	47.42	6.91
Male employment rate	80.09	5.27	73.97	5.74	69.63	7.22	60.04	10.37	55.95	10.16	55.05	9.09
Female employment rate	26.39	15.79	24.57	13.60	25.61	10.12	26.47	8.56	27.02	8.66	31.44	9.34
Tot employment rate	52.96	8.71	49.05	7.82	47.27	6.98	42.85	8.65	41.12	8.89	42.94	8.93
Share in agriculture	56.78	24.09	43.12	22.60	30.28	19.81	22.44	18.61	14.17	12.25	10.05	9.15
Share in manufacturing	28.01	20.15	37.58	19.41	43.46	17.60	44.30	15.33	38.66	14.12	37.28	12.48
Share in commerce	7.32	5.42	11.86	6.39	15.45	7.40	24.13	9.74	30.46	10.09	34.65	9.45
Share in other service	7.89	4.93	7.43	4.65	10.82	5.69	15.78	6.44	16.70	5.71	18.01	5.47
North-West	0.37	0.48	0.37	0.48	0.38	0.48	0.38	0.48	0.38	0.48	0.38	0.48
North-East	0.18	0.39	0.18	0.39	0.18	0.39	0.18	0.39	0.18	0.39	0.18	0.39
Centre	0.13	0.33	0.13	0.33	0.12	0.33	0.12	0.33	0.12	0.33	0.12	0.33
South	0.22	0.42	0.22	0.42	0.22	0.42	0.22	0.42	0.22	0.42	0.22	0.42
Islands	0.09	0.29	0.09	0.29	0.09	0.29	0.09	0.29	0.09	0.29	0.09	0.29
Municipalities	7940		7953		8018		8052		8063		8070	

Sources: own elaborations on data from Datawarehouse CIS and *8milaCensus* (see text for references). Establishments and employees are aggregated over 15 manufacturing sectors. The number of municipalities because of failed matching for a small number of municipalities between the Datawarehouse CIS and *8milaCensus* (failed matches range between 1.6% and 0.2% of the municipalities depending on the year).

5.3.3 Establishments and employees by size class

The Datawarehouse CIS remains, as far as I am aware, the only electronic resource to allow historical comparisons of the industrial censuses since 1951 with constant sectors at the municipality level. However, the Datawarehouse only provides information on the number of establishments and the number of employees in the municipalities. A further disaggregation of the data by establishment size is provided instead by another electronic resource, the *Atlante Statistico dei Comuni*, originally published in CD-ROM format by Ferrara and Basso (2006) and updated until the third edition of 2013 as a downloadable application.[12]

It is important to note that the data in the *Atlante* is not directly comparable with that of the Datawarehouse CIS because the new source applied a more recent sectoral classification (up to five digits) and more modern definitions of the units of analysis.[13] Moreover, the dataset only included information since the census of 1971, thus preventing comparisons with previous years. Hence, the two analyses should be compared qualitatively, rather than quantitatively. However the repository allows to perform intertemporal comparisons of the data at constant 2001 borders, hence it does not require further spatial reclassification.[14]

In order to explore the heterogeneity of the effect by firm size, I have extracted from the *Atlante*'s application all data for a range of sub-sectors that can be matched with the wage data The resulting dataset includes information

[12]The third edition of the *Atlante* was distributed in application format, to be downloaded and installed for offline use. The application was available for download at the address `https://www4.istat.it/it/archivio/113712` (last retrieved January 2023). However, the application can no longer be downloaded since the publication of the fourth edition (2019), which is an online platform available at the address `https://asc.istat.it/ASC/` (last retrieved January 2023). The fourth edition only contains the data from the industrial census of 2011. Nonetheless, the application containing the database of the third edition can still be obtained by writing to Istat's Contact Centre at the following address `https://contact.istat.it/s/?language=it` (as of January 2023).

[13]The dataset from the *Atlante Statistico* records a marginally smaller number of employees (circa 5% on average between 1971 and 1981) but the difference is larger with respect to the number of establishments (circa 20%), possibly also due to my narrower choice of sectors for matching purposes.

[14]See the metadata section in the application under the menu *metadati* → *Censimento generale dell'industria e dei servizi 1971-81-91-2001* → *Confronto censimenti*.

on manufacturing establishments in 8,101 municipalities for 16 sub-sectors and twelve size classes in 1971, 1981, 1991 and 2001. Size was defined according to the number of workers employed in each establishment. Hence, the dataset allows to know, for each municipality-sector cell, how many establishments employed: one worker, two workers, between three and five, between six and nine, 10-19, 20-49, 50-99, 100-199, 200-499, 500-999, and over 1000 workers.[15] In addition, the dataset allows to know how many workers were employed in total by all establishments in each size class. Due to the availability of wage data only for 1971 and 1981, I will limit the analysis to the short term effect of raising the minimum wage in each sector, using instead the data from the Datawarehouse CIS for long-term analysis (see the identification strategies in section 5.4).

Table 5.2 presents the breakdown of the number of establishments by sector, size class and year for 16 manufacturing sectors. The table shows that the total number of establishments increased significantly between the two periods (+21.5%), but not equally across all size classes and sectors. The number of establishments increased particularly among those employing beteween six and nine (+50.4%) and ten and nineteen workers (+66%), while the number of establishments employing over 1000 workers decreased (-5.3%). Overall, only two sectors lost establishments: clothing and footwear (-9%) and oil refinery (-8.4%). In the former case, this was due especially to the loss of establishments at the tails of the distribution (under 5 and over 1,000 employees), while in the latter case the whole sector shrank.

[15] The censuses registered also establishments without any employee, which applied to establishments that were 'temporarily inactive at the time of the census or whose employees worked mostly in another establishment of the same firm' (Istituto Centrale di Statistica, 1976b, p. viii). Since the cause and length of the inactivity cannot be known, and this situation only affects 702 observations (less than 0.3% of the total), I exclude these cases from all computations.

Table 5.2: Summary statistics: Establishments by sector and size

Year	Sector	1-5	6-9	10-19	20-49	50-99	100-499	500-999	1000+	All
1971	Paper and packaging	1,285	625	676	534	182	165	18	2	3,487
1971	Chemicals	2,952	750	828	739	332	350	52	28	6,031
1971	Printing and publishing	8,722	1,904	1,341	690	230	160	9	9	13,065
1971	Food and beverage	44,040	4,785	3,041	1,916	577	440	34	10	54,843
1971	Textiles	48,148	3,286	3,576	2,540	1,038	895	84	19	59,586
1971	Oil	149	90	120	112	20	37	9	2	539
1971	Rubber	4,737	276	218	184	71	85	9	11	5,591
1971	Plastics	3,620	1,029	957	613	243	141	7	2	6,612
1971	Non-metallic minerals	14,313	3,132	2,633	2,163	721	452	29	7	23,450
1971	Chemical fibres	14	5	7	3	4	12	8	18	71
1971	Metallurgy and metal carpentry	57,739	6,840	5,060	3,118	1,088	741	64	43	74,693
1971	Wood and wooden furniture	87,800	6,103	4,199	2,233	720	260	6	2	101,323
1971	Engineering and transport vehicles	31,875	4,832	4,410	3,569	1,514	1,400	183	160	47,943
1971	Leather and hide	4,457	877	774	378	115	60	2	0	6,663
1971	Clothing and footwear	82,640	3,657	4,122	2,626	938	677	36	10	94,706
1971	Other industries	6,874	1,065	837	475	137	83	6	1	9,478
1971	Total	399,365	39,256	32,799	21,893	7,930	5,958	556	324	508,081

Year	Sector	1-5	6-9	10-19	20-49	50-99	100-499	500-999	1000+	All
1981	Paper and packaging	2,088	774	936	487	162	172	19	2	4,640
1981	Chemicals	3,629	1,079	1,123	816	358	405	65	28	7,503
1981	Printing and publishing	15,328	2,755	2,259	846	242	171	8	12	21,621
1981	Food and beverage	45,658	6,045	3,867	2,008	635	523	38	11	58,785
1981	Textiles	58,692	5,479	5,610	2,719	940	739	39	7	74,225
1981	Oil	117	74	116	109	37	26	14	1	494
1981	Rubber	5,675	477	472	282	100	85	7	14	7,112
1981	Plastics	7,715	1,883	1,781	852	271	175	8	1	12,686
1981	Non-metallic minerals	17,030	3,510	3,182	2,191	703	481	30	6	27,133
1981	Chemical fibres	32	15	19	14	22	26	10	9	147
1981	Metallurgy and metal carpentry	74,219	10,844	9,279	4,020	1,176	808	72	41	100,459
1981	Wood and wooden furniture	96,332	7,636	5,874	2,588	688	252	5	0	113,375
1981	Engineering and transport vehicles	51,291	8,581	8,444	4,854	1,871	1,753	231	166	77,191
1981	Leather and hide	7,790	1,571	1,368	522	129	72	1	0	11,453
1981	Clothing and footwear	64,472	7,014	9,044	3,847	1,110	626	25	8	86,146
1981	Other industries	11,199	1,298	1,052	444	121	66	3	1	14,184
1981	Total	461,267	59,035	54,426	26,599	8,565	6,380	575	307	617,154

5.3.4 Linking municipalities with wage zones and contractual minimum wages

In order to estimate the effect of the egalitarian wage push on manufacturing firms and employment, it is necessary to match the municipality-industry cells with contractual wage data or relevant proxies. Collective agreements established minimum wage rates for blue-collar workers according to fixed scales, which depended on the complexity of the tasks performed on the job. In addition, until 1968 the nominal minimum wages differed between provinces according to their classification into different wage zones.

Hence, the first step consisted in linking municipalities to their respective wage zone according to the provinces' borders around 1968. This required to merge provinces that were created after 1968,[16] and then to assign each province to a wage zone and scaling coefficient. The resulting dataset assigned municipalities to seven wage zones and 14 scaling coefficients—the number of coefficients being higher than the number of zones due to exceptions in the scaling system. A complete list of the wage zones and coefficients by province is provided in Table 4.3. This matching allows to implement the two DiD strategies with the dataset built from the Datawarehouse CIS.

In addition, the data from the *Atlante Statistico* could be matched to the nominal minimum wage for low-skill blue-collar workers in each sector, after combining together multiple sub-sectors. A detailed description of the sources of the minimum wage data is provided in section A.1. To harmonize the wage data with the sectoral classification from the *Atlante Statistico* I followed the criteria presented in Table 5.3. Consequently, the number of establishments and employees, for each size class, is aggregated into 16 sectors, which account for over 99% of both establishments and employees in the manufacturing sector proper (i.e. not considering construction, utilities and mining). The residual category ('other industries') accounts for fewer than 1.9% of establishments and 1.5% of employees.

5.4 Identification and estimation

5.4.1 Difference-in-Differences approaches

The standard approach to the estimation of average treatment effects in a longitudinal setting such as the one presented in this paper would apply a two-

[16] Provinces created after 1968 include Pordenone (aggregated back to Udine), Isernia (to Campobasso), Oristano (to Cagliari), Biella (to Vercelli), Lecco (to Como and Bergamo), Lodi (to the province of Milan), Monza and Brianza (to Milan), Prato (to Florence), Crotone and Vibo Valentia (to Catanzaro), and Verbano-Cusio-Ossola (to Novara).

Table 5.3: MATCHING BETWEEN MINIMUM WAGES AND ATLANTE STATISTICO

N	Wage sectors	Census codes (Ateco 3)
1	Food & beverage	151-159
2	Textiles	171-177
3	Clothing & footwear	181-183, 193
4	Leather & hide	191-192
5	Wood & wooden furniture	201-205, 361
6	Paper & packaging	211, 212
7	Printing & publishing	221-223
8	Oil	232
9	Chemicals	241-246
10	Artificial fibres	247
11	Rubber	251
12	Plastics	252
13	Non-metallic minerals	261-268
14	Metallurgy & metal carpentry	271-275, 281-287
15	Engineering and transport vehicles	291-297, 300, 311-316, 321-323, 331-335, 341-343, 351-355
16	Other industries	362-366

Matching between minimum contractual wages and census data from *Atlante Statistico*. Three-digit sectors in the census dataset (selection of manufacturing proper). For sources see text and section A.1.

way fixed effect estimator, using a typical specification such as in Equation 5.1. Here, the outcome variable y in municipality j for sector i at time t is a function of the the minimum wage in province J at time t (where the municipality j is located in province J), controlling for a vector of time variant characteristics $\mathbf{X}$, municipality fixed effects μ and sector fixed effects θ (which absorb the unobserved time-invariant heterogeneity), and year fixed effects τ (which control for common shocks).

$$y_{jit} = \alpha + \beta W_{Jit} + \gamma \mathbf{X}'_{ijt} + \mu_i + \theta_j + \tau_t + \eta_{jit} \qquad [5.1]$$

However, this specification can have a limited application in this chapter. First, the historical sources that I have been able to locate do not allow to reconstruct minimum industrial wages at the province level for 1951 and after 1981 at census years, effectively limiting the time range of our analysis to three periods with the Datawarehouse CIS and two using the *Atlante Statistisco*. Second, the recent econometric literature has cautioned against the use of two-way fixed effect estimators due to the strong assumptions implicit in the methodology. These cautions apply most explicitly to event-study designs where treatment happens at different points in time (i.e. staggered treatment), which is not our case. Nonetheless, a more robust identification strategy can be applied, which hinges on the abolition of the wage zone system.

Until 1968, minimum wages differed between provinces depending on the scaling coefficients that had been established in 1954 (and revised in 1962). Their abolition between 1968 and 1972, then, implied that provinces with a lower starting coefficient would experience a proportionally steeper increase in minimum contractual wages across all sectors. This exogenous source of spatial variation that was identical for all sectors can be exploited in a Difference-in-Differences setting by interacting the wage zone coefficient with a binary variable that switches from zero to one after 1968.

Equation 5.2 provides the relevant specification. The term in brackets represents the difference (in percentage points) between the wage zone coefficient in Milan (set to 100) and in province J, according to the 1962 agreements. This difference is interacted with a binary variable that switches from zero to 1 after the abolition of the wage zones. $\bar{X}$ represents the vector of pre-treatment controls (averaged over 1951 and 1961), interacted with a time trend—which ensures against the risk of bad controls, given that some of the variables included might also be influenced by the treatment. The fixed effects are defined as above. The specification thus takes the following form:

$$y_{jit} = \alpha + \delta[100 - C_{Jt}] * Post_{1968} + \gamma \bar{\mathbf{X}}'_{jiT<1971} * Year_t + \mu_i + \theta_j + \tau_t + \epsilon_{jit} \quad [5.2]$$

Under the assumptions of DiD designs with continuous variables, the δ coefficient would recover the causal response of the outcome variable to a marginal raise of the minimum wage rate in the municipality-sector cell.

The specification can then be augmented with region or macroregion trended fixed effects (i.e. fixed effects interacted with the time trend) to control for heterogeneous pre-treatment trends, which has become customary in minimum wage studies with a similar research design.

Under the assumption that municipalities with marginally lower increases in minimum wage rates are a reasonable control group for those marginally higher, this identification strategy would thus allow to recover the average treatment effect of raising the minimum wage rate after 1968, across the next three decades. However, it is plausible that the response changed over time as the shock was exhausted by 1972. Hence, to better observe the dynamic effect of the treatment over the long run it is possible to estimate a flexible specification where the term in brackets is interacted with a time indicator, according to equation Equation 5.3.

$$y_{it} = \sum_{y=1951}^{2001} \psi_y [100 - C_{it}] * 1(Year = y) + \rho \bar{\mathbf{X}}'_{jiT<1971} + \tau_t + \alpha_{ij} + \zeta_{ijt} \qquad [5.3]$$

This specification estimates five time-specific coefficients ψ which capture the effect relative to the pre-treatment period in each census year y (the coefficient for 1961 is set to zero by construction). The coefficients in 1971, 1981, 1991 and 2001 thus capture the short, medium and long term response of the outcome variables to the shock of 1968-1972. Moreover, the coefficient for 1951 acts as a check for the validity of the design, for we expect to find no significant effect in this period, after including the set of fixed effects and the vector of controls.

5.4.2 Handling zero-valued outcomes and skewed distributions

In our main analysis the dependent variable is the total number of manufacturing establishments in the municipality. It is important to note that this variable shows a distribution that is not appropriately handled by canonical linear models (such as OLS). First, the number of establishments and employees are non-negative count variables with a mass on zero, meaning that many municipalities have no manufacturing establishment at any given time in all industries. In fact, only 52% of the records in the dataset (municipality-sector-year triples) are non-zero. This is a feature of the data generating process, not the product of some censoring, and should be handled accordingly in the estimation. Second, these distributions are skewed to the right due to long tails of municipalities with large number of establishments and/or employees in each industry.

The traditional approach with such distributions consists in log-transforming the variable by adding a small fixed constant to the zero value or, alternatively, compute the arcsinh of the outcome variable. These transformations ensure that the value of the variable is defined at zero and is well-behaved for non-zero values, but recent research has shown that both transformations can arbitrarily bias the magnitude of the estimated average treatment effect and prevent its interpretation as a percentage change (Aihounton and Henningsen, 2021; Cohn, Liu, and Wardlaw, 2022; Mullhay and Norton, 2022; Chen and Roth, 2022).

To handle these features, it is suggested to use a Poisson conditional-fixed-effect quasi-maximum likelihood estimator on the un-transformed variables instead of using OLS after log-transformation, for the Poisson QMLE is found to consistently estimate the marginal effects (Motta, 2019; Mullhay and Norton, 2022, pp. 19-20; Chen and Roth, 2022, p. 12). In fact, the Poisson QMLE provides consistent estimation of conditional mean parameters even with non-Poisson distributions (Wooldridge, 2010, pp. 724-736), which suggests to choose it over alternative negative binomial count models even in the case of overdispersion, as negative binomial count models have been found to underperform in similar settings (Mullhay and Norton, 2022, pp. 20).

5.5 Results

5.5.1 Average effect on manufacturing establishments

We start the analysis by estimating the average treatment effect of abolishing the wage zones (our favourite proxy for the minimum wage increase) on the number of manufacturing firms, following the specification in Equation 5.2. The regressor of interest is the difference between the wage coefficient in Milan and in each municipality, interacted with an indicator taking value one if the year is greater than 1968. The control variables include demographic characteristics (population size, population density, sex ratio, aged and child dependency ratio, mean family size), education (illiteracy rate), labour market variables (male and female participation rate) and the local economic structure (share employed in agriculture, manufacturing and commerce). All controls are trended pre-treatment averages.To avoid the issue of zero-valued outcomes, in the first set of estimates I use as dependent variable the untransformed number of establishments and estimate the regression by Poisson pseudo-maximum likelihood.[17]

Table 5.4 presents the results under different sets of controls. The estimate reported in column 1 includes the municipality-sector fixed effects (i.e. unit-level fixed effect) and the year fixed effects; column 2 uses the same set of fixed effects as column 1 but introduces the full set of pre-treatment trended controls; columns 3 and 4 include region-specific time trends (respectively, linear and quadratic); columns 5 and 6 include macroregion-specific time trends.[18]

[17]The estimation is performed using Correia, Guimarães, and T. Z. Zylkin (2020). The number of observations is lower than the total in the dataset due the programme's automatically handling the 'separation' problem with count models by dropping observations that are uninfluential for the estimation. Dropping the observations ensures the existence of the maximum likelihood solution, the model's convergence, and the correct estimate of the standard errors (Correia, Guimarães, and T. Zylkin, 2019). The results presented in the paper use the default option in the programme, which uses a combination of rules for identifying the separated observations. For robustness, I have also run the estimation with the option `separation(none)` which retains all observations (not reported). In this latter case, the model converges after circa 15 or 20 iteration (as opposed to circa 9 without the option) and both the point estimates and the standard errors for the regressor of interest remain unaffected.

[18]In the dataset there are twenty regions and five macro-regions (North-West, North-East, Centre, South and Islands).

Standard errors are double-clustered both at the municipality-sector (i.e. unit) level to avoid serial autocorrelation, and at the province level to allow for spatial autocorrelation within the province.

The results find that the coefficient for the interaction term is negative and statistically significant across all specification, meaning that municipalities located in wage zones with a larger gap with respect to Milan show a lower firm count after 1971. The effect is also economically significant: increasing the original minimum wage gap with respect to Milan by ten percentage points (the mean value in the dataset) is associated with 19.4% fewer manufacturing establishments after 1969, according to the specification with the full set of controls, and 17.7% in the fully saturated model with linear region or macro-region trends, on average across the period 1971-2001.[19]

[19] The decrease in the expected number of establishments for a ten percentage-point increase in the minimum wage gap is computed as $\{100 * [exp(\hat{\delta} * 10) - 1]\}$, where $\hat{\delta}$ is the estimated coefficient (Wooldridge, 2014, p. 484).

Table 5.4: The repeal of wage zones for manufacturing establishments

	number of establishments					
	(1)	(2)	(3)	(4)	(5)	(6)
Gap Milan$_{1968}\times$	-0.0202***	-0.0214***	-0.0198***	-0.0195***	-0.0195***	-0.0202***
Post$_{1968}=1$	(0.0047)	(0.0035)	(0.0030)	(0.0032)	(0.0031)	(0.0032)
Population		-0.0011	-0.0097	-0.0079	-0.0051	-0.0044
$\times$ Time trend		(0.0072)	(0.0062)	(0.0064)	(0.0069)	(0.0070)
Pop. density		0.0183**	0.0288***	0.0283***	0.0269***	0.0254***
$\times$ Time trend		(0.0085)	(0.0056)	(0.0059)	(0.0063)	(0.0065)
Sex ratio		0.3480***	0.2400***	0.2845***	0.3300***	0.3593***
$\times$ Time trend		(0.0947)	(0.0827)	(0.0860)	(0.0967)	(0.0977)
Aged dependency		-0.1616***	-0.2076***	-0.2045***	-0.1554***	-0.1588***
ratio $\times$ Time trend		(0.0317)	(0.0262)	(0.0268)	(0.0272)	(0.0279)
Child dependency		0.0357	0.1043***	0.0614*	0.0903***	0.0667**
ratio $\times$ Time trend		(0.0312)	(0.0324)	(0.0356)	(0.0338)	(0.0336)
Mean family size		0.1474***	0.1245**	0.1455***	0.0888*	0.1046*
$\times$ Time trend		(0.0496)	(0.0486)	(0.0554)	(0.0529)	(0.0543)
Illiteracy rate		-0.0103	-0.0358***	-0.0356***	-0.0151	-0.0200
$\times$ Time trend		(0.0096)	(0.0102)	(0.0101)	(0.0132)	(0.0130)
Male		0.4747***	0.4319***	0.4855***	0.4250***	0.4587***
participation rate $\times$ Time trend		(0.1158)	(0.0935)	(0.1000)	(0.1140)	(0.1133)
Female		0.0195**	0.0223***	0.0231***	0.0248**	0.0258***
participation rate $\times$ Time trend		(0.0085)	(0.0084)	(0.0085)	(0.0098)	(0.0097)
Share employed		0.0700***	0.0689***	0.0727***	0.0694***	0.0711***
in agriculture $\times$ Time trend		(0.0106)	(0.0086)	(0.0091)	(0.0098)	(0.0099)
Share employed		0.1539***	0.1356***	0.1449***	0.1472***	0.1509***
in manufacturing $\times$ Time trend		(0.0137)	(0.0110)	(0.0115)	(0.0119)	(0.0122)
Share employed		0.0537***	0.0456***	0.0471***	0.0475***	0.0495***
in commerce $\times$ Time trend		(0.0133)	(0.0110)	(0.0112)	(0.0136)	(0.0136)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Munic. x Sect. FE	Yes	Yes	Yes	Yes	Yes	Yes
Region trend FE	No	No	Linear	Quadratic	No	No
Macroreg. trend FE	No	No	No	No	Linear	Quadratic
Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.8740	0.8793	0.8802	0.8801	0.8796	0.8795
N	453,287	453,137	453,137	453,137	453,137	453,137

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The table presents the coefficients estimated through Poisson QMLE from the model in Equation 5.2. Standard errors are two-way clustered at the unit (municipality-sector pair) and province level.

5.5.2 Dynamic response of manufacturing establishments

The previous section has found that municipalities that started with a larger wage gap with respect to Milan showed a lower count of manufacturing establishments after 1971. However, the specification did not allow to distinguish between short, medium and long term effects. It is possible, in fact, that the negative impact was short-lived, and affected municipalities recovered in later decades. If this is the case, the average treatment effect found in the previous section would underestimate the short-term effect and overestimate the long-term impact. To allow the effect to flexibly adjust over time we estimate the specification presented in Equation 5.3, including the full set of controls.

Figure 5.3a plots the estimates of the coefficients for the interaction term between the gap with respect to Milan and the time indicator. By construction, the coefficient for the pre-treatment period (1961) acts as reference point and is set equal to zero. The figure shows that municipalities that started with a larger gap with respect to Milan experienced a significant reduction in the count of manufacturing establishments already in 1971 (three years after the shock), and an even larger loss of establishments in 1981 (thirteen years after), relative to municipalities that started with a smaller gap. The relative loss was also economically significant: a ten percentage-point increase in the minimum wage gap was associated with a relative loss of almost 10% of the number of establishments in 1971 and 20% in 1981. The negative impact was partly absorbed in the long run, but in 2001 the relative loss was still circa 12%.

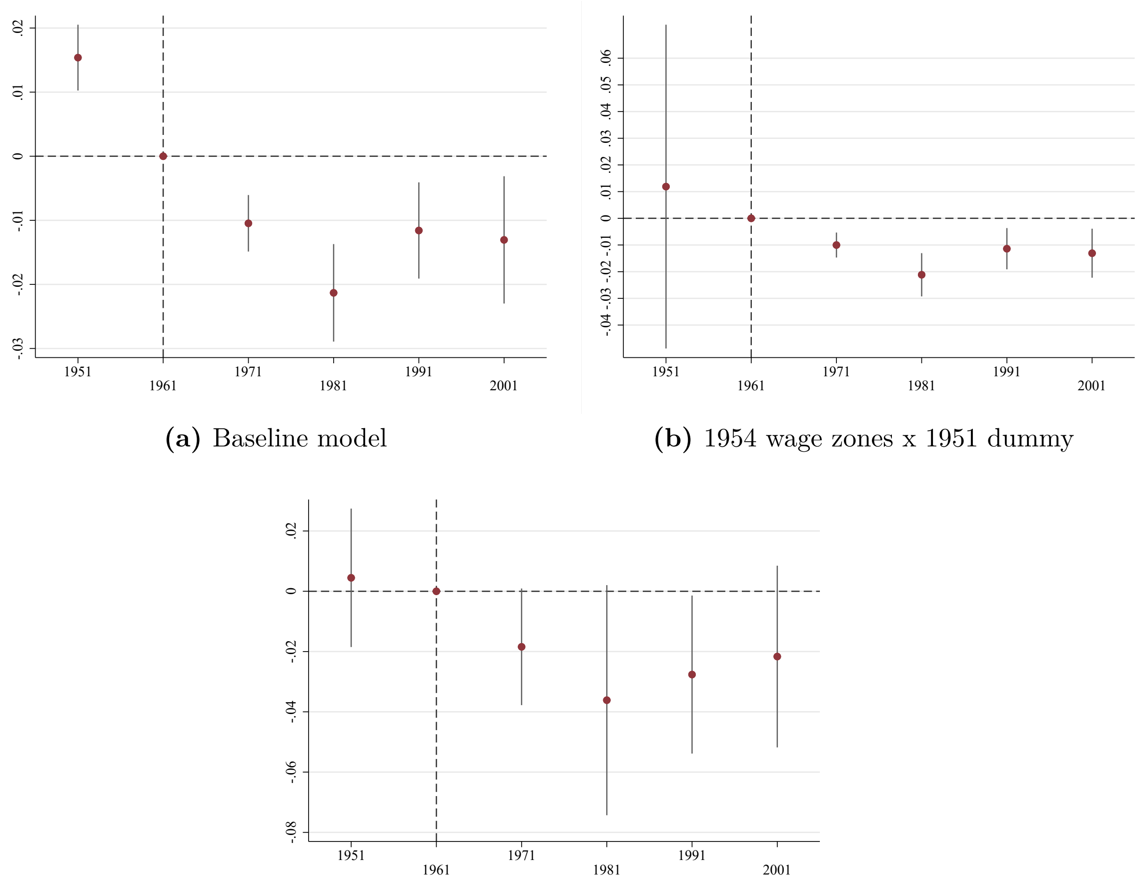
However, it is important to note that the coefficient for the year 1951 is positive and significantly different from zero. In a usual setting, where the treatment variable is supposed to be ineffective before the treatment period, this result would cast strong doubts on the exogeneity of the treatment. However, after further scrutiny, it appears that the positive coefficient is justified by previous reforms of the wage zone system, and that its statistical significance supports in fact our interpretation.

The wage zone system had originally been introduced in 1954, but with a greater number of wage zones (thirteen) than the version that would eventually be abolished in 1968. Counting also exceptions to the wage zones, the original system comprised 23 distinct provincial coefficients for scaling the collectively-bargained minimum wages.[20] The original system was simplified in 1962, when the number of wage zones was brought down to seven and the number of coefficients to fourteen. This implies that some provinces already experienced a one-off increase in the relative minimum wage before 1968. Hence, it is possible that the coefficient for 1951 captures this earlier and partial reform.

In order to test this hypothesis, I present two alternative estimations. Figure 5.3b shows the coefficients after including a control for the original wage zone system. The control is built by interacting the original 1954 wage zone classification with an indicator variable that takes value 1 if the year is 1951. This additional control does not modify the point estimates of the coefficients but it absorbs a large variation, which makes the coefficient on 1951 statistically insignificant.

Figure 5.3c, instead, includes an interaction term between the 1954 gap with respect to Milan and the time dummies. This additional interaction would thus filter out the potential bias introduced by the 1962 reform. The results confirm our hypothesis: after we control for the earlier reform, there is no association between the gap in 1968 and the count of establishments in 1951 (the coefficient is now close to zero and not statistically significant). Moreover, the coefficients for the post-treatment period differ from the baseline specification: the short and medium run effects are respectively 50% and 38% larger, while the recovery in the long-term is more accentuated. In fact, we cannot reject the null hypothesis that by 2001 the effect had disappeared. Moreover, the standard errors are larger for all periods in this specification, but this is to be

[20] See *Accordo Interconfederale 12 Giugno 1954 per il conglobamento e il riassetto zonale delle retribuzioni per i settori industriali*, 12 June 1954, and *Accordo integrativo dell'accordo interconfederale 12 giugno 1954*, 28 July 1954, both available for download from the CNEL repository of collective agreements at https://www.cnel.it/Archivio-Contratti/Accordi-Interconfederali (last retrieved January 2023).



(a) Baseline model

(b) 1954 wage zones x 1951 dummy

(c) 1954 wage gap x time dummies

Figure 5.3: Dynamic response of establishment count

Poisson QMLE estimates of the δ coefficients from equation 5.3 under different sets of controls. Panel a includes time and municipality-sector fixed effects and the common vector of pre-treatment trended controls; panel b adds an indicator for the wage zone assigned to the municipality under the 1954-1961 system interacted with a time indicator equal to one if the year is 1951; panel c substitutes this control with a continuous variable equal to the difference between Milan's coefficient and the municipality's under the 1954-1961 system, interacted with a full set of time dummies. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level. Number of observations is 452,213 in the first estimate, 437,789 in the second and 444,047 in the third.

expected considering the greater saturation of the model.

5.5.3 Effect on employees and average establishment size

The previous sections have shown that raising the contractual minimum wage (as proxied by the abolition of the wage zones) was associated with a lower number of establishments, especially in the short and medium term. Did this also translate in a lower count of industrial employees? To answer this question, I perform the same analyses as before, using the untransformed number of employees as dependent variable.

Table 5.5 presents the results for the usual DiD strategy (cf. Equation 5.2). The coefficient for the interaction term is positive in the first specification, but it appears that this is entirely driven by omitted variable bias. Once we include the full set of pre-treatment controls, the coefficient turns negative and statistically significant, even as we add regional and macroregional time trends (either linear or quadratic). The size of the effect is slightly smaller than for the number of establishments but still economically large: a ten-percentage-point larger gap with respect to Milan in 1968 predicts a lower number of employees ranging between 13% and 16.5%, on the whole period 1971-2001.

That our proxy for the minimum wage increase was associated with a lower number of employees is to be expected, given the large negative effect on the number of establishments. However, it appears that the reaction was stronger for the number of establishments than for the number of employees. This is confirmed by estimating the same model using the average establishment size (the ratio between the number of employees and the number of establishments in the municipality-sector cell) as dependent variable. Table 5.6 shows that the gap with respect to Milan predicts a greater number of employees per establishment after 1968. In particular, raising the gap by ten percentage points is associated with a 6.2%-10.5% greater establishment size after the repeal of the wage zone system.

The fact that the number of establishments responded more strongly to the wage shock than the number of employees might appear unexpected, for it implies that the main channel ran through the creation of firms, rather than through the hiring of workers. This could be explained either by heterogeneity in the response by establishment size—meaning that establishments with fewer employees were impacted by the shock more than large establishments—, or by a stronger recovery in the number of employees in the long run. The latter

Table 5.5: Wage zones' effect on industrial employees

	number of employees					
	(1)	(2)	(3)	(4)	(5)	(6)
Gap Milan$_{1968}\times$	0.034***	-0.015***	-0.017***	-0.016***	-0.014***	-0.018***
Post$_{1968}=1$	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Population		-0.014	-0.022***	-0.019**	-0.017**	-0.019**
$\times$ Time trend		(0.009)	(0.008)	(0.008)	(0.008)	(0.008)
Pop. density		0.020	0.037***	0.033***	0.024**	0.013
$\times$ Time trend		(0.012)	(0.009)	(0.010)	(0.011)	(0.010)
Sex ratio		0.790***	0.851***	0.910***	0.807***	0.195
$\times$ Time trend		(0.194)	(0.152)	(0.179)	(0.195)	(0.127)
Aged dependency		-0.039	-0.007	-0.003	-0.031	-0.206***
ratio $\times$ Time trend		(0.049)	(0.051)	(0.052)	(0.051)	(0.034)
Child dependency		0.089*	0.206***	0.121**	0.120**	-0.041
ratio $\times$ Time trend		(0.048)	(0.064)	(0.059)	(0.058)	(0.052)
Mean family size		0.150**	0.126**	0.123*	0.075	0.094
$\times$ Time trend		(0.059)	(0.063)	(0.067)	(0.062)	(0.076)
Illiteracy rate		-0.016*	-0.025**	-0.024**	-0.019	-0.015
$\times$ Time trend		(0.009)	(0.012)	(0.011)	(0.014)	(0.012)
Male		0.920***	-0.525	0.887***	0.884***	0.094
participation rate $\times$ Time trend		(0.149)	(0.443)	(0.133)	(0.141)	(0.132)
Female		0.004	0.012	-0.008	-0.006	-0.053***
participation rate $\times$ Time trend		(0.015)	(0.130)	(0.013)	(0.015)	(0.017)
Share employed		0.095***	0.094***	0.093***	0.088***	0.101***
in agriculture $\times$ Time trend		(0.013)	(0.016)	(0.015)	(0.014)	(0.013)
Share employed		0.007	0.028**	0.015	0.002	-0.032*
in manufacturing $\times$ Time trend		(0.013)	(0.014)	(0.014)	(0.014)	(0.016)
Share employed		0.049***	0.056***	0.047***	0.040**	-0.021
in commerce $\times$ Time trend		(0.015)	(0.016)	(0.015)	(0.016)	(0.018)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	No	No	No	No	No	No
Munic. x Sect. FE	Yes	Yes	Yes	Yes	Yes	Yes
Region time trend	No	No	Linear	Quadratic	No	No
Macroreg. time trend	No	No	No	No	Linear	Quadratic
Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.9167	0.9294	0.9302	0.9300	0.9295	0.9290
N	453,095	452,945	452,945	452,945	452,945	452,945

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The table presents the coefficients estimated through Poisson QMLE from the model in Equation 5.2. Standard errors are two-way clustered at the unit (municipality-sector pair) and province level.

Table 5.6: Wage zones' effect on average establishment size

	average establishment size					
	(1)	(2)	(3)	(4)	(5)	(6)
Gap Milan$_{1968}$ × Post$_{1968} = 1$	0.010***	0.008***	0.007***	0.009***	0.006***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Population × Time trend		-0.000	0.001	0.001	0.000	0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Pop. density × Time trend		-0.010***	-0.010***	-0.010***	-0.010***	-0.008***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sex ratio × Time trend		-0.094***	-0.066***	-0.100***	-0.058**	0.015
		(0.027)	(0.025)	(0.025)	(0.026)	(0.023)
Aged dependency ratio × Time trend		0.015	0.015	0.012	0.014	0.045***
		(0.011)	(0.010)	(0.010)	(0.011)	(0.009)
Child dependency ratio × Time trend		0.030*	-0.036**	-0.013	0.007	0.048***
		(0.016)	(0.016)	(0.016)	(0.019)	(0.018)
Mean family size × Time trend		-0.153***	-0.052***	-0.081***	-0.133***	-0.144***
		(0.025)	(0.020)	(0.023)	(0.026)	(0.028)
Illiteracy rate × Time trend		0.009**	-0.002	0.006	0.000	0.006
		(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Male participation rate × Time trend		-0.189***	-0.115	-0.139***	-0.153***	-0.023
		(0.038)	(0.082)	(0.034)	(0.037)	(0.025)
Female participation rate × Time trend		-0.007*	0.004	-0.005	-0.003	0.001
		(0.004)	(0.021)	(0.003)	(0.004)	(0.004)
Share employed in agriculture × Time trend		-0.049***	-0.046***	-0.046***	-0.047***	-0.051***
		(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
Share employed in manufacturing × Time trend		-0.047***	-0.036***	-0.040***	-0.043***	-0.040***
		(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Share employed in commerce × Time trend		0.017***	0.014***	0.015***	0.019***	0.026***
		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	No	No	No	No	No	No
Munic. x Sect. FE	Yes	Yes	Yes	Yes	Yes	Yes
Region time trend	No	No	Linear	Quadratic	No	No
Macroreg. time trend	No	No	No	No	Linear	Quadratic
Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.1149	0.1161	0.1163	0.1163	0.1161	0.1160
N	297,466	297,423	297,423	297,423	297,423	297,423

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The table presents the coefficients estimated through Poisson QMLE from the model in Equation 5.2. Standard errors are two-way clustered at the unit (municipality-sector pair) and province level.

explanation would imply that surviving establishments had greater capacity to grow. I test these alternative channels separately.

To check whether the number of employees recovered more quickly than the number of establishments, I estimate the flexible DiD in Equation 5.3, controlling also for the wage gap with Milan under the 1954-1962 system (interacted with the time dummies). As in the case of the establishments, municipalities that started with a larger wage gap in 1968 registered a lower number of industrial employees in 1971 but the coefficient bounces back and loses statistical significance in the medium and long term. It is also important to highlight that in this case the coefficient for 1951 is positive and statistically significant even after controlling for the old reform of the wage zone system. Including macroregion or region time trends does not significantly modify the point estimate. While the cause for this result is not clear, it reinforces our suspicion that the effect on the total number of employees might be also driven by some source of heterogeneity.

5.5.4 Heterogeneity by establishment size

To test the hypothesis that establishments of different sizes responded differently to the wage shock I turn to a different source, the *Atlante Statistico*, which provides information on the number of establishments and employees by size class. As previously described, this source only covers the census years since 1971, so it is not possible to replicate the same identification strategy as before. However, we can estimate the short-term effect of the minimum wage increase on the number of establishments and employees directly, with a two-way-fixed-effect estimator (see Equation 5.1). In this case, the dependent variable is the count ofemployees by establishment size, while the independent variable is the untransformed minimum wage for each municipality-sector cell in the years 1971 and 1981. The regression is estimated separately for each size class, controlling for the usual set of time-varying local characteristics (i.e. not the trended values, given the absence of a pre-treatment period), and separately time fixed effects, municipality fixed effects and sector fixed effects. As in previous estimates,

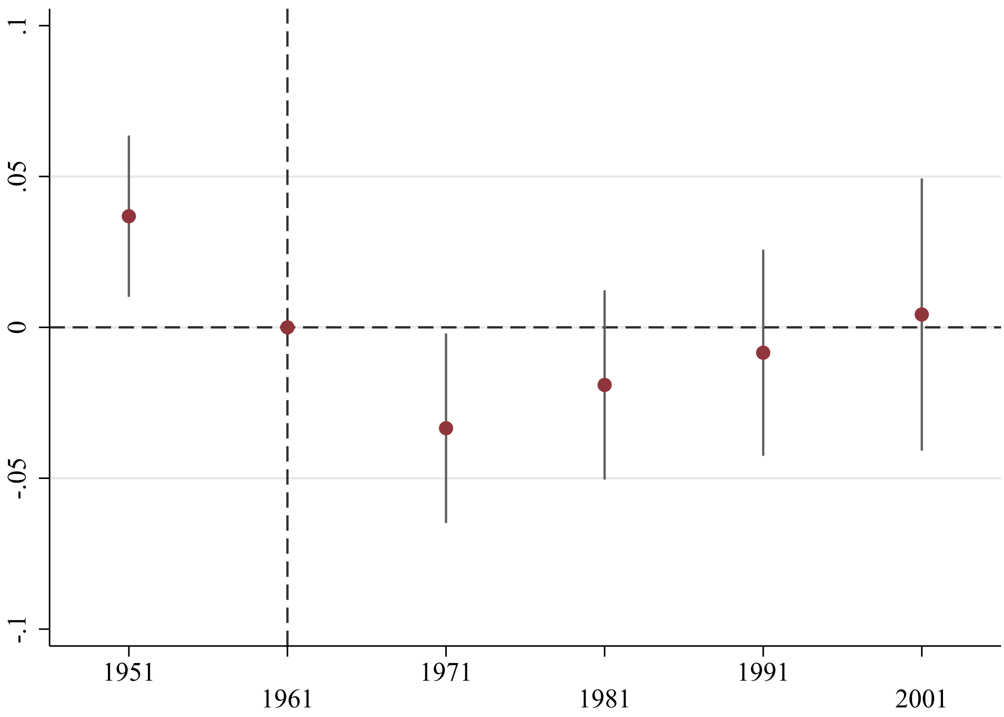


Figure 5.4: Dynamic response of employees count

Poisson QMLE estimates of the δ coefficients from equation 5.3 with the full set of pre-treatment trended controls and a continuous variable equal to the difference between Milan's coefficient and the municipality's under the 1954-1961 system, interacted with a full set of time dummies. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level. Number of observations is 443,861.

the confidence intervals are clustered both at the municipality-sector level and province level.

Figure 5.5 plots the estimated coefficients for the untransformed minimum wage (in thousands of current lire) on the number of manufacturing establishments, using Poisson QMLE. The results clearly point to heterogeneity in the response by size: the negative effect of the wage shock was particularly strong and statistically significant on establishments that employed between three and fifty employees. The coefficient are instead positive for smaller establishments (under three employees) and mildly positive for establishments between one hundred and one thousand employees, even though the estimate is statistically significant only for establishments in the 500-999 range. The coefficient turns

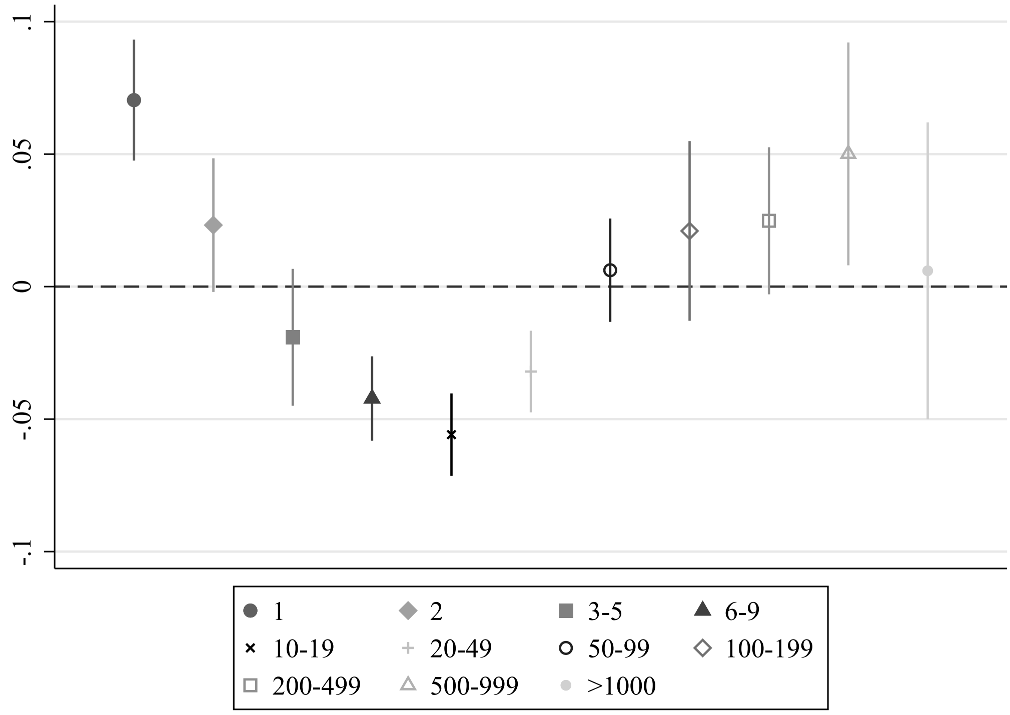


Figure 5.5: Short-term effect on establishments by size

Poisson QMLE estimates of the γ coefficients from equation 5.1 with the full set of time-varying controls, time fixed effects, sector fixed effects and municipality fixed effects. The coefficients are estimated from running separate regressions for each size class. The size class is reported in the legend and indicates the number of employees in the establishment. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level.

to zero and statistically insignificant for establishments over one thousand employees. Very similar results can be obtained from using the number of employees as dependent variable (see Figure 5.6).

These results allow to raise several points. First, the relatively small effect of the minimum wage hike that was identified in the previous DiD analyses masks significant heterogeneity by size. In fact, very small and medium-large establishments appear to partially compensate for the large negative impact on smaller ones. However, the fact that establishments under twenty workers accounted for a large share of manufacturing employment explains why the net effect remained negative and statistically significant. The second point concerns the positive effect on very small manufacturers (i.e. those employing

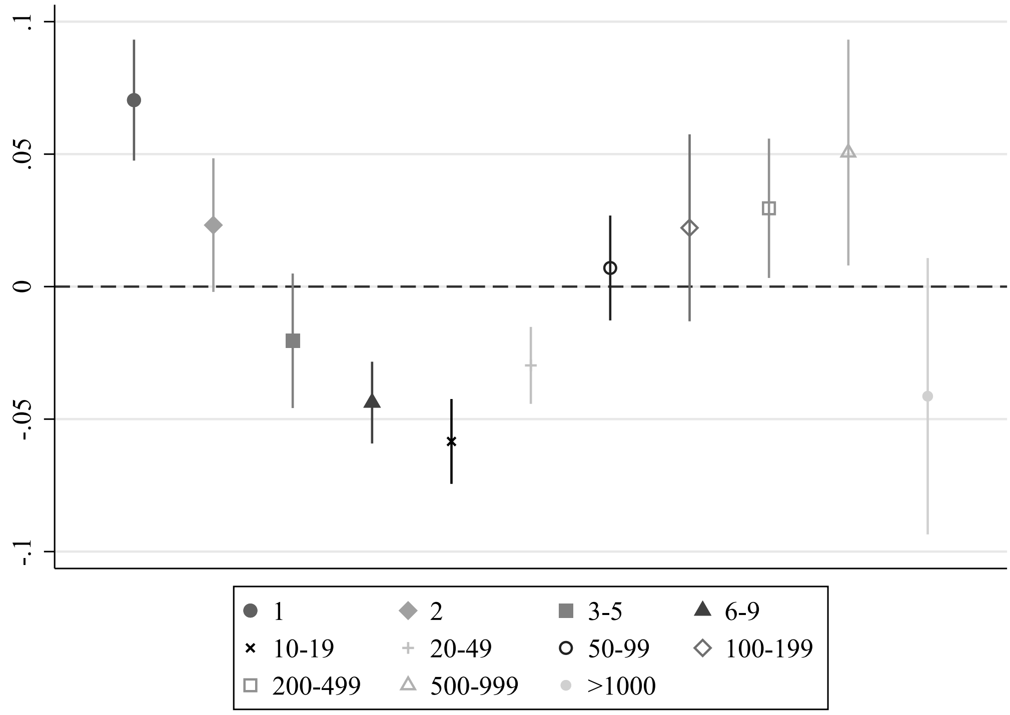


Figure 5.6: Short-term effect on employees by establishment size

Poisson QMLE estimates of the γ coefficients from equation 5.1 with the full set of time-varying controls, time fixed effects, sector fixed effects and municipality fixed effects. The coefficients are estimated from running separate regressions for each size class. The size class is reported in the legend and indicates the number of employees in the establishment. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level.

between one and two workers). Since these establishments were for the vast majority artisanal workshops that relied significantly on the input of the owner and sole worker, it is to be expected that the minimum wage level did not significantly influence the number of employees.

Finally, it is also interesting to note that the size of the coefficients is very similar (but not identical) between the estimates on the number of establishments and those on the number of employees, for each size class. This is to be expected for small establishments, because there is limited room for adjustment with respect to the number of employees within small establishments: for instance, in the extreme case of one-employee establishments, the coefficient will be the same whether we estimate it on the number of establishments or the number of employees, because the two figures coincide. This is not the case for larger establishments, however, because a large establishment can remain open but reduce (or increase) the number of increase, in which case we would find no effect on former but a negative (positive) effect on the latter. The fact that we estimate a similar coefficient for both, instead, suggests that the main channels is through the number of establishments (their closing or opening) rather than the number of employees (hiring or dismissal).

This result might appear unexpected, yet it seems historically plausible in light of the employment protection laws that were introduced in the 1970s. First, the *Statuto dei lavoratori* of 1970 strongly curtailed firms' freedom to dismiss workers on productivity grounds (G. F. Mancini, 1973). The main option for firms that intended to restructure their processes was represented by mass layoffs. These had to be coordinated with the unions and the government, which would then cover up to 80% of the employees' wages for the duration of the restructuring—in some cases, multiple years (D'Harmant François and Brunetta, 1987; Bonazzi, 1990). There is evidence that the government's guarantee, which was extended in 1968 to a wide range of cases—sectoral or local economic crises, firm's restructuring, reorganization, and employment crises—was used to disguise dismissals, absorb technological shocks, and finance the retraining of workers (Tronti, 1991, pp. 124-27). It is important to note that under the government's guarantee, workers remained officially employed with the original firm. Hence, it is possible that these employment protection regulations mask some of the marginal effect on the number of employees, so that our estimates mostly capture the cases of establishments being closed.[21]

Overall, these results can provide support for a preliminary interpretation: the hypothesis that the increase in contractual wages the efflorescence of SMEs does not seem to be supported by the data, except for small artisanal workshops.

[21]Note in fact that the Industrial Census of 1981 explicitly counted employees under *Cassa integrazione* as regular employees of the establishment (Istat, 1985, p. 58). The Industrial Census of 1971 did not explicitly mention *Cassa integrazione* but they reported as employees 'all persons [. . .] employed on the day of 25 october 1971, even if temporarily absent for business, vacation, sick leave, suspension, etc.' (Istituto Centrale di Statistica, 1976c, pp. ix-x, my translation).

If that were the case, we would observe the opposite profile in the response by establishment size, and possibly a positive effect of the minimum wage proxy on the number of establishments in the previous analyses. In fact, it appears that medium-size manufacturing establishments suffered the most from the increase in wages and that, given their relatively large role for industrial employment, they pulled the total effect down. The total effect on the number of employees appears instead muted, possibly because these were re-employed in other firms. However, we have yet to test whether our results are driven by two other sources of heterogeneity besides the size class: geography and sector. The next sections will address both issues.

5.5.4.1 Heterogeneity by geographic area

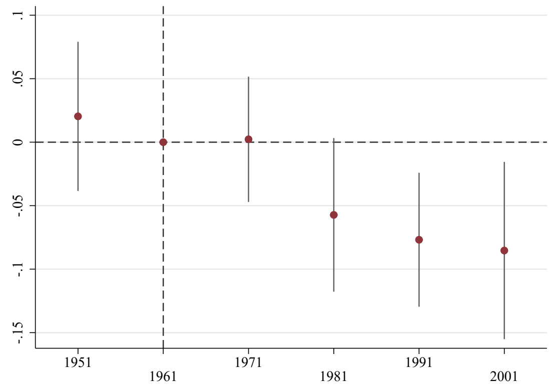
The Italian economy is historically characterized by significant regional divides in income levels, productivity and economic structure—particularly between the South and the rest of the country. In fact, the time span considered in our analysis includes the only period of sustained convergence between the Southern regions and the national average (circa 1951-1971), in part thanks to top-down development projects which provided modern infrastructure, supported technical and organisational change in local firms, and favoured the localisation of large manufacturing plants in underdeveloped areas (Felice and Lepore, 2017). These improvements, however, began to deteriorate in the 1970s, initiating a new period of regional divergence that became even more pronounced between the late 1980s and the 1990s.

In contrast to the performance of Southern regions, the North-East and the Centre experienced fast productivity and income growth in the decades 1970s-1980s, leading some areas to catch up with the levels of the North West—which had traditionally been the industrial core of the country. The strong growth of the North-East and Centre was sustained by the efflorescence of small manufacturing in industrial districts—communities with strong cultural and social identities where SMEs could nest and exploit informal networks to achieve efficiency through agglomeration and external economies.

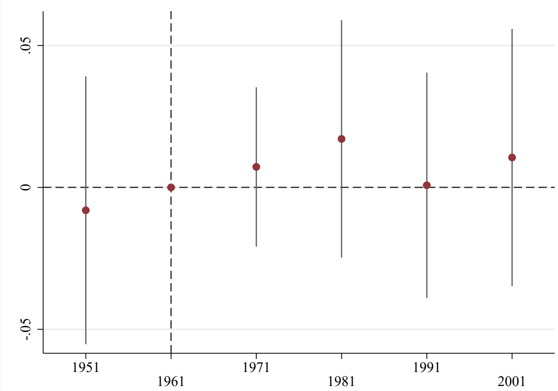
Several specifications that we estimated previously included macro-region time trends, which should absorb the unobserved long-term trajectory of each area. However, considering not only their different industrial structure but also their differing evolution during the period under study, it is appropriate to explicitly test whether the results from the previous sections hold within each area or differ systematically.

Figure 5.7 presents the results from the flexible DiD design using as outcome variable the untransformed number of establishments. The dynamic response changes significantly between the three macroareas. In the North-West we find not short-term reaction, but starting in 1981 municipalities that had had a larger wage gap with respect to Milan start showing a lower count of establishments, which seems to become permanent. In the South and Islands, instead, we find a negative and statistically significant association both in the short and in the medium run, even though the effect disappears in the long run. The estimate for the North-East and Centre, instead, does not return statistically significant coefficients for any time period. This appears particularly interesting considering that small manufacturing developed significantly in this area since the 1970s. Were there local moderating factors that reduced the impact on small establishments, or is this spuriously driven by unobservable time-varying local characteristics that are not captured by our research design?

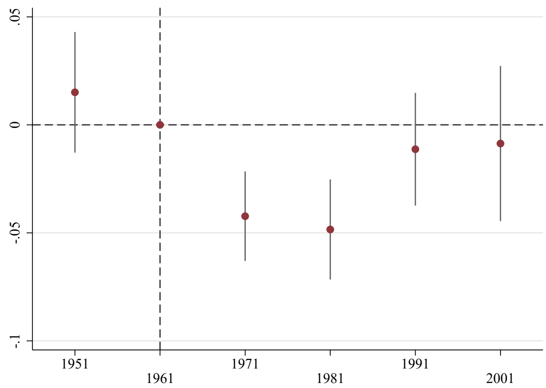
To answer this question I estimate the short-term effect of raising the sectoral minimum wage on the number of establishments between 1961 and 1981. Figure 5.8 shows that establishments employing between six and twenty employees were negatively affected in all three areas, even though less so in the North West. The South, in contrast, shows the largest coefficients (in absolute terms) for establishments employing between three and fifty workers. Considering the large number of small establishments in Southern Italy, these findings explain why we clearly found a negative association with the total number of establishments and the proxy for the wage hike in the previous analysis.



(a) North West



(b) North East and Centre

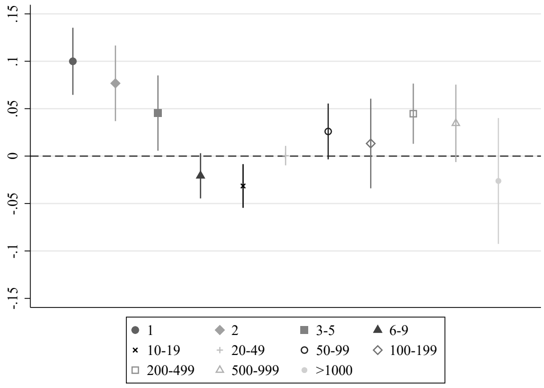


(c) South and Islands

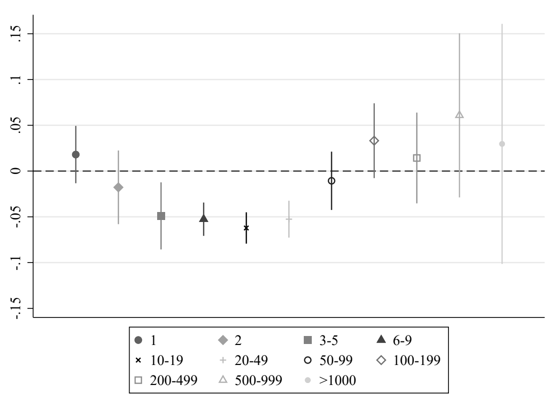
Figure 5.7: Dynamic response of establishments by area

Poisson QMLE estimates of the δ coefficients from equation 5.3 under the common vector of pre-treatment trended controls, time and municipality-sector fixed effects, and a continuous variable equal to the difference between Milan's coefficient and the municipality's under the 1954-1961 system, interacted with a full set of time dummies. Panel a restricts the sample to municipalities in the North-West, panel b to provinces in the North-East and Centre and panel c to the South and Islands. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level.

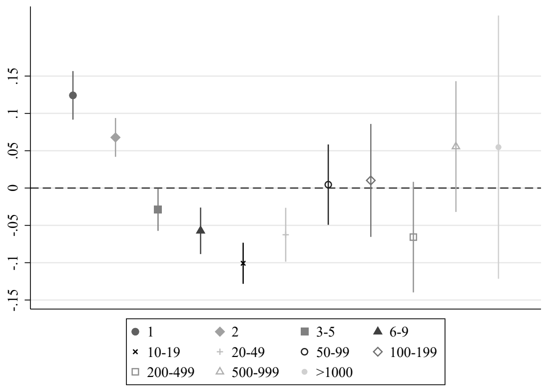
Replicating the analysis with the number of employees as dependent variables does not significantly change the results (see Figure 5.9), although it is worth noting that there is a clear negative and statistically significant effect for establishments over 1000 workers in the North-West. This finding is interesting considering that large manufacturing plants were particularly concentrated in the North West, and suggests that large factories did in fact reduce the number of workers in reaction to the wage hike.



(a) North West



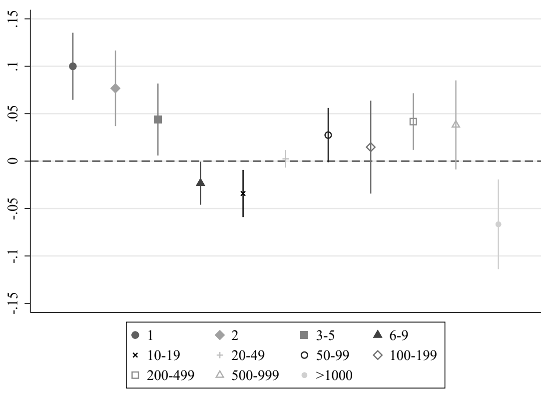
(b) North East and Centre



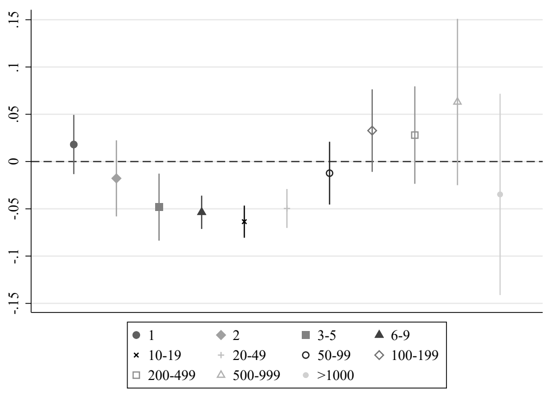
(c) South and Islands

Figure 5.8: SHORT-TERM EFFECT ON ESTABLISHMENTS BY SIZE AND AREA

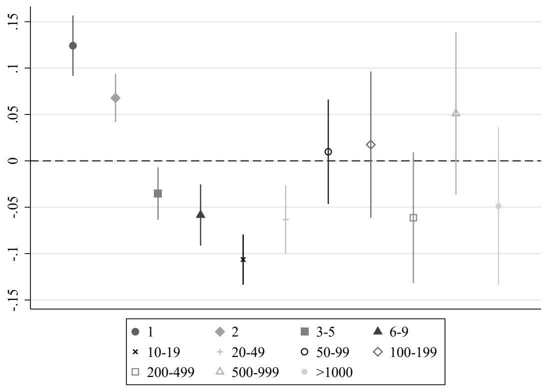
Poisson QMLE estimates of the γ coefficients from equation 5.1 with the full set of time-varying controls, time fixed effects, sector fixed effects and municipality fixed effects. The coefficients are estimated from running separate regressions for each size class. The size class is reported in the legend and indicates the number of employees in the establishment. Panel a restricts the sample to municipalities in the North-West, panel b to provinces in the North-East and Centre and panel c to the South and Islands. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level.



(a) North West



(b) North East and Centre



(c) South and Islands

Figure 5.9: Short-term effect on employees by size and area

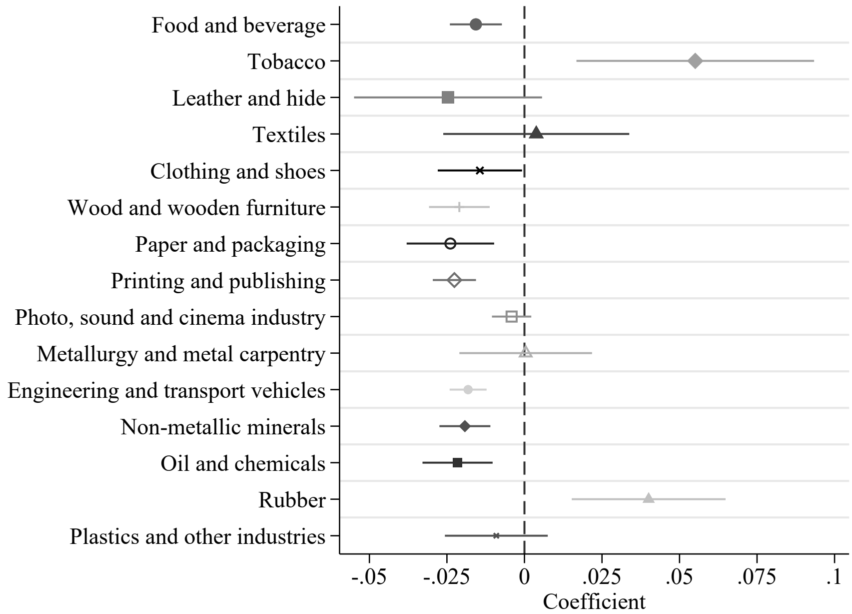
Poisson QMLE estimates of the γ coefficients from equation 5.1 with the full set of time-varying controls, time fixed effects, sector fixed effects and municipality fixed effects. The coefficients are estimated from running separate regressions for each size class. The size class is reported in the legend and indicates the number of employees in the establishment. Panel a restricts the sample to municipalities in the North-West, panel b to provinces in the North-East and Centre and panel c to the South and Islands. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level.

5.5.4.2 Sector heterogeneity

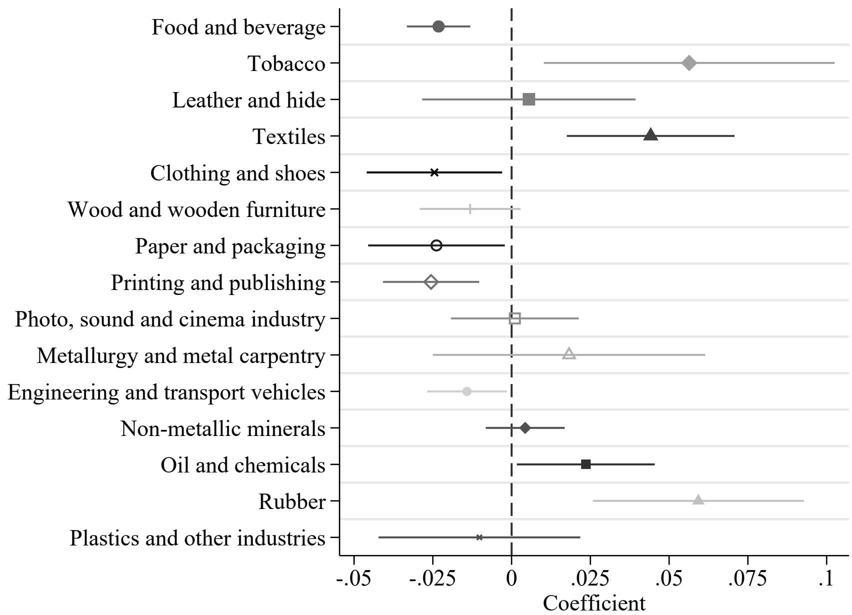
Another source of possible heterogeneity that might drive our results is heterogeneity in firms' response to the shock between sectors. If firms responded differently to the shock depending on the sector, our results might be spuriously driven by the uneven spatial distribution of sectors on the national territory. To test whether this might be the case, I run the baseline DiD model from Equation 5.2 separately for each of the fifteen manufacturing subsectors, using the data from Datawarehuose CIS.

Figure 5.10 appears to dispel this hypothesis: looking at the number of establishments in panel a, the coefficient for the interaction between the wage gap with respect to Milan (our proxy for the minimum wage increase) and the post 1968 dummy is negative and statistically significant across most sectors. The estimates range between .015 and 0.25, which is in line with the general results that were presented in Table 5.4. This finding suggests that the sectoral composition is not driving the main results. The few exceptions are two industries for which we find a positive and significant coefficient (tobacco and rubber), and three industries for which we cannot reject the null hypothesis that the minimum wage hike had no effect on the number of establishments in 1971-2001 (textiles, metallurgy, and the residual group 'plastics and other industries').

The second panel in Figure 5.10 shows the results for the number of employees. With respect to the previous analysis, all results are less precisely estimated, and the number of sectors for which we cannot reject the null hypothesis increases, as well as the sectors that show a positive coefficient—which now include textiles, and the oil and chemical industries. This is to be expected considering the we found a smaller effect on the number of employees throughout our previous analyses.



(a) Establishments



(b) Employees

Figure 5.10: Wage zones' effect after 1968 by sector

Poisson QMLE estimates of the δ coefficients from equation 5.2 with the full set of time-varying controls, time fixed effects, and municipality fixed effects. The coefficients are estimated from running separate regressions for each sector. All standard errors are two-way clustered both at the municipality-sector level and at the province level. Confidence intervals are at the 95% level.

One possible reason for the non-negative estimates on some sectors might be the different skill composition of the workforce and industrial structure before the wage increase. While this data is not available at the municipality level, we can retrieve some aggregate statistics at the national level from a period survey conducted by the Ministry of Labour on a large sample of manufacturing firms. The results for 1968 are reported in Table 5.7.

Table 5.7: Skill distribution before the Hot Autumn by sector

Sector	Medium-High and High	Medium-Low and Low	Apprentices	Other	Total
electric engineering & electronics	37.9	52.2	4.2	5.7	100
food	44.8	46.3	5	3.9	100
clothing	45.6	33.6	16.5	4.3	100
wood products	46.4	41.3	9.7	2.6	100
automotive	47.0	49.3	2.4	1.3	100
paper & packaging	50.9	42.9	4	2.2	100
non-metallic mineral prod.	50.9	44.2	3.5	1.4	100
metallurgy and metal carpentry	51.9	40.6	1.1	6.4	100
non-electric engineering	53.3	37.9	7.3	1.5	100
wooden furniture	54.3	27.9	15.8	2	100
footwear	55.1	25.9	18.3	0.7	100
chemicals	57.2	37.9	1.5	3.4	100
plastic	60.9	35.8	1.1	2.3	100
hide and leather	61.1	28.9	8.4	1.6	100
printing & publishing	64.3	19.5	14	2.2	100
rubber	64.8	31.3	3	0.9	100
textiles	78.1	13.9	7.3	0.8	100
artificial fibres	80.1	13.7	6	0.2	100
oil and coal derivatives	84.0	15.5	0	0.5	100
all manufacturing	54.5	36.1	6.8	2.6	100

Share of blue-collar workers employed in each sector by skill category in April 1968 (Ministero del Lavoro e della Previdenza Sociale, 1969, pp. 360-363, table O/3).

Comparing the textiles sector with clothing and footwear, for instance, we notice that the former had a significantly larger share of high-skill workers. Considering that the egalitarian push after 1968 raised the wages of low-skill workers more than those of high-skill workers, it is possible that all firms in the textiles sector experienced a proportionally lower shock than those in the clothing industry. In addition, the industrial structure differed significantly between these cognate sectors. Table 5.8 shows the percentage of employees by establishment size, in each sector. In the clothing and footwear sector, over 53% of workers were employees in establishments with fewer than fifty employees, and almost half of these were in establishments with fewer than ten employees. In contrast, the textile sector employed fewer than 15% of workers in establishments under ten employees, and almost half were concentrated in establishments with over 100 employees. A similar argument can be extended to other sectors: in general, sectors that show a non-negative coefficient in the estimates show either a relatively large share of high-skill workers (leather and hide, oil) or a greater concentration of the employees in large establishments (metallurgy and metal carpentry, chemicals, rubber), and sometimes both.

Table 5.8: Percentage of total employees by establishment size in 1971

	Size class			
Sector	<10	<50	>99	>499
Chemical fibres	0.1	0.5	98.8	92.2
Oil	2.1	24.4	69.9	39.6
Chemicals	3.4	18.9	71.8	42.6
Paper and packaging	4.5	35.8	50.7	13.8
Engineering and transport vehicles	5.7	22.0	69.5	46.6
Plastics	9.9	47.9	35.5	8.5
Rubber	10.0	22.1	72.3	50.6
Non-metallic minerals	11.5	48.5	36.2	9.5
Textiles	14.2	40.1	47.2	15.4
Printing and publishing	15.9	51.2	37.7	15.9
Metallurgy and metal carpentry	17.0	45.6	43.9	23.6
Leather and hide	19.3	66.5	19.7	1.9
Clothing and footwear	23.4	53.7	33.9	9.1
Food and beverage	26.4	57.6	32.6	11.0
Wood and wooden furniture	38.4	76.8	11.4	1.4
Other sectors	19.4	61.3	26.8	7.3

Percentage of blue-collar workers employed by establishment size in each sector in 1971. Size classes are defined as establishments employing fewer than 10 or 50 workers, and over 99 and 499 workers. Source: own elaborations on Istat, *Atlante Statistico dei Comuni*, ed. 2013 (see text).

5.5.5 Robustness check for spatial autocorrelation

A common concern when dealing with long-run longitudinal studies that use geographical data is the threat of spatial autocorrelation, which can lead to computing inaccurate standard errors (Kelly, 2019). This possibility appears especially plausible with our analysis, as the location of productive establishments is non-random due to factor endowments and agglomeration economies exerting great influence on the localisation and spatial concentration of firms (Krugman, 1991; Fujita and Thisse, 2013).

Our analyses have already implemented some of the most common approaches to attenuate this threat: municipality fixed effects absorb time-invariant characteristics, including geographical coordinates, while region and macroregion time trends allow to control for systematic differences in the evolution of the outcome variables between these geographical areas over time. Moreover, by clustering the standard errors at the province level (in addition to the municipality-sector level) we have controlled for autocorrelation of the residuals between all municipalities within each province.

Furthermore, we separately estimated all our models for each of the three macro-areas, showing that the results are largely coherent, which suggests that our interpretation is not driven by differences between the North-West, the South and/or the Centre and North East, but rather by variation within each area. Finally, our identification strategy has allowed to test for pre-trends using the data for 1951. We saw that, once we controlled for the old wage zone system, this test was passed by the analysis on the number of establishments but not on the number of employees, which suggested us to use more caution in assigning a causal interpretation to the latter.

However, the threat of spatial autocorrelation remains for groups of municipalities that are not located within the same province and/or the same macroregion. To gauge the plausibility of this threat, the first check consists in computing the global Moran's I on the (standardised) residuals of the regressions using as dependent variables the number of establishments and as independent variables the usual vector of time-varying controls. The global Moran's I is a measure of average spatial autocorrelation which takes values comprised between -1 (strong negative autocorrelation, or overly dispersed) and 1 (strong positive autocorrelation, or overly clustered observations), where 0 indicates random spatial distribution. Due to computational constraints, this analysis is performed after aggregating all sectors together, which removes one cross-sectional dimension in the panel. Hence, point estimates will partly differ from the previous analyses.

Table 5.9 reports the estimated Moran's I for each year, the Z-score and its p-value on the (standardized) residuals from six cross-sectional regressions and two panel regressions, with and without controls (both with municipality and time fixed effects). The interpretation of the table requires first to look at the Z-score (or, alternatively, to the p-value). With a Z-score over 1.96 (p-value under 0.05) we can reject the null hypothesis of spatial independence, meaning that the regression residuals are spatially autocorrelated. This clearly applies in most cross-sections: even after controlling for time-varying characteristics, the residuals on the number of establishments and employees remain spatially autocorrelated. This, however, is not the case when we perform the analysis on the residuals of the panel estimate with municipality and year fixed effects—which is the approach we followed throughout the analysis. This result appears to support our longitudinal approach (Voth, 2021, pp. 256-262). In addition, it is worth pointing to the value of the Moran's I: both in the case of the cross-sectional and panel specifications, this is very close to zero. This suggests that, even though we can reject the hypothesis of spatial independence, our residuals are very close to being randomly distributed over space—which further reinforces the plausibility of our estimates.

Nonetheless, to check that the significance of the results is not driven by spatial dependence, I perform the main estimations adjusting standard errors for spatial autocorrelation following. As for coputing the global Moran's I, I pool all sectors together by computing the total number of manufacturing

Table 5.9: Global Moran's I, cross-sectional and longitudinal

		establishments			employees		
Year	FE	Morans' I	Z(I)	p-value	Morans' I	Z(I)	p-value
1951	No	0.0013	3.72	0.00	0.0008	2.55	0.01
1961	No	0.0041	8.85	0.00	0.0005	1.23	0.22
1971	No	0.0062	13.81	0.00	0.0003	0.82	0.41
1981	No	0.0080	16.89	0.00	0.0008	1.81	0.07
1991	No	0.0087	17.24	0.00	0.0003	0.80	0.42
2001	No	0.0055	11.25	0.00	0.0005	1.14	0.25
All	Yes	-0.00015	-1.59	0.11	-0.00016	-1.66	0.10

Estimates of global Moran's I of the residuals obtained from regressing the number of establishments and employees on the difference in the minimum wage coefficient between Milan and the municipality and the usual vector of time-varying controls. The longitudinal estimate includes time fixed effects and municipality fixed effects. Z(I) and p-value represent the z-score and the p-value of the estimate. Computations obtained using Kondo, 2018 with a threshold distance of 146km to minimize neighbour-less observations (two municipalities).

establishments and employees in each municipality-year cell. This compromise is necessitated by the need to make the problem computationally tractable. To maintain an agnostic approach to spatial dependence, I opt for different distance cutoff thresholds (25, 50, 100 km) when computing the spatial weight matrix. With the latter definition, only two municipalities are neighbourless, encompassing three remote and small islands (Pantelleria, Lampedusa and Linosa). No other municipality has fewer than 50 neighbours and the mean municipality has 855 neighbours (median 719, maximum 2082).

The results for the Poisson conditional fixed effects model with spatial standard errors is reported in Table 5.10. With respect to the number of establishments, the coefficients appear slightly smaller (in absolute value) than in the analysis with sector fixed effects, but they are statistically significant at the 99% level across all distance cutoffs, both with and without controls. The results for the the number of employees, instead, differ from our previous results and also between the two specifications. In the specification without time-varying controls (column 3), the sign is positive and statistically significant under all three distance cutoffs. Once we introduce the time-varying controls,

Table 5.10: Establishments and employees with spatial standard errors

	establishments		employees	
	(1)	(2)	(3)	(4)
gap	-0.0154	-0.0139	0.0392	0.00119
25km	(0.00456)***	(0.00130)***	(0.00738)***	(0.00142)
50km	[0.00409]***	[0.00151]***	[0.00624]***	[0.00158]
100km	{0.00368}***	{0.00170}***	{0.00553}***	{0.00179}
Controls	No	Yes	No	Yes
Time FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes

Poisson QMLE estimates on panel data for 7,978 municipalities between 1951 and 2001 (15 sectors combined), obtained from regressing the number of establishments and employees on the difference in the minimum wage coefficient between Milan and the municipality interacted with a post 1968 dummym, municipality and time fixed effects and, in columns (2) and (4), the usual vector of time-varying controls. Conley spatial standard errors in parenthesis are computed with the program xtpsse by Bertanha and Moser (2015). The spatial weight matrix uses a distance threshold of 25km, 50km, and 100 km from the municipality centroid.

however, the coefficient becomes considerably smaller in size and loses statistical significance.

5.6 Conclusions

Between the 1970s and the 1980s, the Italian industrial sector underwent major structural modifications. At the aggregate level, the most characterizing feature was the shift of the fulcrum of production from large manufacturing plants to small establishments. This transformation exacerbated the prevalence of small size firms, a historical characteristic of the Italian economy which is often considered a cause of low productivity growth. Several causes have been proposed by the literature for the expansion of small manufacturing, including the role of raising minimum contractual wages after 1968.

According to contemporary observers, the wage hike disproportionally affected large firms due to a combination of legislation, union presence and industrial structure. In response, large firms would have increased outsourcing from small and medium-size establishments, which could offer specialized production at lower cost. In the most extreme cases, production was outsourced to unregistered workshop and domestic production, fuelling the growing informal sector. Contrasting interpretations, instead, attributed the expansion of small manufacturing to other factors than wage regulation, including shifts in demand, technological change and external competition.

This paper has tested one aspect of the former hypothesis: that raising minimum wages affected the number of manufacturing establishments and their size distribution. In order to test this hypothesis, the paper has harmonized two historical geographical datasets from the manufacturing censuses of 1951-2001, reporting information on the number of establishments and employees for circa fifteen industrial sectors in about 8,000 municipalities. The paper has exploited spatial and sectoral variation in the intensity of the minimum wage hike after 1968 to estimate the effect on the variables of interest.

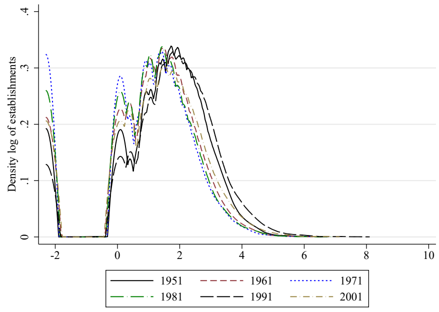
In contrast to expectations, the paper has found that municipalities which experienced a steeper increase in contractual minimum wages recorded a lower number of manufacturing establishments after 1968. By employing a dynamic generalized DiD estimation, we observed that the negative effect appeared already in the short term (in 1971) and became more accentuated in the medium term (1981), only to show signs of regression to the mean in the next two decades. This result suggested that the contractual minimum wage hike had a significant effect on firm creation, which is in line with comparable literature on similar wage setting institutions.

These results were driven by variation within macro-areas rather than between, even though the sectoral and original establishment size distribution could induce heterogeneity in the aggregate effects. In particular, the negative medium-term effect was particularly large for establishments employing between three and fifty employees, while a contrarian positive effect can be observed for even smaller firms (under three employees) and possibly for larger ones. It is thus possible that the contractual wage growth contributed to the polarisation of the firm size distribution.

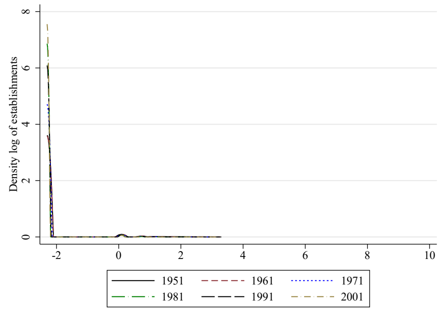
Results for the number of employees, instead, have been mixed. Whilst also negative, the coefficients have been usually smaller than for the number of establishments, suggesting that the impact was less severe on the total industrial employment. This could partly be explained by the disproportionate effect on small and medium-size firm, which accounted for the vast majority of establishments but a smaller share of employees. This would also explain why municipalities experiencing a steeper increase in contractual wages also register a larger number of employees per establishment after 1968. The effect on the number of employees is also less consistent across sectors than the effect on the number of establishments. In fact, we only find a statistically significant negative coefficient for five of the fifteen sectors considered, in contrast to eight in the case of establishments. Moreover, the results for the number of establishments appear robust to spatial autocorrelation, whilst those for the number of employees are not.

In conclusion, the results of the paper are mixed. On the one hand, the paper rejects the hypothesis that the wage increase alone could explain the expansion of small manufacturing during the 1970s—otherwise, we should have observed the opposite sign on the coefficients for the number of establishments and an inverted curve with respect to size classes. Hence, it is plausible that the expansion of large manufacturing was due to other causes. However, it is possible that the wage hike modulated the effect on the size distribution by exacerbating its polarisation. Considering that after three decades the effect could still be observed in the North West and in the South, we cannot rule out the possibility that this contribution cast a long shadow on the size distribution of Italian manufacturing firms.

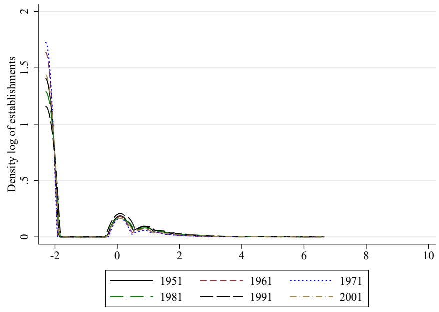
5.A Additional figures



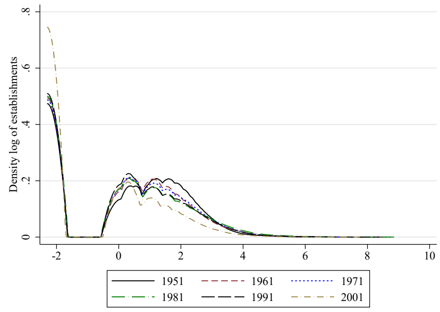
(a) Food and beverage



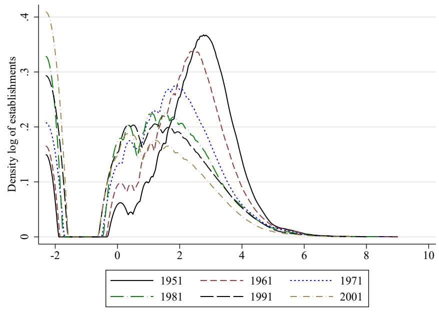
(b) Tobacco



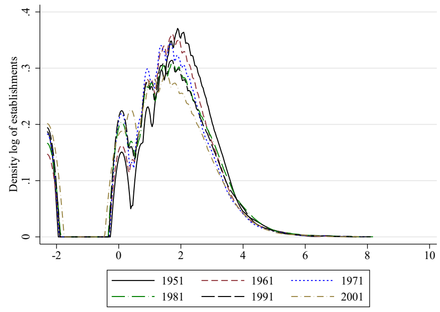
(c) Leather and hide



(d) Textiles



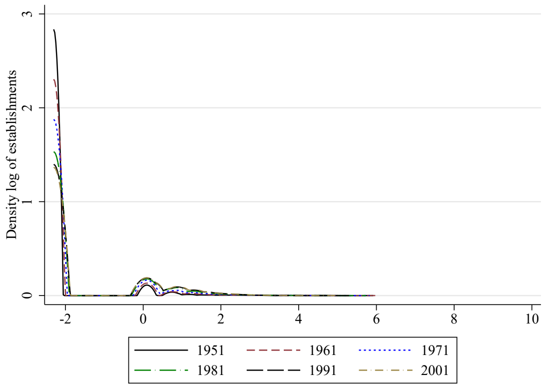
(e) Clothing and footwear



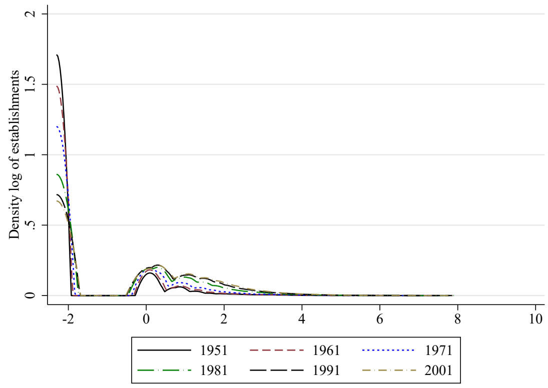
(f) Wood and wooden furniture

Figure 5.11: Municipality distribution of industrial establishments by year and subsector (1-6)

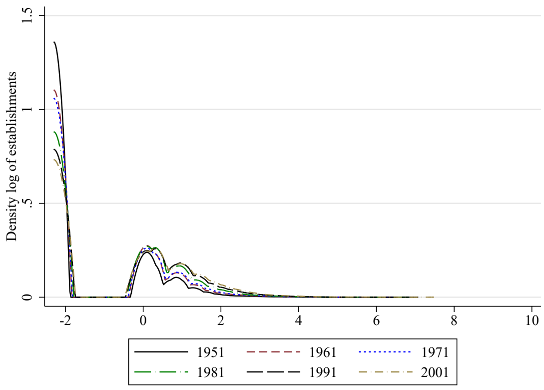
Kernel density distribution of the manufacturing establishments in the dataset by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.



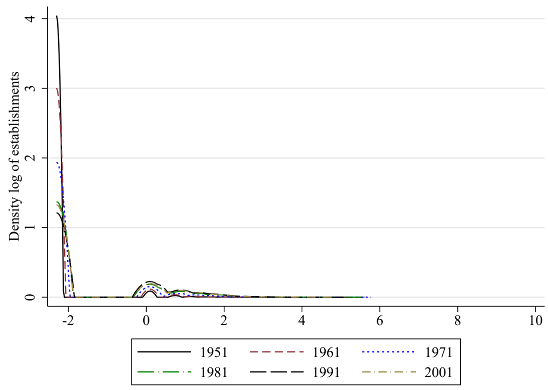
(a) Paper and packaging



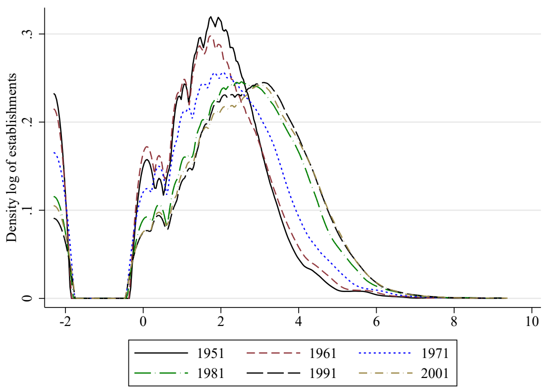
(b) Print and publishing



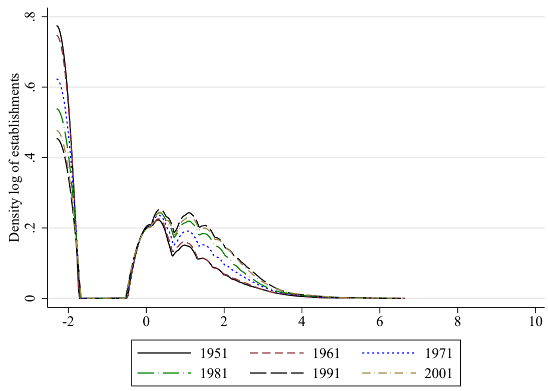
(c) Photo sound and cinema industry



(d) Metallurgy and metal carpentry



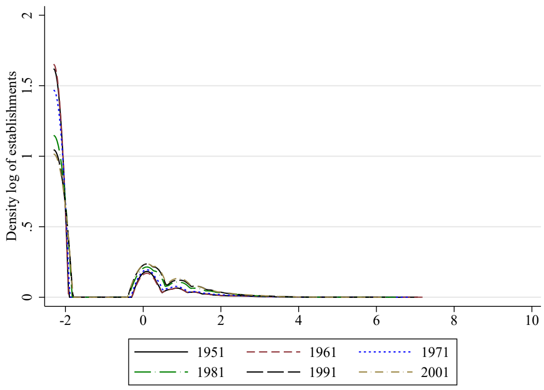
(e) Engineering and transport vehicles



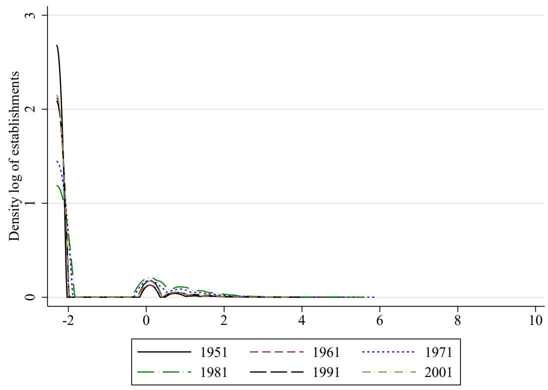
(f) Non-metallic minerals

Figure 5.12: MUNICIPALITY DISTRIBUTION OF INDUSTRIAL ESTABLISHMENTS BY YEAR AND SUBSECTOR (7-12)

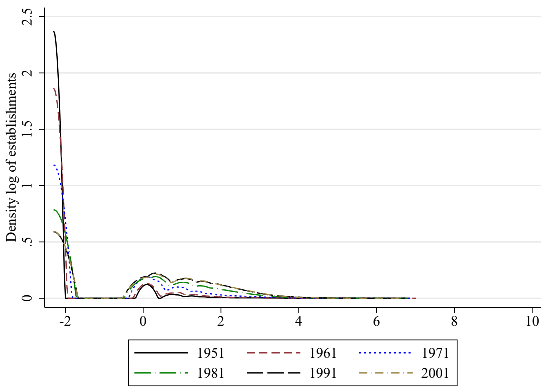
Kernel density distribution of the manufacturing establishments in the dataset by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.



(a) Oil and chemicals



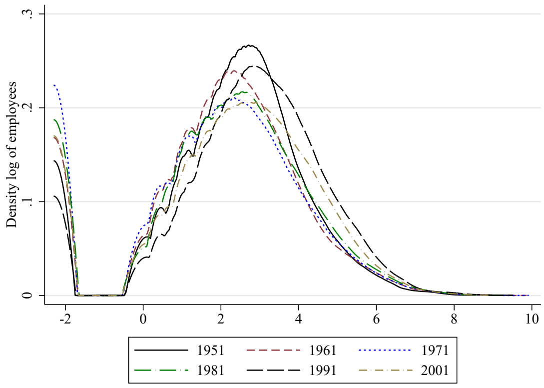
(b) Rubber



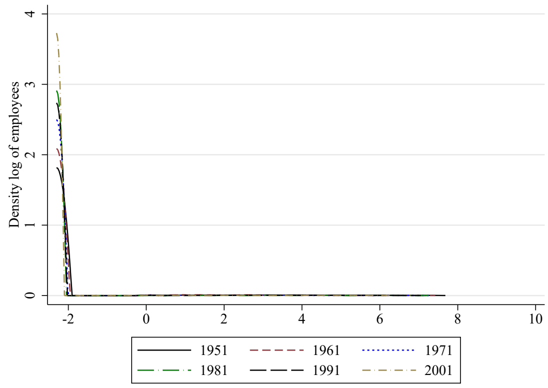
(c) Plastics and other industries

Figure 5.13: Municipality distribution of industrial establishments by year and subsector (13-15)

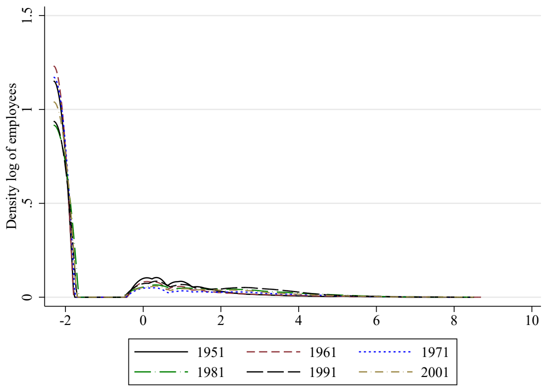
Kernel density distribution of the manufacturing establishments in the dataset by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.



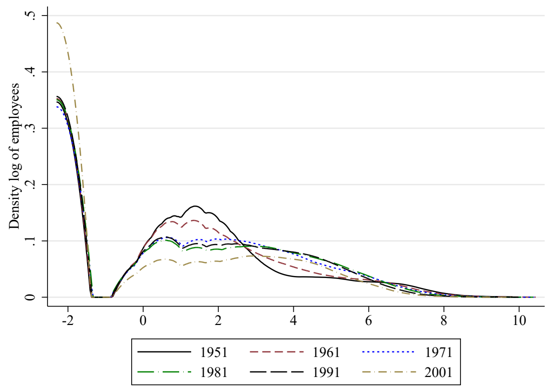
(a) Food and beverage



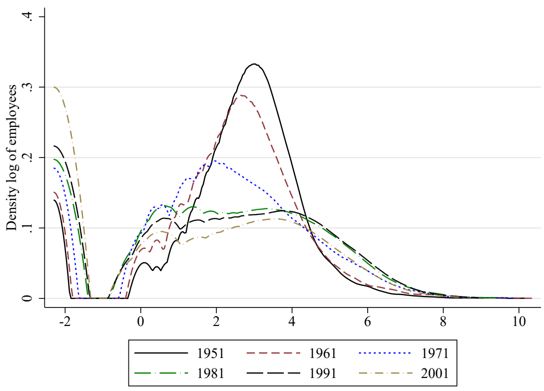
(b) Tobacco



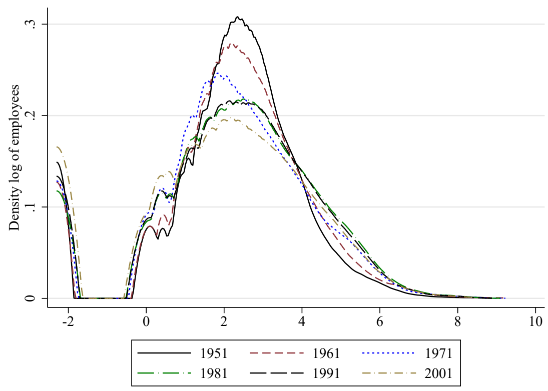
(c) Leather and hide



(d) Textiles



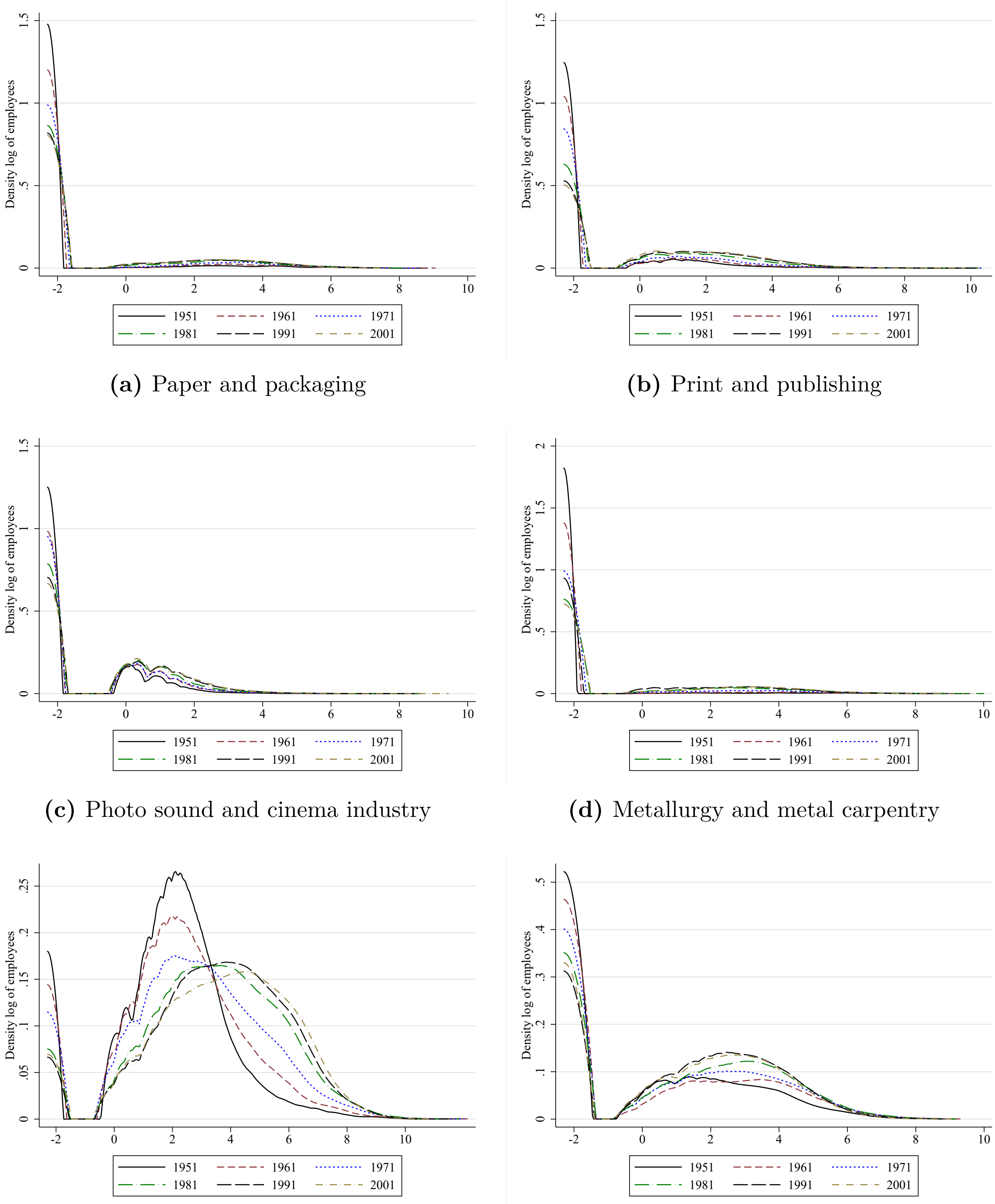
(e) Clothing and footwear



(f) Wood and wooden furniture

Figure 5.14: Municipality distribution of industrial employees by year and subsector (1-6)

Kernel density distribution of the manufacturing employees in the dataset by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.



(a) Paper and packaging

(b) Print and publishing

(c) Photo sound and cinema industry

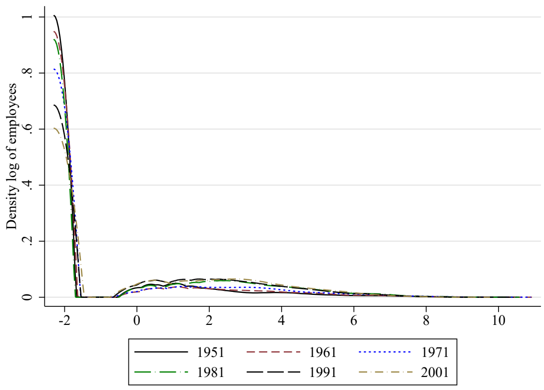
(d) Metallurgy and metal carpentry

(e) Engineering and transport vehicles

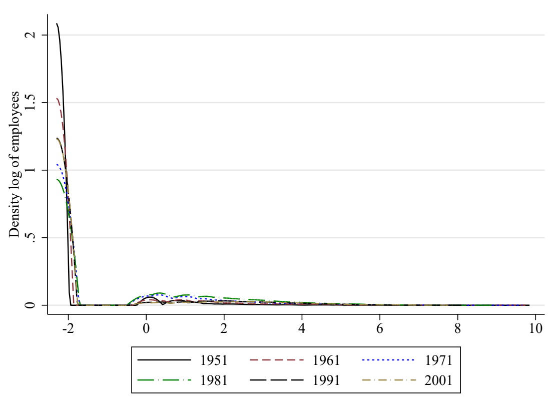
(f) Non-metallic minerals

Figure 5.15: MUNICIPALITY DISTRIBUTION OF INDUSTRIAL EMPLOYEES BY YEAR AND SUBSECTOR (7-12)

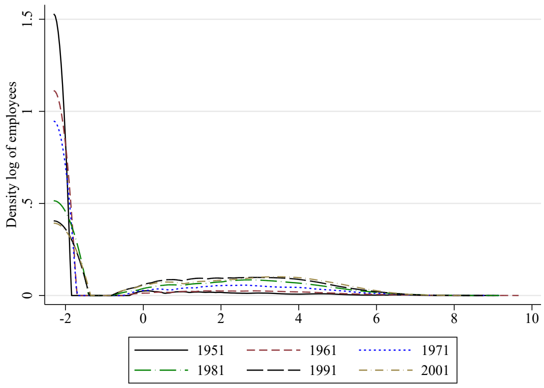
Kernel density distribution of the manufacturing employees in the dataset by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.



(a) Oil and chemicals



(b) Rubber



(c) Plastics and other industries

Figure 5.16: MUNICIPALITY DISTRIBUTION OF INDUSTRIAL EMPLOYEES BY YEAR AND SUBSECTOR (13-15)

Kernel density distribution of the manufacturing employees in the dataset by year. Source: elaborations on data from *Datawarehouse CIS*. The mass around -2 represents municipalities with zero manufacturing establishments, computed as log of 0.1.

Chapter 6

Conclusions

6.1 General argument and main findings

For the past three decades, the Italian economy has diverged from other Western countries, threatening the future wellbeing of its inhabitants, the sustainability of its state's finances, the country's participation in the European institutions, and its role in world relations. Understanding the causes of Italy's stagnation is important not only for designing effective countering policies, but also for other countries that might risk falling into a similar state.

Economists typically focus on proximate factors of productivity drag and their institutional determinants. Economic historians, instead, take a long-term view and explore deeper causes. This thesis has taken an intermediate approach: it has focused on three factors that are commonly considered among the current causes of stagnation and has traced their evolution back in time, finding common turning points in the 1970s. The thesis has hypothesized that these transformations were influenced by the changes in wage-setting institutions following the Hot Autumn of 1969—particularly, the labour unions' adoption of egalitarianism as a bargaining objective. The hypotheses have been tested in separate substantive chapters that make use of new datasets that combined new series digitized and harmonized from statistical publications and data derived from secondary sources and digital repositories.

The first substantive chapter has explored the impact of raising contractual entry-level wages for blue-collar workers on the propensity to enroll in post-compulsory upper secondary education and the choice of school track. Exploiting spatial variation in the intensity of the wage hike, the chapter has shown that the shock increased the number of early school leavers in the short term, and that the loss was particularly concentrated among vocational schools preparing for skilled blue-collar jobs in the manufacturing sector. Even though the effect was only limited in time—as it was later compensated by growth in other school tracks, particularly those preparing for white-collar jobs—, the dip in enrolment rates during the 1970s was sufficient to delay the expansion of upper secondary education, which explains a significant part of Italy's lag with respect to the OECD average.

The second substantive chapter has studied the impact of equalizing nominal minimum wages between high- and low-productivity areas on internal migration and factor misallocation. Estimating gravity models on the longitudinal matrices of bilateral migration flows between provinces, the paper has confirmed that differentials in nominal minimum wages were effectively a pull factor of migration before 1969—not only between the North and the South, but also within each macroarea. Moreover, the paper has confirmed the common argument that the spatial equalization inverted the relationship between real wages and local productivity, which might help explain excess unemployment in low-income areas. However, the chapter has also qualified the consensus. In particular, it has shown that the pre-1969 system already introduced significant equalization of nominal wages within the Southern regions, and that the reform affected mostly provinces in the Centre-North and the relationship between the North and the South.

The third substantive chapter has discussed the effect of the minimum wage hike on the number of manufacturing establishments and their size distribution. Using census data at the municipality level for six benchmark years, the analysis has found that municipalities that experienced a steeper hike in contractual wages after the Hot Autumn recorded a lower number of establishments in

1971 and in 1981, and that the effect was absorbed in the following decades. This observation contrasts *prima facie* with contemporary hypotheses, but is coherent with studies that find a negative effect of minimum wage hikes on firm creation in the medium-to-long run. However, the paper also finds heterogeneity between establishment size (by number of employees), with a positive effect on very small establishments, a negative effect on small-to-medium size establishments, and no significant effect for larger ones. Hence, it is possible that the heterogeneity of the shock contributed to the shift in the firm-size distribution towards small establishments.

6.2 Implications

The results of the thesis present a series of implications for the individual topics that they contribute to and in general to the debate on the economic history of contemporary Italy.

The first substantive chapter complements the growing literature on human capital accumulation by directing attention to the pause in the expansion of upper secondary education between the 1970s and the 1980s. First, the counterfactual estimates highlight the significance of this pause in delaying Italy's catch-up to the expected educational attainment given its income level. Second, it stresses the role of labour market forces in influencing the demand for education, which contributes with a different perspective both to Italian literature in economic history, which focuses on supply factors for the expansion of education, and education economics, which brings attention to the continued role of parental background for schooling choices.

This approach could be extended to other periods in Italy's economic history to consider other labour market factors, outside of contractual minimum wages. Outside of the Italian case, the paper raises questions on the influence of collectively bargained minimum wages on educational attainment in tracked systems that could be explored in other historical and geographical contexts.

The second substantive chapter provides a historical check for the debate on the spatial equalization of minimum wages. This topic is widely discussed in public opinion but quantitative analyses are few and mostly focused on the contemporary period. Providing a longitudinal approach helps understand the historical implications of the system and the differences with the previous wage-setting institutions. In particular, it notes that the pre-existing system already introduced asymmetries between the North and the South of the country, whose implications for the evolution of regional divides during the Golden Age could be further explored in future research.

Besides the specificity of the Italian case, this study can also be a reference for wider discussions on the role of institutional factors in influencing migration flows and local labour markets. In addition, this study can speak to public debates on the wage-setting criteria for public sector employees and those of large organizations that run similar offices in locations with different cost of living.

The mixed results from the third substantive chapter suggest that an updated and qualified version of the theory of *decentramento produttivo* could complement explanations of organisational change in the manufacturing sector between the 1970s and the 1980s. However, it also highlights heterogeneity between sectors and territories that should be addressed in future research. Besides the historiographical discussion, the paper also speaks to contemporary debates on the role of labour market institutions in influencing the Italian firm-size distribution.

For a long time, great attention—especially in public discourse—was given to the 1970 employment protection legislation that made exceptions for firms under a threshold number of employees. In fact, the argument that such exceptions were a major factor causing the small size of Italian firms played a supporting role in the Italian government's 2015 reform of employment protection legislation. The chapter suggests that other labour market institutions—particularly the application of minimum wage rates established by collective agreements—might have had an important influence.

6.3 Limitations and future research

The results of the thesis, however, should be considered in light of some limitations, which open opportunities for future research. In general, the thesis focused its attention on the evolution of collectively-bargained minimum wages in the manufacturing sector, which is justified by the leading role played by industrial unions in the Hot Autumn and the importance of the sector in the Italian economy at the time. However, future research could focus on expanding the data collection and wage reconstructions to other sectors (mainly, agriculture, selected services and public employees) in order to achieve a more complete representation of their evolution and explore the interconnections between them.

The substantive chapters have also left some channels unexplored—largely due to data availability—which could be addressed in future research projects. In particular, the chapter on education could not test for effects at the household level, which would require micro-level data and a different research design—a possibility that I will consider exploring, maybe for other time periods. Secondly, the chapter has focused on human capital acquired through formal education, but it has not considered the possibility that training at the firm level was affected by the wage hike and the compression of wage differentials. This would be an interesting channel to explore, considering that some research has established a positive relationship between wage compression and firm-level training (Acemoglu and J. S. Pischke, 1999; Brunello, 2004). I plan to address this problem in post-doctoral research, focusing on the use of apprenticeship contracts, on which I have started the collection of primary sources.

The chapter on internal migration has focused on total migration flows, which is what matters most for the argument on the spatial misallocation of labour. However, it is possible that the equalization of wages between high- and low-productivity provinces also modified the sign of migrant selection on the skill level. If true, this effect might have implications for the trajectory of regional divides before and after the reform. In fact, it is often suggested that, today, internal migrants in Italy are positively selected on human capital—especially when moving from the South to the North (Accetturo, Albanese, et al., 2022, pp. 51-54)—, even though researchers have provided evidence of the opposite (Bartolucci, Villosio, and Wagner, 2018). On the other hand, it is traditionally argued that internal migration in Italy during the Golden Age largely concerned low-skill occupations, even though it is not clear that this implied negative selection, nor that high-skill workers did not participate in the migration flow—see for instance the discussion in Paci (1973b).

Hence, a natural extension of the chapter would consider the effect of the wage equalization on migrant selection. The bilateral migration matrices that have been digitised for the chapter unfortunately do not provide a disaggregation by education or skill level that would allow to perform this type of analysis. In fact, as far as I am aware, commonly available statistical sources provide this information at a higher level of spatial aggregation, lower time frequency, or without information on bilateral flows, which would require to modify the research design.[1] However, I plan to keep exploring alternative sources to address this research question in future research.

[1] For a recent example studying the period since 1980 see Piras (2021).

Appendix A

Primary sources and harmonization procedures

The datasets used throughout the thesis have been assembled from a range of primary sources, the majority of which have been specifically digitized for this project. Since the primary sources were produced by a multitude of institutions for different purposes and using different classification criteria, the design and execution of harmonization procedures have represented critical preliminary steps for the research, and an additional contribution of the thesis. This appendix provides a description of the sources used and the harmonization procedures undertaken, with as much details as possible to locate the data and replicated the process.

A.1 Minimum contractual wages

The main set of longitudinal data that is carried throughout the thesis contains the reconstruction of minimum contractual wages in 92 provinces with annual frequency, between 1962 and 1982. Additional data have been collected for the periods 1955-1961 and 1983-1996, but they are not fully comparable to the main dataset due to changes in the composition of the industries, and thus they are not used for the empirical analyses in the substantive chapters.

Theoretically, all minimum wage scales established by sectoral collective bargaining could be directly reconstructed from the official agreements between the labour unions and the employers' associations, which were published by both. However, such a reconstruction would be extremely complex because of the high number of sectoral agreements signed during the period under consideration, the changing definition of industries over time, the complexity of the individual documents' internal structure and cross-references between them,[1] and—most importantly—the difficulty of collecting them all.[2]

However, reconstructing the minimum wage scales directly from the collective agreements is not necessary, because Istat, the National statistical institute, collected, harmonized and published them in tabular format with annual frequency throughout the period of analysis, for a large number of industries. The tables reported the minimum wage rate established by sectoral national collective agreements separately for blue- and white-collar workers, distinguishing by skill level, sex (until 1963) and by wage zone (until their abolition in 1972).[3] Since the provinces belonging to each wage zones are reported in the tables, these can be used to construct a longitudinal dataset of contractual minimum wage scales for blue- and white-collar workers that spans from the mid 1950s to the late 1980s.

The tables were reported by Istat in several publications, but these often differed between them in the coverage of industries or wage zones. Fortunately,

[1] For example, a collective agreement could establish different sets of wage scales for the next three years, but a subsequent agreement might modify them.

[2] Since 1986 the CNEL (Consiglio Nazionale dell'Economia e del Lavoro, a constitutional authority established in 1957) has been tasked with maintaining and making accessible to the public all collective agreements signed in Italy, at any level. Signatory parties have a legal obligation to deposit one copy of the agreement with CNEL. The CNEL maintains an online repository (*Archivio Contratti*, available online at `https://www.cnel.it/Archivio-Contratti`, last retrieved March 2023) from which the copies of collective agreements can be downloaded, in either PDF or RTF format. However, while all agreements signed since 1990 are available on the platform, only a small subset of agreements for the period before are available (circa 509). For a description of the structure of the repository see *Archivio CNEL dei contratti collettivi nazionali di lavoro (CCNL)*, `https://www.cnel.it/Portals/0/CNEL/Archivio_Contratti/Aggiornamenti%202022/Novembre/archivio%20CNEL%20CCNL%20-%20guida%20alla%20consultazione_25_11_2022.pdf?ver=2022-11-25-112846-687` (retrieved January 2023).

[3] The tables reported the minimum wage rate for unmarried adults (i.e. 21 years old). The wage rate included the basic pay and the inflation benefit; additional pay components (e.g. productivity premiums) were included only if they were paid to all workers in the sector. From 1976, the series also included the seniority component. The series never included family bonuses.

combining multiple publications for each year allows to restore a consistent coverage. For the construction of the dataset, I used as main source the publication *Annuario di statistiche industriali*, a compendium of industrial statistics published with annual frequency from 1956 to 1986 (the publication continued under the title *Statistiche industriali* in 1987-1990). To obtain a balanced panel, missing industry-province cells were filled digitizing another publication, the *Annuario di statistiche provinciali*, an annual compendium of statistics at the province level which was published between 1959 and 1974. Notice that the tables are also reported in the publication *Annuario di statistiche del lavoro*, from 1959 to 1984 (titled *Annuario di statistiche del lavoro e dell'emigrazione* in 1961-1970).[4]

In a limited number of instances, the combined use of the three sources left some cells empty, in which case the contractual wages were derived directly from the original text of the industry's most recent collective agreement (available in digital format for the majority of industries from the historical archive of CNEL - Consiglio nazionale dell'economia e del lavoro, https://www.cnel.it/Archivio-Contratti). When the most recent collective agreement was not available, the missing industry-province cells were filled through linear interpolation from lead and lag values or adjacent cells. Interpolation was applied to compute only 35 industry-province cells out of 47,196 (i.e. 0.07 percent of the observations).

Even though Istat harmonized the data to ensure comparability over time and between sectors, some adjustments need to be performed. Before 1968 and for most sectors, wages were expressed in Italian lire per day in the case of blue-collar workers and lire per month for white-collar workers. Since 1968, wages of blue-collar workers were given as lire per hour. Since 1984 for all industries (and in previous years for a restricted number of industries) wages of blue-collar workers were given as lire per month. To ensure comparability

[4]This latter publication also reports the minimum wage rates for agricultural workers and workers in some services, which I am currently in the process of digitizing for future research.

with the previous series, hourly values were converted to daily by multiplying them by eight. This simplifying assumption is coherent with available statistics on hours worked per day: according to a survey conducted by the Ministry of Labour, blue-collar employees worked an average of seven hours and forty-one minutes per day in 1973, with a standard deviation of 14 minutes between the provinces, across all industrial sectors excluding energy, gas and water (Ministero del Lavoro e della Previdenza Sociale, 1974b, pp. 256-259). Monthly wages, instead, have been rescaled to daily by dividing the monthly value by twenty, that is assuming an average number of five days worked in a four-week month. Other methods, including rescaling all wages to monthly or to hourly values, do not alter qualitatively any result in the analysis. These robustness checks are available upon request.

Skill categories were traditionally four for male workers. However, since the 1950s, the collective agreements in several industries introduced additional classes and modified their names to better suit the characteristics of the sector. The source adjusts the data to take into account these differences, so that wages are directly comparable both between industries and across time. When I compute minimum low-skill wages, I always consider the one for lowest ranking level—in each sector and year—in order to ensure that the series consistently compare workers receiving the entry-level wage. The wage ratio is computed by dividing the highest-ranking skill level with the lowest-ranking, to ensure that the series consistently compares workers assigned to the most complex tasks with workers assigned to the least complex ones.

As mentioned above, until 1972, wages were reported separately for wage zones. From 1962 to 1972, collective agreements identified ten wage zones (classified from one to six, plus two additional special zones for Turin and Milan and Genoa and Rome, and two separate zones for the provinces of Arezzo and Ancona). Wage zones comprised one or more provinces, and were further divided in two sets (A and B) that computed the inflation bonus on different price indexes. Table A.1 provides a list of the wage zones with the respective provinces and inflation indexation sets. After the complete repeal of the wage zones, in 1972, Istat published the national wage rate for each sector. In our dataset, in order to maintain the same administrative unit of analysis, the national-level rates have been imputed to all provinces.

Table A.1: PROVINCES BY WAGE ZONE, 1962-1972

wage zone	inflation set	provinces
0	A	Milano, Torino
0*	A	Genova, Roma
1	A	Como, Firenze, Sondrio, Varese
2	A	Aosta, Bergamo, Bolzano-Bozen, Brescia, Cremona, Gorizia, Imperia, Livorno, Massa-Carrara, Novara, Pavia, Pisa, Savona, Trento, Trieste, Venezia, Vercelli
3	A	Alessandria, Belluno, Bologna, La Spezia, Mantova, Modena, Napoli, Padova, Parma, Piacenza, Ravenna, Reggio nell'Emilia, Verona, Vicenza
		Asti, Cuneo, Ferrara, Forlì,
4	A	Grosseto, Lucca, Palermo, Pistoia, Rovigo, Siena, Treviso, Udine
4	B	Ancona
5	A	Arezzo
5	B	Ascoli Piceno, Bari, Cagliari, Catania, Frosinone, Latina, Lecce, Messina, Perugia, Pesaro, Pescara, Rieti, Salerno, Taranto, Terni, Viterbo
6	B	Agrigento, Avellino, Benevento, Brindisi, Caltanissetta, Campobasso, Caserta, Catanzaro, Chieti, Cosenza, Enna, Foggia, L'Aquila, Macerata, Matera, Nuoro, Potenza, Ragusa, Reggio di Calabria, Sassari, Siracusa, Teramo, Trapani

Wage zone 0 is separately defined for Milan and Turin and for Rome and Genoa. An agreement to phase out wage zones was reached in 1968 between the confederal labour unions and Confindustria, the employers' association. Wage zones were eliminated by each industry individually through the renewal of collective agreements in the following years. By 1972, all industries had abolished wage zones, introducing same nominal level contractual wages by skill category across whole of Italy, except for the construction sector, where province-level differences in contractual wages remained through the period under study. Source: Istat, *Statistiche industriali*, 1962, tav. 97, p. 151, footnote a.

A.2 Average effective wages at the province level

Average effective wages in the manufacturing sector are digitized from an annual publication by INAIL, the national institute for insurance against workplace accidents, titled *Notiziario statistico*. Among other statistics, the publication reported the mean daily earnings of blue-collar workers that suffered a temporary incapacitating accident on the workplace in the solar year. The earnings were reported separately for each province and ten macro-sectors. To harmonize the series with the minimum wage and industrial census data, I have devised a conversion system that is reported in table A.2. Each year-province mean effective wage is obtained as the average of mean wages across the ten macro-sectors, weighted by the employment shares according to the local industrial composition, in each province-year cell.

Table A.2: CONVERSION TABLE BETWEEN CENSUS, MINIMUM WAGE AND INAIL CODES

N	INAIL definition	min wage	census
1	Industrial food processing	5	3010
2	Chemicals, rubber, plastics	2, 3,4	3070, 3131, 3080
	Paper & packaging, printing & publishing	10, 12	3140, 3151
	Leather & hide	18	3030
3	Construction	9	4010
4	Electricity & gas	6	5010
5	Wood & similar	16	3061, 3062
6	Metallurgy, metal carpentry,	15	3102, 3101
	machinery, transport vehicles, instruments	17	3111, 3112, 3113, 3115
7	Mining, mineralogy and complementary	11	2010, 2020
8	Textiles and clothing	1, 7, 19	3052, 3040, 3051
9	Trucking and warehousing	—	—
10	Other	8, 13, 14	3132, 3120, 3133

This weighting procedure allows to control for changes in composition between macro-sectors, while changes within macro-sectors would be accounted for originally by the source, as long as the frequency of accidents is a function of the number of employees in each sub-sector. The underlying assumption requires that the probability of a temporary incapacitating accident is equally distributed among sub-sectors in each macro-sectors, and that the probability distribution does not change over time. While it is not possible to directly verify this assumption, it appears plausible given that macro-sectors are relatively narrowly defined and they share similarities in the production processes. The main exception is macro-sector 2, which aggregates chemicals, rubber and plastics with paper & printing and with leather & hide. To ensure comparability with the minimum wage series, I excluded sector 9—which is more appropriately classified in the service sector.

The INAIL series is the only source of effective wage data for blue-collar workers at the province level with annual frequency through the period under consideration. Hence, the series has been routinely used for research that requires spatial disaggregation with relatively high frequency (Salvatore, 1977; Padoa Schioppa, 1991). Nonetheless, the source presents some idiosyncratic characteristics that need to be addressed. First, the series only covers individuals that were temporarily incapacitated due to an accident on the job in the solar year. This selection criteria can introduce several distortions, both in the cross-section and over time. A possible source of distortion arises from the correlation between the probability of an accident and unsobservable workers' characteristics. For instance, if the probability of an accident decreases with experience, young workers will be over-represented in the sample.

To check that this idiosyncratic weighting does not alter the evolution of the wage series, I have compared the mean blue-collar wage (obtained as a weighted average from the province-level data, using population as weights) with other series of industrial earnings that are available in the same time period at the national level. The series have been digitized from surveys conducted by the Ministry of Labour on a large sample of firms employing ten or more workers and reported in its quarterly publication titled *Statistiche del lavoro*. The sources present two series for the period 1962-1974: one only considers 'direct' wages, i.e. average wage rates per hour effectively worked; the second series also includes common additional pay components, such as paid holidays and family bonuses. Figure A.1 plots all wage series for the national average. INAIL wages appear consistently lower than the comprehensive Ministry of Labour series until 1974, but it matches the direct series—except possibly for the early years. Most importantly, all series show a strong comovement, even though the gap between the INAIL wages and the comprehensive series tends to decrease, especially since 1969. It is possible that this convergence is explained by the compression of the wage distribution that followed the mininimum wage hike of 1969: if the INAIL data is negatively selected, we would expect it to rise faster than the average industrial wage after 1969.

The Ministry of Labour series between 1975 and 1982 cannot be directly compared with the previous years, due to a switch in sources and computation methods (see figure's note). Hence, it is not possible to know whether the convergence between the two series is entirely spurious or it is partly justified by structural changes in the wage distribution. It is nonetheless possible that the convergence is due to the reform of the wage indexation system in 1975, which produced larger percentage increases for low wages every new quarter. It is in fact well established that the reform of the wage indexation system caused a strong compression of the wage distribution (Manacorda, 2004) and that, by the late 1970s, the 'direct' components of industrial wages (payscale minima and inflation bonus) accounted for over 80% of average blue-collar earnings (Brunetta, Cucchiarelli, and Tronti, 1994, pp. 160-161). Taking into consideration that the 1970s also saw a reduction of pay scale stratification (Regini, 1974, p. 77), it seems plausible that the gap between the two series dropped significantly in the later period.

An additional cross-sectional source of concern about the INAIL series

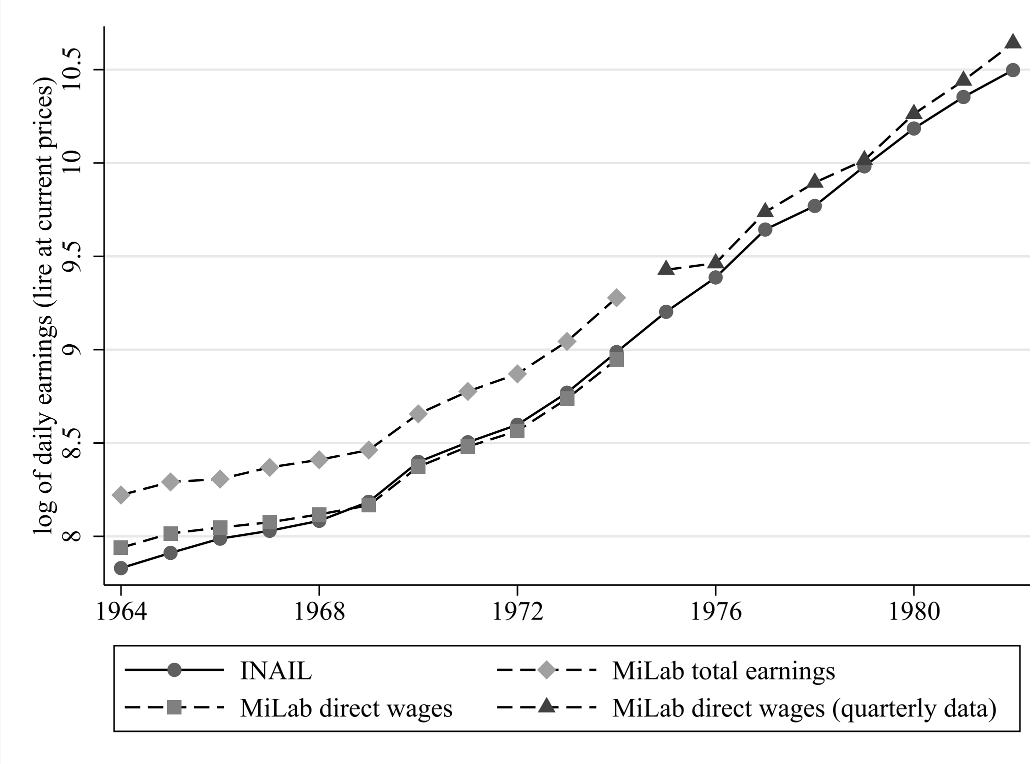


Figure A.1: Comparison of blue-collar mean daily wage series

Log of daily earnings for blue-collar workers at nominal value from different sources. INAIL data include daily wages for blue-collar workers injured on the job, excluding any additional component. The Ministry of Labour series of direct wages include average wages for one hour of effective work. The 'total earnings' series includes also other indirect earnings, including paid holidays, personal and family bonuses, and additional components. Sources and methodology: the INAIL series has been digitized from Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro (1964)-Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro (1975) for 1964-1974 and from "Statistiche di base e retrospettive" (1978)-"Statistiche di base e retrospettive" (1986) for 1975 to 1982. Data for 1982 have been linearly interpolated by province between 1981 and 1984. The Ministry of Labour series between 1962 and 1974 have been digitized from Ministero del Lavoro e della Previdenza Sociale (1968, p. 177-179), Ministero del Lavoro e della Previdenza Sociale (1971, p. 262), Ministero del Lavoro e della Previdenza Sociale (1974b, p. 262). Data for 1975 to 1982 have been digitized from a quarterly publication which originally supplemented and later substituted the previous source (Ministero del Lavoro e della Previdenza Sociale, 1975-Ministero del Lavoro e della Previdenza Sociale, 1982). For data availability, the series only refer to the second quarter of each year, except for 1982, which reports annual averages. All Ministry of Labour series presented only hourly wages. Daily wages have been computed by multiplying the hourly wage by the average number of hours worker per day, whenever the information was available (i.e. until 1966 included). Afterwards, the number of hours worked per day was obtained by dividing the average number of hours worked per month by 21, that is the average number of hours worked in 1962-1966, which is equivalent to four five-day weeks plus one day of overtime.

arises from the possibility that the idiosyncratic weights differ between provinces. This is the most relevant threat of distortion for the econometric analysis because it might influence the identifying variation and bias the estimates in unpredictable ways. However, comparisons with the limited available data at the province level dispels such concerns. Starting in 1972, the Ministry of Labour temporarily and occasionally published its comprehensive wage series at a more disaggregated provincial level. The two series show a strong correlation (r>.8) in all available years, suggesting that the idiosyncratic weighting of the INAIL series does not alter significantly the provinces' relative positions. Figure A.2 shows the scatterplots of the INAIL and Ministry of Labour series at the province level for the available years, which confirm the positive correlation between the two series.

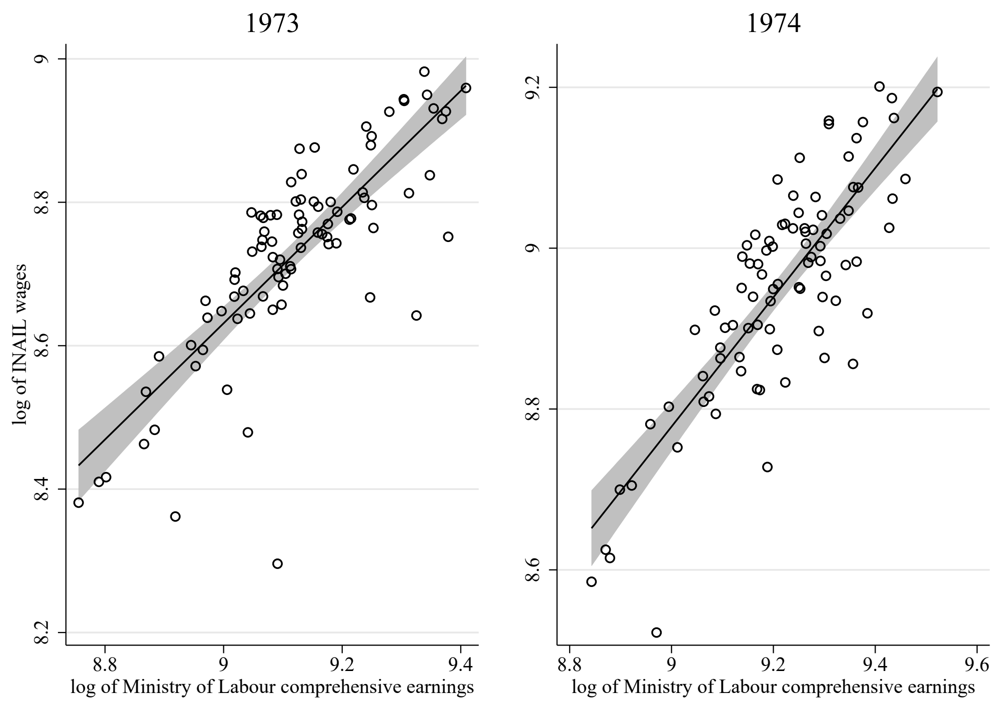


Figure A.2: Blue-collar daily wage series at the province level

Log of daily earnings for blue-collar workers at current nominal value from different sources. INAIL data include daily wages for blue-collar workers injured on the job, excluding any additional component. The Ministry of Labour series of comprehensive earnings include paid holidays, personal and family bonuses, and additional components. Sources and methodology: for the INAIL series see footnote Figure A.1. The Ministry of Labour data are from Ministero del Lavoro e della Previdenza Sociale, 1974a and Ministero del Lavoro e della Previdenza Sociale, 1974b, Tab. OP/2. The Ministry of Labour earnings are for all industry, including construction but excluding energy and water. The solid line represents the linear interpolation of each scatterplot. The shaded area represents the 95% confidence interval.

Moreover, occasional discordances can also be attributed to the the Ministry of Labour series: the Ministry surveyed only firms employing over ten employees (five in the construction sector), which excluded a significant number of low-wage firms in several manufacturing sectors. Given the variation in the local industrial composition and firm size, it is possible that the Ministry of Labour series overestimates wages in provinces that had a hollowed-out firm-size distribution. This was particularly the case in the South, where native firms were mostly of small size and remained concentrated in traditional sectors, meanwhile state subsidies promoted large industrial plants in heavy sectors. Thus, the INAIL series—which did not select on firm size—could arguably be more representative of the local industry composition and firm size distribution. Hence, it is unclear whether province-level adjustments of the INAIL series are justified.

Nonetheless, the underestimation of average earnings due to the idiosyncratic weighting of the INAIL series can lead to overestimating the minimum wage bite, especially for the early period. To provide a more plausible estimate of the bite, I have adjusted the INAIL series by multiplying the wages by the ratio between the Ministry of Labour series and the INAIL series, for every year. Alternatively, to avoid potential distortions in the period after 1975, I have multiplied the INAIL wages by the national average of the ratio between the province-level Ministry of Labour wages and the province-level INAIL data in 1973. It is worth noting that such adjustments do not affect the econometric analysis, because they only apply a common scalar to all provinces in each year, which is absorbed by time-fixed effects. They are simply performed to provide a more plausible estimate of the mean minimum wage bite in the descriptive section.

A.3 Effective wages by skill category and skill premium at the national level

Data on effective wages by skill category at the national level between 1962 and 1973 are digitized from the quarterly publication of the Italian Ministry of Labour (*Statistiche del lavoro*), which computed labour statistics on a large sample of Italian manufacturing firms. The sample size varied over time to account for the growing number of Italian firms and their changing sectoral composition, but it was typically in the range of 50,000 to 60,000 units. According to the publication, this was the universe of manufacturing establishments that employed at least ten workers in the week before the survey (five workers for the construction sector). The unit of analysis was the manufacturing establishment, i.e. the productive unit (for the construction sector, this is the sum of the construction sites belonging to the same firm in each province). The unit was classified univocally under one industry label according to the prevailing activity of the firm. In case the unit contained departments that were entirely destined to other activities, these departments were classified as autonomous units. The aim of the survey was to collect information on employment, working times and actual wages in the manufacturing sector. The survey was conducted every three months and asked questions regarding the situation during and at the end of the quarter, except for the disaggregation by sex and skill category, which was conducted every six months (period april-october) for blue-collar workers and annually for white-collar workers. The survey was coordinated by the Ministry of Labour (Ministero del Lavoro e della Previdenza Sociale) and was administered by the local Ispettorati del Lavoro. The Ispettorati also performed periodical checks on the quality of the responses on a sample of 3% of the units surveyed. These data have been used to estimate the skill premium at the national level (see Fig. 3.2) and as independent variable in the sectoral-level analysis (year 1968 and 1973 only).

Data on actual wages by skill category for 1984, 1987 and 1990 are digitized from *Rassegna di statistiche del lavoro*, a quarterly publication financed by Confindustria, the association of manufacturing employers, to collect labour statistics from a range of offical sources and to produce original research on the labour market. Data for 1984 and 1987 come from the *Indagine Confindustria su occupazione e retribuzioni nell'industria manifatturiera*, edited by A. Carandente, which surveyed a representative sample of manufacturing firms to collect information on employment, working time and wages. The surveys were published in *Rassegna di statistiche del lavoro*, n. 3-4, 1985 and n. 2, 1989 respectively. Data for 1990 come from the article by G. Faustini and F. Ludovisi, *La determinazione delle retribuzioni nell'industria italiana: il "gap" tra retribuzioni contrattuali e di fatto*, tables 4-8, pp. 50-53, published in *Rassegna di statistiche del lavoro*, n. 2, 1991. These data have been used to compute the skill premium (see Fig. 3.2) at the national level and, for 1984 only, at the sectoral level.

Estimates of the wage dispersion in 1975-2000 are computed from the 'Veneto Worker Histories' database. The database was developed by the Department of Economics at Ca' Foscari University of Venice, under the supervision of Prof. Giuseppe Tattara. Permission to use the database was granted by Fondazione Rodolfo Debenedetti, the research institute that stores and preserve the database.[5] The data was extracted from administrative archives at Inps, the Italian institute of social security, in 2003. The database records matched-employer employee data for the universe of individuals employed in the private sector in the provinces of Treviso and Vicenza (both in the Veneto region) at least once between 1975 and 2003, regardless of their place of birth and of their previous or following working life. Workers in agriculture and public administration are not included in the data. Other individuals excluded are those whose pensions were not managed by INPS, even if they worked in the private sector. These latter individuals worked mostly in health services, in the state-owned railway company (Ferrovie dello Stato), and in other firms owned by the Italian government through IRI and its subsidiaries. The database also excludes autonomous workers without employees (including artisanal and commercial micro-businesses employing only the owners). As declared by the authors, 'each individual [in the database] is followed for the whole working

[5] A description of the dataset and instructions to request access are available at https://www.frdb.org/en/dati/dati-inps-carriere-lavorative-in-veneto/ (last retrieved January 2023).

life, even when hired by a firm operating outside the considered geographical area' (Tattara and Valentini, n.d., p. 3; my translation). This applies both before and after the time the individual worked in Veneto. For example, an individual that started work in Sicily, came to work in Veneto for one year only, and moved back to work in Sicily until retirement appears in the database for the whole period, and not only for the time spent in Veneto, with the database registering all the employment spells and the data regarding firms in Sicily, too.

The database contains almost 46 million records (45,985,568), one for each employer-employee match in each year between 1975 and 2003. The matches concern more than 3.5 million distinct workers (3,650,312) and one million firms (1,126,568). The informative potential of the database is thus very high. However, it requires several adjustments in order to provide historically significant and statistically unbiased estimates. Its major source of bias is that, despite providing national coverage, the database is neither a random sample of Italian private workers, nor a perfect population of Veneto workers. It is not a random sample of Italian workers because workers born in Veneto are overly represented. This is due to the fact that people born in Veneto will work in Veneto at least once in their life with very high probability, while the same probability is much lower for of Italians not born in Veneto. In fact, 68% of workers in the registry archive were born in Veneto (about 2.5 million individuals), and 32% outside (slightly less than 1.2 million individuals). Any estimates based on this sample would then be heavily affected by people born in Veneto, and if people born in Veneto have distinct characteristics that correlate with variables of interest, any estimate would be biased. Moreover, Veneto-born and non-Veneto-born workers in the database are not easily comparable: while all non-Veneto-born workers moved at least once in their life from their region of birth (because they must have worked in Veneto to be included in the dataset), some Veneto-born individuals in the database might have never moved from their region of birth. Since decision to emigrate, even for short periods, might correlate with relevant unobservables, any estimate based on this sample might be biased. The dataset was claned following the procedure described by Devicienti *et al.* for the same source: weekly wages were computed dividing total gross wage per employment spell by the number of weeks worked or, if unavailable, by the number of days worked divided by 5.5; in case of multiple employment spells for the same worker and year, only the longest spell was used; employment spells shorter than 16 weeks have been excluded. The dataset was trimmed to exclude observations in the 1st and 99th percentile.

To compute the wage dispersion at the aggregate level in 1975-2000, I restricted the analysis only to employment spells in Veneto, irrespective of the worker's place of origin. This choice is motivated by the opportunity of pooling all sectors together and, following the discussion by Devicienti, Fanfani, and Maida (2019, pp. 382-84) on the same data source, hinges on the assumption that evolution of the Veneto wage distribution tracks closely—over time—the changes in the national distribution (see 3.2).

A.4 Provinces' industrial composition

Local industry weights are computed from an electronic database reporting the number of establishments and employees at the municipality level (LAU 2) for 1961, 1971, 1981 and 1991. The data, originally from the industrial censuses carried out in the respective years, was harmonized by Istat to allow intertemporal comparisons between industrial sectors. Access to the electronic data was possible at the following website: `http://dwcis.istat.it/index.html` (last retrieved 26/11/2019). However, since September 2020, the website has been disabled. Nonetheless, information on the dataset, including sources and methodology, can be obtained from the archived snapshots at the Internet Archive through the WayBack Machine (see for instance `https://web.archive.org/web/20161110223356/http://dwcis.istat.it/cis/index.htm`. The archived version does not allow to download the data at the municipality level due to login procedure failing, but the raw files can be provided upon request.

Data were originally output into a distinct csv file for each census year of 1951, 1961, 1971, 1981, 1991, 1996 and 2001. Four fields were reported in each file: code and name of the municipality; code and description of the subsector (*categoria economica*) at four-digit level; number of establishments and number of employees in the sector. I have cleaned the dataset dividing codes and descriptions into separate fields, and I appended the cross-sectional csv files to obtain a panel dataset. An important notice is that municipality-sector cells were reported only if they had at least one establishment in one census year. Consequently, the resulting panel was unbalanced, as it missed all municipality-sector cells that were equal to zero in all census years. To produce a complete balanced dataset, I obtained the full list of municipalities in each census year from Istat's *Atlante Statistico dei Comuni*, 2014 edition (available at https://www.istat.it/it/archivio/113712), and I added all missing municipality-sector cells, setting the value of establishments and employees equal to zero. The resulting dataset contains information on the number of establishments and employees in 8,141 municipalities for 57 sectors in each census year, for a grand total of 1,852,272 observations. Sectors include extractive industries, manufacturing, construction, energy and services, but not agriculture. For this paper, I only consider 21 sectors in manufacturing proper, in addition to extraction of metallic minerals, construction, and energy. Tab. A.3 lists the sectors considered and the number of establishments and employees in 1971. The 21 sectors in manufacturing proper cover over 97% of all manufacturing establishments and almost 98% of all employees in 1971. Other manufacturing sectors not considered are tobacco, production of cinematographic, photographic and phonographic materials (which is originally combined with services such as movie production), and 'other manufacturing', a residual category from the census classification. Among non-manufacturing sectors, I exclude extraction of non-metallic minerals, oil and gas refinery, and the water industry. I exclude from the manufacturing classification all repair shops (which were considered so until the 19 census) due to their later and more appropriate classification into the service sector. For a discussion, see Istat (1998).

The data was not originally harmonized for geographical comparisons. To measure the industrial composition at the provincial level I have first harmonized the data to historical provincial boundaries (choosing 1961 as the benchmark year) by aggregating the municipality data into contemporary provinces first and then aggregating provinces to 1961 boundaries. This implied adding the values for the new provinces of Pordenone (established in 1968) to Udine, that of Isernia (established in 1970) to Campobasso and that of Oristano (established in 1974) to Cagliari, when present. Secondly, I have harmonized the data for comparison with the wage series, by using the sector definitions of the minimum wage series. The harmonization consisted in summing the number of establishments and employees from the dataset's subsectors according to the minimum wage sectors, in each year-province cell. Intercensual values have been estimated with a linear interpolation of the census data.

A.5 Annual estimates of industrial employees at the province level

To compute value added per worker in industry with annual frequency it is necessary to divide the total value added in the sector (obtained from the Tagliacarne series) by the number of employees. Unfortunately, administrative data is not available in general before 1983 and the few surveys of industrial employment (such as those conducted by the Ministry of Labour) are not fully representative of all firms and they are limited in terms of time coverage. Labour force estimates would be the most obvious candidate for computing such a measure but, to my knowledge, they are not available with annual frequency at the province level (NUTS-3) from the 1960s to the 1980s. Nonetheless, by combining their regional series with province-level information on employment from the industrial censuses of 1961, 1971 and 1981, I have been able to estimate new time series of industrial employment at the province level from 1961 to 1981. This section presents the sources used for this estimation and its methodology.

Table A.3: SECTORS IN THE CENSUS DATASET: CODES, ESTABLISHMENTS AND EMPLOYEES

census sectors	codes	establishments	employees
Food & beverage	3010	49,272	381,215
Leather & hide	3030	6,680	56,811
Textiles	3040	49,280	541,030
Clothing	3051	97,041	416,447
Footwear	3052	36,390	172,052
Wood & wooden products	3061	68,597	221,062
Furniture	3062	31,072	175,532
Paper & packaging	3070	3,491	94,256
Printing & publishing	3080	13,603	141,020
Iron & steel	3101	2,641	221,354
Forging, pressing, stamping and roll forming of metal	3102	911	24,294
Non-electric engineering, metallic carpentry, secondary smelting	3111	35,026	703,473
Electrical & telecom engineering	3112	5,370	318,125
Precision engineering, goldsmithing & silversmithing	3113	9,210	125,630
Transport vehicles	3115	2,498	335,844
Non-metallic minerals	3120	23,985	330,487
Chemicals	3131	6,230	252,280
Oil derivatives	3132	266	22,579
Artificial textiles fibres	3133	71	47,332
Rubber	3140	5,629	84,568
Plastics	3151	6,619	101,485
Total manufacturing proper		*453,882*	*4,766,876*
Extraction of metallic minerals	2010	140	9,521
Construction	4010	158,553	997,534
Electricity & gas	5010	5,366	134,037
Total industry		*631,226*	*6,011,586*

Four-digit sectors in the census dataset (manufacturing proper and other industries). Establishments and employees refer to the 1971 census, national total from 8,141 municipalities. Tobacco, cinematographic, photographic and phonographic materials, and 'other manufacturing' (totalling 13,305 establishments and 103,618 employees) are excluded from the analysis. Sources: see text.

Notice that all data are repoted at constant borders for twenty regions divided into 92 provinces.

Official statistics on the Italian labour force were produced since 1959 by Istat (the National Statistical Institute) using a quarterly survey that was administered on a stratified sample of representative households. The stratification procedure included the totality of provincial capitals and all municipalities with a population over 20.000, and a stratified sample of all other municipalities according to geographical, morphological and economic observables. Surveyed households were selected from the registry offices of the municipalities included in the study. One third of the households exited the panel every quarter, and municipalities were partially resampled every four quarters (Istituto Centrale di Statistica, 1958b). The results from the most recent survey were published every new quarter (Istituto Centrale di Statistica, 1958a and subsequent years), but the annual averages were also computed and reported in the yearbook of labour statistics (Istituto Centrale di Statistica, 1960).

Due to the stratification procedure, results were reported at most at the regional level (NUTS-2). However, the labour force survey represents the most credible benchmark for estimates of employment, unemployment and participation rates with annual frequency on this time scale. The sample size, survey methodology and variables' definitions changed over time, with major updates in 1977 (adding undeclared employment and extending the definition of unemployed) and in 1984 (when the survey questions where adapted to European Community standards).[6] Nonetheless, results from 1959 to the late 1980s are largely comparable, until a major reform of the methodology in 1992 forced Istat to rework previous estimates to ensure forward compatibility.

To estimate the number of employees in the industrial sector with annual frequency at the province level, I have followed a three-step procedure. First, I have digitized the annual averages of the labour force surveys reported in the

[6]For detailed explanations of changes over time see *Avvertenze* to Istituto Centrale di Statistica, 1979, pp. 7-10 and subsequent quarterly publications in the series.

yearbook of labour statistics for all twenty regions from 1959 to 1982. The sources already distinguished the number of employees by macro-sector (agriculture, industry, and 'other activities'), where industry includes manufacturing proper, construction and utilities. The only adjustements needed were made with respect to the definition of unemployed, hence they did not affect the estimates discussed in this section.

Second, I have computed the number of industrial workers in each province in 1961, 1971 and 1981 according to the respective industrial censuses. The source used for this computation is the Datawarehouse CIS, a now-discontinued official repository that was maintained by Istat which allowed to retrieve the number of establishments and the number of employees at the municipal level for the industrial censuses of 1951, 1961, 1971, 1981, 1991 and 2001.[7] The data had been adjusted by Istat to account for changing sector definitions between the censuses. I have aggregated the municipalities' data at historical provincial borders to compute the number of employees in the industrial sector (including mining, manufacturing proper, construction and utilities). Then, I have performed a linear interpolation between the census years. Hence, I have used the linearly-interpolated series to compute each province's share of industrial workers with respect to their region's total.

The third step consisted in allocating the regional number of industrial employees from the annual labour force surveys to each province in the regions according to the share of indutrial workers computed from the census data. The computation is represented by the following equation, where $\hat{E}$ stands for the estimated number of industrial employees in province i and year t, which is

[7]On 26 November 2019, I downloaded all census files from the Datawarehouse CIS, which at the time was maintained by Istat at the following web address: http://dwcis.istat.it/cis/index.htm. Since February 2020, it appears that the server has been disconnected. Unfortunately, comparable services provided by Istat, including the *Atlante statistico dei comuni*, do not allow to perform the same queries of the older Datawarehouse CIS. In particular, the new services do not allow to make historical comparisons with the years 1951 and 1961. The metadata describing the website, sources and methodology can still be accessed through the Internet Archive at the following address https://web.archive.org/web/20100124131626/http://dwcis.istat.it/cis/index.htm (last retrieved August 2022).

obtained by multiplying the number of industrial employees in region j at time t by the share of interpolated industrial employees from the censuses $\bar{C}$.

$$\hat{E}_{it} = E_{jt} * \frac{\bar{C}_i t}{\bar{C}_j t} \qquad \text{[A.1]}$$

The result of this procedure is illustrated in Fig. A.3, which depicts the estimated number of industrial employees in the province of Turin from 1961 to 1981, together with the linear interpolation from the industrial censuses. Notice that, while not identical, the levels are close between the two series. Differences in values can be attributed to the distinct definitions of employment and data collection methodologies.

It is also important to note that the underlying assumption to this procedure implies that the data-generating process for provincial employment between two census years can be approximated by a random walk with drift. By construction, the drift is province-specific while the transitory random shock is common across all provinces within the same region but differs between regions, even though we cannot rule out that some shocks in the data are also common across regions. This simple characterization is coherent with the hysteresis hypothesis of unemployment (Blanchard and Summers, 1986), which has been found to be especially realistic for Italy between the 1970s and the 1980s (Marcellino and Mizon, 2001; Fabiani et al., 2001).

A.6 Estimates of age groups between census years

School data need to be compared with the population in the relevant age groups to compute enrolment rates, and job centre registrations should be normalized by the number of young individuals in the province. However, as far as I am aware, annual time series reporting the size of age groups at the province level are not available before 1982. To estimate the number of individuals (male and female) that were aged 14-18 (to compute enrolment rates in upper secondary

Figure A.3: Estimates of industrial employees in the province of Turin

The connected markers represent the total number of employees in industry (mining, manufacturing proper, construction and utilities) in the province of Turin computed from the industrial censuses of 1961, 1971 and 1981. The dashed line indicates the interpolated values. The solid line plots the number of industrial employees estimated by multiplying the number of industrial employees in the Piedmont region according to the labour force survey by Turin's share of industrial employees in the Piedmont region according to census data. Turin's share is computed for any given year as the ratio between the interpolated number of industrial employees in Turin and the interpolated number of industrial employees in Piedmont, obtained from census data. Sources are Istituto Centrale di Statistica (1968b), Istituto Centrale di Statistica (1977) and Istituto Centrale di Statistica (1983a) for the regional labour force data and Datawarehouse CIS for the census data. All series are computed at historical borders.

education) and 15-21 (to normalize job registrations) in each year-province cell between 1962 and 1982, I have first digitized tables from the population censuses of 1961 (Istituto Centrale di Statistica, 1968a, Table 2.C, pp. 140-231) and 1971 (Istituto Centrale di Statistica, 1974a, Table 2.C, pp. 274-461), which report the resident population in each province at the time of each census, by age and sex.[8] The census of 1961 defined age as number of years since

[8]Both volumes are available in pdf format from Istat's digital library at the website https://ebiblio.istat.it/SebinaOpac/.do?locale=eng (last retrieved January 2023). Note that the table for 1971 does not report the data for the province of Macerata. I have computed the values for Macerata by subtracting all other provinces from the national total,

birth (that is, counting the first year of life as number one), while the census of 1971 computed age as number of birthday anniversaries (thus counting the first year of life as number zero). In order to harmonize the definitions, I have subtracted one to the age reported in the census of 1961. The resulting data has been further harmonized to historical provincial boundaries by aggregating the province of Pordenone (established in 1968) to Udine and the province of Isernia (established in 1970) to Campobasso, in 1971. The same procedure has been applied to Istat's official reconstructions of the intercensual population in 1982: in this case, in addition to the harmonization of Pordenone and Isernia, the province of Oristano (established in 1974) was aggregated to the province of Cagliari.[9]

These procedures provided an intermediate dataset containing the size of age groups in each province in 1961, 1971 and 1982. To obtain estimates of the size of each age group in the missing years (1962-1970 and 1972-1981) I first identified the year of birth for each age group. Thus, I obtained the number of individuals born in each year from 1898 to 1982 (i.e. the birth cohort). Restricting the analysis to individuals that were no older than 21 in 1962 (born 1941) and no younger than 14 in 1982 (born 1968), I performed a linear interpolation between the benchmark years for each birth cohort, by sex and province. Finally, the size of the 14-18 and 15-21 age groups was computed by summing the number of individuals in the same age range, for each year-province cell.

This methodology has allowed to compute new longitudinal series of the 14-18 and 15-21 age groups in each province and year, at historical borders. However, some limitations to this reconstruction must be acknowledged. First, the linear interpolation imposes the assumption that any changes in the size of the birth cohorts accrue evenly over time, which could be too restrictive.

for each age cohort and sex. For the 1971, I only digitized data for the population of age 30 and under.

[9] I downloaded the Istat intercensual reconstruction for 1982 from the official web repository GeoDEMO https://demo.istat.it/dat81-91/PROVIN/Index.htm (last retrieved 11/02/2022). Since 2023, the website has changed user interface and name (it is now *Demo. Demografia in cifre*), but the data is still available at the same address.

Changes to the size of a birth cohort in each province can be attributed to deaths and net migrations. Thus, the assumption implies that age-specific death rates are similar and that the probability of migration does not vary with age between birth and age 21. It is obvious that age-specific risk factors can negate this assumption. A more precise procedure would consist in deflating the number of individuals using age-specific death rates and accounting for emigration and immigration rates by age. However, the data requirements for such an analysis cannot be satisfied for the earlier period at the necessary frequency and level of disaggregation, due to the lack of accessible sources. Nonetheless, the focus on short age ranges (lasting five or six years) suggests that age-specific risk factors do not vary significantly: mortality at 14-21 for the age groups considered was extremely low from 1962 through 1982. The probability of emigration did in fact increase in the age range, but as long as this did not vary extremely *between* consecutive birth cohorts, the potential bias should not affect the empirical analysis.

It is also necessary to highlight that the census data and the official reconstruction of the 1982 population considers only *resident* individuals in the province. An individual was considered resident only if she was registered at the local population office (*anagrafe*) at the time of the census, and she would be counted by the census enumerators even if she were not present at the stated address at the time of the enumerator's visit. An alternative measure would be the size of the present population, that is the number of people that were present at the address at the time of the enumerator's visit. To obtain the present population from the resident population one needs to add individuals that were present at the time of the visit but were registered in a different province and subtract the number of individuals that were officially resident but absent at the time of the visit. Hence, the resulting totals would inflate the size of the age groups in provinces with negative net migration (in the age group) and reduce it in provinces with positive net migration. While the present population can provice a more accurate description of recent migrations, the choice of the resident population stems from the consideration that the resident data is more conservative, thus appearing more appropriate for the purpose of computing enrolment rates in school, for it is assumed that students mantain a stable residence in the province. Moreover, Ista's official 1982 reconstructions report only resident population, so this choice is forced to ensure correct historical comparability.

Several studies highlighted possible errors in the 1971 census, for the size of a limited number of birth cohorts appears too large when compared with the previous and the following censuses. This is in fact reflected in our data: the size of certain birth cohorts spikes in 1971 with respect to consecutive cohorts, while this does not happen for the census of 1961 and Istat's reconstructions for 1982. To eliminate any potential biases that this might cause, I follow the methodology proposed by (Caselli, Golini, and Capocaccia, 1989) only for the birth cohorts that are relevant for the 14-18 and 15-21 age groups in the period under consideration (1962-1982). These are the cohorts born in 1960, 1950 and 1948. The formula suggested by the authors to correct the error in each affected cohort g is the following:

$$P_g^{71^*} = P_g^{81} \sqrt{\frac{P_{g-1}^{71} P_{g+1}^{71}}{P_{g-1}^{81} P_{g+1}^{81}} K}$$

Where P is the size of cohort g, the apex indicates the year of the census that reports the information (1971 or 1981), and K indicates a coefficient which accounts for mortality and net migration between the two censuses. The corrections are performed separately for male and female. Using the values reported by Caselli, Golini, and Capocaccia (1989, pp. 9-3), the K coefficient for males is 0.999995 for the 1960 cohort, 1.000034 for the 1950 cohort and 0.999865 for the 1948 cohort. For females, the coefficient is 0.999995, 1.000025 and 0.999950, respectively. The correction does appear to solve the unexpected spikes in the data from the 1971 census: Figure A.4 plots the ratios between the size of each cohort in 1971 with respect to 1961 and with respect to 1982, both with and without adjustments, aggregated at the national level. The spikes that are present in the unadjusted data are not present in the adjusted data, for the relevant birth cohorts. The same check is performed for each province separately, reaching the same conclusion (graphs available upon request). Nonetheless, to check that the correction does not alter the results, regressions are run both both with and without adjustments and results remain unchanged (available upon request).

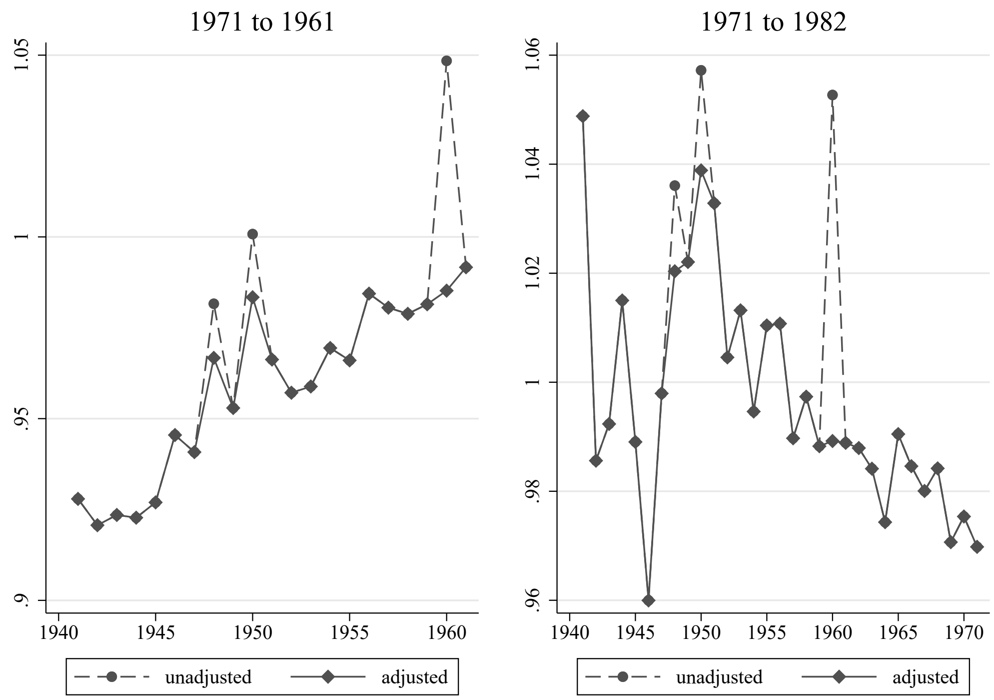


Figure A.4: Comparison between raw and adjusted population data

Ratio of the cohort sizes (1971 to 1961 and 1971 to 1982) with and without adjustments. The ratio is equal to one if the cohort size reported in the 1971 census is the same in the 1961 census (left panel) or Istat's 1982 official reconstructions (right panel). The ratio can differ from one due to deaths and net migration. The adjusted series is the same as the unadjusted except for three birth cohorts: 1948, 1950 and 1960. Adjustment method and sources described in the text.

A.7 School data

Data on school enrolment has been digitized from two separate sources. Total enrolment in all tracks of upper secondary school (male and female combined) for the academic year 1962-1963 to the academic year 1971-1972 has been digitized from Istituto Centrale di Statistica (1967b) and following years until Istituto Centrale di Statistica (1974b). Data on school enrolment by sex, track and curriculum has been digitized from Istituto Centrale di Statistica (1966b) and following years until Istituto Centrale di Statistica (1985b), for the school types considered in the analysis. The data has been compared between the two sources and in case of contrast the latter source has been favoured. Occasional apparent errors in sources (e.g. swings in year-on-year enrolment too large to be plausible) have been resolved by linear interpolation for the two adjacent years.

To assess the plausibility of the estimates, further checks have been performed by aggregating the data at the national level and comparing with estimates by Checchi (1997) and Istat (2011). Figure A.5 compares the number of students enrolled in upper secondary school (all tracks and curricula, male and female) according to my reconstruction and Checchi (1997). The figure shows that the difference between the two series is contained between -0.5% and 0.5%, and is equal to zero in most years.

Figure A.6, instead, compares the gross enrolment rate in upper secondary school according to the different series. The series presented in this paper (Ramazzotti) is very close to the official reconstruction by Istat (2011) in most years, except for the latter's inexplicable outlier in 1970. The series by Checchi is slightly lower (average difference 0.85% across the whole period) but follows the same trend. Due to the similarity of the reconstructions of total enrolment between my series and Checchi, it appears that the difference is largely due to different estimates in the population level. The cohort size in Checchi's series is 2.3% smaller than my estimate on average across the whole period, with a larger negative differential at the beginning of the period (peaking -6.4% in 1964) and a small positive differential in 1982 (1.6%). It is possible that the difference is due to different adjustments in the estimation of the size of the age groups between census years.

In light of these very minor differences, the comparisons of our national

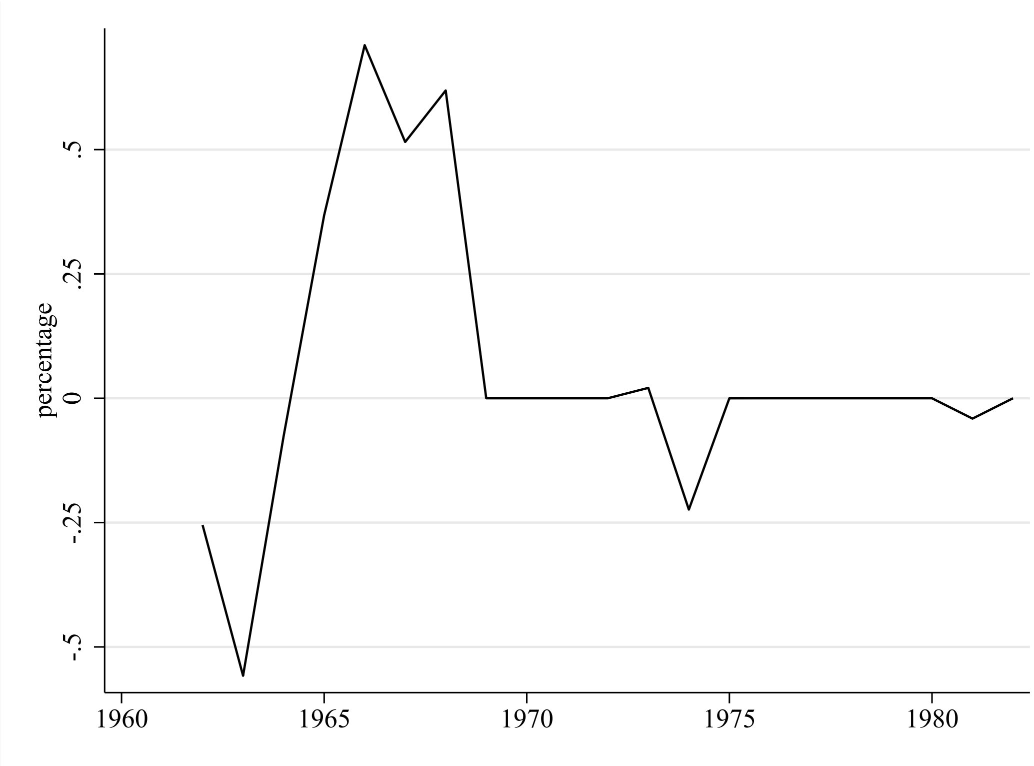


Figure A.5: Comparison between series of students enrolled

Annual percentage difference between the number of students enrolled in upper secondary school (all tracks and curricula, male and female) according to my reconstruction and Checchi (1997).

series with the available reconstructions reassures us about its plausibility and, hence, that of our province-level data.

A.8 Youth unemployment

As far as I am aware, estimates of youth unemployment from labour force surveys are not available at the provincial level for the period under study in published format. To circumvent this data limitation, I opt to use the number of young people registered at local job centres. Statistics from the local job centres have well-known limitations, due to the administrative nature of the data—in contrast to statistical sources, such as the labour force estimates—as highlighted, for instance, by warnings contained in Istituto Centrale di Statistica (1970, pp. 18-19). On the one hand, not all unemployed would register, especially individuals that searched for jobs that did not require

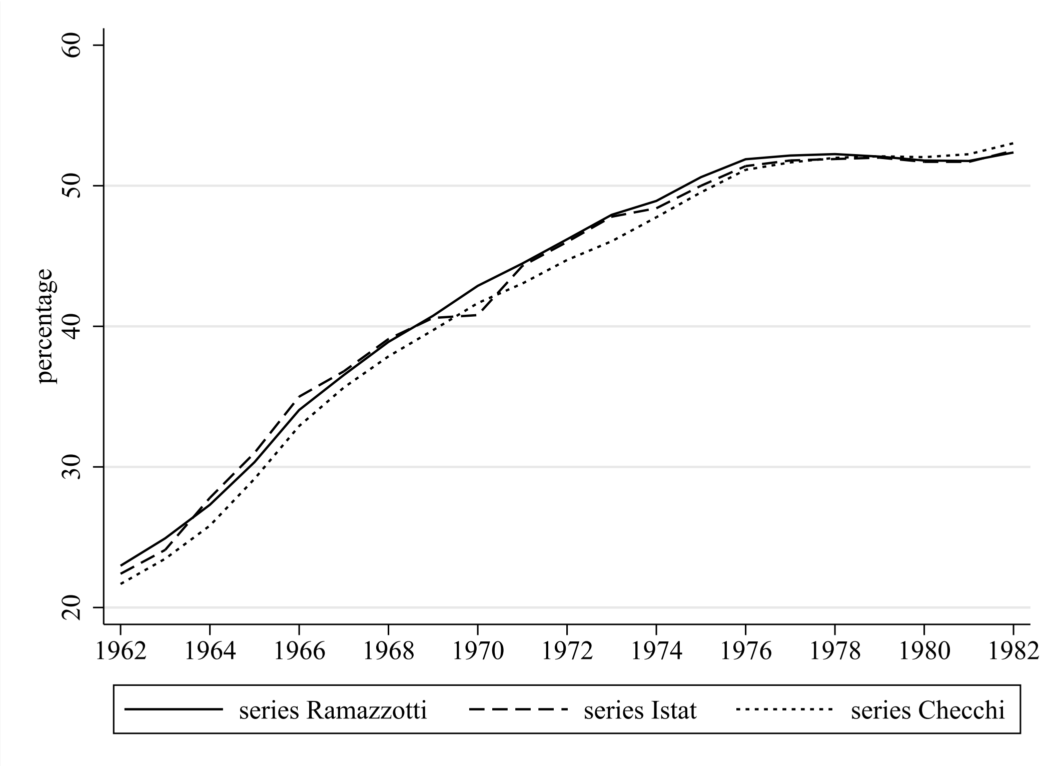


Figure A.6: COMPARISON BETWEEN SERIES OF GROSS ENROLMENT RATE

Gross enrolment rate computed as the ratio between the number of students enrolled in upper secondary education (both sexes, all tracks and curricula) and the relevant age group (14-18 years old), in percentage. Series Ramazzotti is the one presented in the paper, series Istat is from Istat (2011), series Checchi is from Checchi (1997).

compulsory registration—however, this typically did not apply to blue-collar jobs—, and those that were searching for local jobs through informal networks. On the other hand, not all people registered at local job centres were effectively looking for a job, for registration alone was necessary to obtain unemployment benefits and other allowances. For instance, in 1968 the labour force survey reported that 331,000 individuals under 21 were searching for their first job, but only 150,502 were registered as such in the job centres' lists, that is about 45% of the total.[10] Similarily, according to the responses given to the labour force survey in 1977, fewer than 53% of unemployed individuals under 21 searching for a job (including both first job seekers and other) had registered at a local

[10]Own computations on data from Istituto Centrale di Statistica (1969a, pp. 71, 100).

public job centre.[11] However, in the same year, the number of people under 21 that were registered at job centres as looking for their first job was higher than that estimated by Istat's survey, suggesting that a significant number was not in active search—although it should be also noted that comparisons over time are also affected by changes in the definition of unemployed according to Istat's own labour force survey.[12]

Because of these limitations, registrations at job centres do not allow to precisely estimate unemployment rates. Hence, I will focus on the number of individuals registered, distinguishing between prime age workers and under 21 and, among the latter, between those that had a previous employment and first job seekers, by sex. Since the reconstruction required to combine a range of different sources, I have checked the plausibility of the series by comparing them with aggregate figures at the national level reported in Istat's annual labour statistics publication. The two series exhibit a strong co-movement and are virtually identical until the latest period (after 1975), when my series tends to slightly under report the number of registrations. This can be attributed to the limited selection of monthly registrations that is used for the later period, due to the absence of sources reporting the annual averages at the province level. Nonetheless, to the extent that the under-reporting is common to all provinces, this deficiency should not systematically bias the estimates.

Figure A.7 shows the total number of individuals registered as unemployed, by sex and category, across all provinces over time. Male prime-age workers were consistently the largest group, but their number remained relatively stable in the long run, oscillating 650 and 450 thousand; female prime-age unemployed remained stable at a considerably lower level until circa 1975, when they started

[11] Own computations on public microdata from the historical quarterly labour force surveys, available from 1977 to 1992, at https://www4.istat.it/it/archivio/206993, last retrieved July 2022. Estimates obtained by computing the share of individuals actively looking for a job that registered at public job centres, between the age of 15 and 21, in the year 1977. Survey respondents are weighted according to the sample probability coefficients reported in the dataset.

[12] Own computations on national-level data from Istituto Centrale di Statistica (1978, pp. 5-7, 94).

converging to the men's. The number of male first job seekers, instead, grew at fast rates after 1975, converging towards the prime age level. An even steeper increase is shown by women seeking their first job, which overtook the number of prime-age unemployed females. This convergence is particularly remarkable considering that the cohort between the age of 15 and 21 accounted for only 10% of the population. Young people with previous employment experiences also show a tendency to increase towards the end of the period, but much more slowly than first job seekers. These tendencies closely matched national series of unemployment rates by group and sex—see Reyneri (1996, p. 66) and Pugliese and Rebeggiani (2004, p. 80)—, reinforcing our opinion that job-centre registrations provide a reliable proxy for the dynamics of local unemployment.

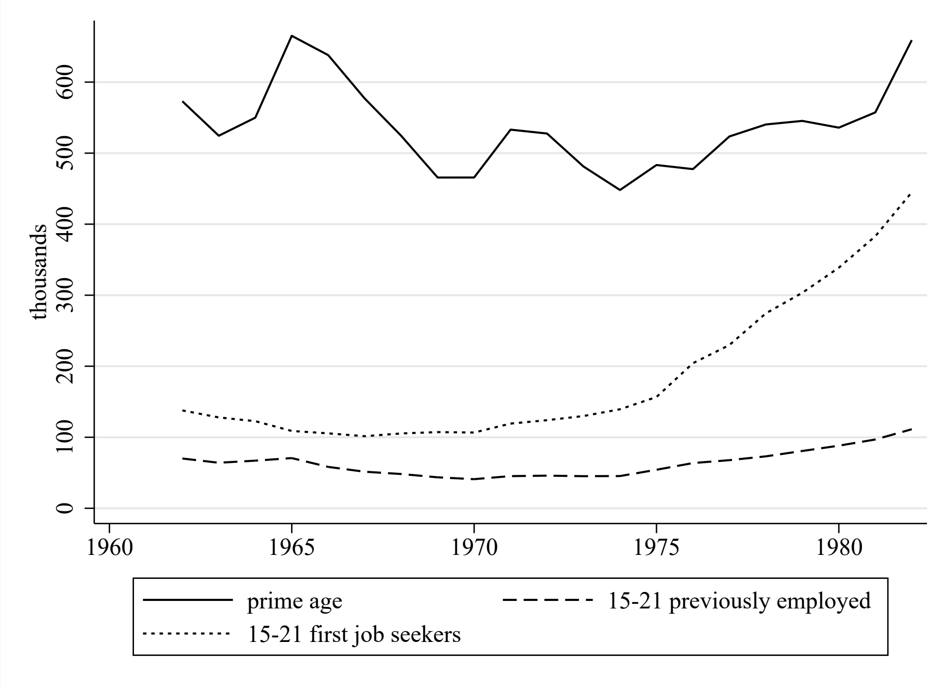
A.9 The official series of the 'cost of living'

From the the interwar period to the 1990s, the National statistical institute published an index of the 'cost of living' for a representative household of dependent workers. Despite its official name, this was not a proper cost-of-living index, but rather a Laspeyres-type price index for a stable basket of consumer goods and services over time. The basket was deemed representative of the consumption structure of working class households at low income levels. The methodology varied little over time, which makes this series particularly appropriate for intertemporal comparisons.[13]. However, changes in the composition of the basket and its representativity need to be discussed.

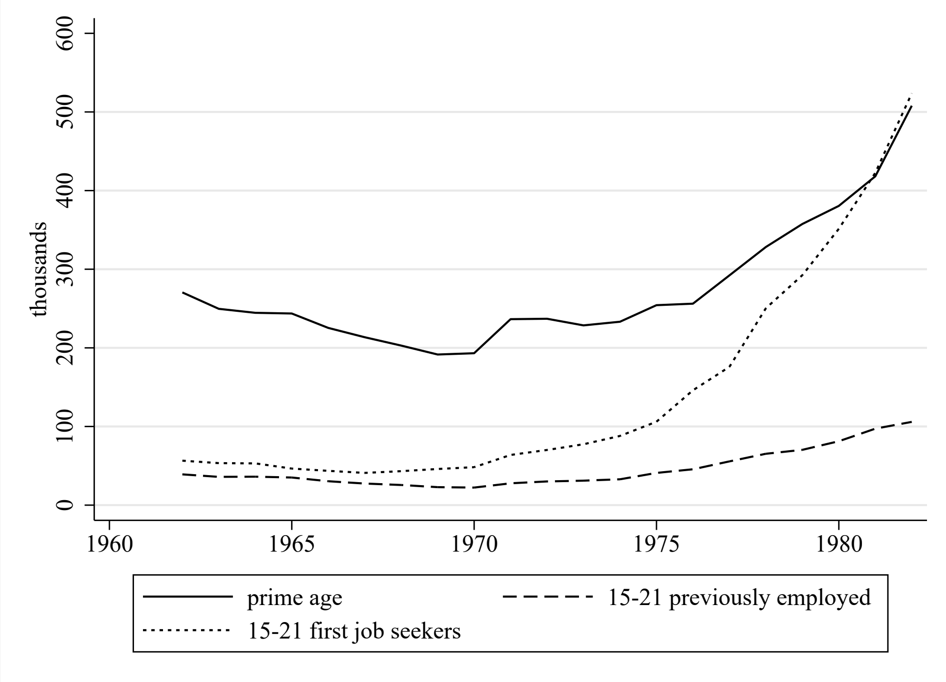
Since 1949 the products in the basket were chosen to satisfy the basic needs of a household of four people (man, woman and two children).[14] The first entirely new index that Istat computed after the Second World War—which used 1961 as benchmark year—included 190 goods and services, organized into 31 categories and five groups (foodstuffs, clothing, electricity and fuel, housing, and other goods and services). Each component was assigned a weight based on

[13] For a list of all methodological changes and sources see D'Acunto (2006).

[14] A previous version of the index, using 1938 as benchmark year, assumed a household of five people.



(a) male



(b) female

Figure A.7: UNEMPLOYED REGISTERED AT JOB CENTRES

Total number of individuals registered at job centres (thousands), by sex and category. Prime age workers are between the age of 22 and 60. Sources: see section A.8

household budget surveys that had been conducted in 1953-54 and in 1956-57 (Istituto Centrale di Statistica, 1967c, pp. 71-73) on a representative sample of households whose breadwinner was a dependent worker not employed in agriculture. The index was computed separately for each province using the Laspeyres formula:

$$I = \frac{\sum_{n=1}^{187} p_{n,t}\, q_{n,1953}}{\sum_{n=1}^{187} p_{n,1953}\, q_{n,1953}} \qquad \text{[A.2]}$$

Where p is the price of the component n and q the quantity consumed in 1953, according to the household budget. In practical applications, Istat used weights (calculated as the share of total consumption) rather than quantities. A new and more representative survey carried out in 1963-64 showed that the old structure of consumption was no longer representative of the Italians' quickly changing habits. Hence, Istat modified the weights accordingly, but maintained almost unchanged the components of the basket.[15] A similar procedure was then followed in 1970, 1976 and in 1980.

Table A.4 reports the changing weights for the five groups of products over these updates. As can be expected from a country undergoing fast economic growth, the share of the budget spent on foodstuffs dropped from 55% in 1961 to 35% in 1980. The share in 1980 might appear too high for the level of income reached by then, but research has shown that Engel's law applied very weakly to Italy during the Golden Age: large improvements in disposable income were followed by limited reduction in the proportion of the expenditure on food. Sorrentino and Vecchi (2017) estimate that the average Italian household spent about 30% of the budget on food in 1981, which is very close to Istat's estimate for the households of dependent workers in the year prior.

The housing group, instead, already accounted for a small share of expenditure in 1961 and declined continuously for two decades, dropping as low as 4.8% in 1980. This might seem a small share of expenditure, considering that the housing group is mostly driven by rents (with a weight of 86.2% over the

[15] The consumption structure was updated from 1963/64 to 1966 using national accounts data.

Table A.4: Evolution of the consumption structure after rebasing

	Percentage of total expenditure				
Product groups	1961	1966	1970	1976	1980
Foodstuffs	54.65	48.71	46.66	40.82	34.97
Clothing	9.8	10.24	10.06	10.19	10.46
Electricity and fuel	4.63	5.14	3.46	3.45	3.39
Housing	11.29	9.01	8.3	6.04	4.82
Other goods and services	19.63	26.9	31.52	39.5	46.36
Total	100	100	100	100	100

Weights of the basket components in the different benchmark periods, by goups of products. Source Istituto Centrale di Statistica (1983b, p. 22).

other components of the group in 1966). Two aspects need to be discussed to make sense of this evolution: the type of rents recorded by Istat and the exclusion of imputed rentals.

With respect to the first point, Istat considered three types of rents: free market rents, statutory controlled rents and rents of dwellings owned by public authorities (Istituto Centrale di Statistica, 1967c, p. 81). The latter were typically offered to employees of ministries and major state-owned companies, and accounted for 12.2% of all rented dwelling in 1966, according to a contemporary inquiry (Istituto Centrale di Statistica, 1966c, p. 7). Free market rents were, in theory, limited to only a minor share of dwellings. Since the First World War, in fact, Italian governments had repeatedly tried to control rents through nominal rent freezes and contract regulations, with the aim of curbing inflationary pressure. The rent freeze introduced during the Second World War, in particular, was meant to expire in 1946, but it was continuously renewed and updated until 1978 (Iannello, 2022, pp. 10-14). The index of the cost of living of 1966, in particular, followed the rent controls of 1963, which froze all nominal rents of existing contracts stipulated after 1947. Together, the contracts frozen in 1947 and in 1963 accounted for 75.7% of all residential dwellings rented in 1966. Hence, the free market rents included in the 1966 index only concerned contracts signed after 1963, which amounted to

12.1% of the dwellings. Using archival data, (Iannello, 2022, pp. 10-14) shows that controlled rents did inf cat increase over time, but the rate of growth was capped by their regulation. Rent freezes appeared to temporarily increase the free market rents, but in the long term the two series moved together (with an expected price differential in favour of the free rents). Hence, the prevalence of controlled rents and their anchoring effect with respect to the free market can help explain the low share of the housing component in the household budgets over time.

The second observation concerns the fact that Istat did not account for imputed rentals, a choice that can be very consequential for the household budget. It was estimated that, in 2006, the share of expenditure on rents was 19.5% with imputed rentals, but only 8% without them—which is lower than the estimate for 1966 (L. Cannari and Iuzzolino, 2009, p. 13). Considering that house ownership increased continuously over the period 1961-1981, it is plausible that the share of expenditure decreased—as long as real housing prices remained roughly constant. This appears in fact to be the case for most of the time period under consideration: long-term reconstructions find that the average Italian house did not appreciate in real terms between 1945 and the early 1970s, when real prices started increasing at faster rates (D. L. Cannari, D 'alessio, and Vecchi, 2016, p. 12). However, this observation does not apply to all places: in the largest cities, real housing prices increased continuously throughout the early 1960s, stabilized during the rest of the decade and increased again in the 1970s. This is coherent with the argument that, in the presence of high spatial mobility of labour, local productivity shocks are capitalized in housing prices.

Nonetheless, it should be noted that these dynamics should not bias our estimates of the spatial differential in the cost of living: even if the local dynamics of housing prices were transferred to rents, the differential evolution between provinces should be captured by Istat's indexes of the cost of living. Moreover, when we explicitly include rents in our spatial index, we do so by using the prices observed in 1954, which we project forward to 1966 using the provincial indexes that are specific to the cost of housing. This is due to the unavailability of published rents for 1966, but the procedure should give us a precise estimate.

As a final observation with respect to the evolution of the consumption structure, it is worth noting that the largest increase can be observed for the residual group 'other goods and services.' This group included—among other components—consumer durables and private vehicles, two categories of products in high demand throughouth this period.

Having discussed the representativity of the consumption structure, it is now necessary to turn to the comparability of the indexes over time. With every change to the weighting, the index was rebased. However, to allow intertemporal comparisons, Istat published chaining coefficients that took into account the changes to the weighting procedure. Hence, in order to obtain a continuous series for each province, I have first digitized the published series with the different benchmark years, and I have then multiplied them by the official chaining coefficients, using the series of 1966 at the reference year.

The choice of 1966 is motivated by representativity concerns. N. Amendola, Vecchi, and Al Kiswani (2009, pp. 8-10) show that, in order to obtain plausible estimates of cost differentials over time, it is sufficient that the spatial index is representative of the consumption structure at the year of its computation, and not over the whole period to be estimated. Because the available information on provincial prices concerns mostly foodstuffs, it is appropriate to choose a benchmark year when food represented a major share of the consumption structure. The year 1961 would maximize representativity, but we know from Istat's publications that the weights used for the index of the cost of living were not very representative, because of the poor quality of the household budget surveys. The weights used for the 1966 rebasing, instead, were computed from high-quality surveys.[16] Since food continuted to account for almost 50% of the consumption structure, we can still argue that our spatial index is representative

[16]For a discussion of household budget surveys in Italy see Chianese and Vecchi (2017).

enough of the consumption structure in the benchmark.

This argument also highlights the difference between our estimates and those produced by N. Amendola, Vecchi, and Al Kiswani (2009). Theirs use a spatial index that is representative of the consumption structure in 2006 and project it back in time using Istat's series; ours compute a spatial index that reflects the majority of the consumption structure in 1966 and project it backwards to 1961 and forward to 1981. The fact that we obtain similar results at the macroregional level using such different spatial indexes reinforces the plausibility of both estimates and the validity of the underlying assumptions.

A.10 Geographical units

To ensure the accurate matching of census data with the relevant wage zones, 1961 province borders have been used throughout the analysis, unless otherwise indicated. This required aggregating all spatial data to 92 constant-border provinces. In particular, data for the province of Oristano was aggregated to the province of Cagliari. To build the province-level wage series since 1965, the province of Pordenone was aggregated to Udine and Isernia to Campobasso. For the municipal-level analysis, 1991 or 2001 borders were used, due to the unavailability of earlier historical shapefiles.

Checks to municipality boundaries and definitions were performed using Istat's repository of historical changes to administrative units which is stored on the Sistat's website (*Sistema Informativo STorico delle Amministrazioni Territoriali*), https://www.istat.it/it/archivio/48427. The Sistat website has not been accessible since November 2020, which was confirmed through personal communication with Istat's library staff on 16/11/2020. However, a backup of the repository is available for download from the website *Storia dei comuni. Variazioni amministrative dall'Unità d'Italia*, an independent project on historical borders, which can be accessed at the following link: http://www.elesh.it/storiacomuni/documentazione.asp (retrieved 08/12/2021).

The historical shapefiles of Italy's provinces were downloaded from https://www.istat.it/it/archivio/231601 (last retrieved 09/12/2021). The shapefile of municipalities in 2001 was downloaded from https://www.istat.it/it/archivio/222527. All shapefiles used are the 'detailed' version with coordinate system WGS84 UTM32N.

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