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Macro and microeconomic evidence on investment, factor shares, firm and labor dynamics in Italy and in Trentino

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In recent years, a number of papers have attempted to shed light on some macroeconomic dynamics in a few countries, especially in the US, which raise some concerns and which may be influenced by variations in corporate market power. This study mainly aims to understand how and to what extent Italy differs from other economies in terms of these trends, and whether there are relevant within-country differences. Specifically, we first look at the trends, based on aggregate data, of domestic investment rate, labor share and capital share, labor force participation, wage dispersion and economic dynamism, observed in Italy since the mid-nighties, and make some comparisons with the US and the EU. Then, since national data may hide relevant within-country heterogeneity, when possible, we split Italy in four macro-areas. Further, we focus on a specific Italian region, namely Trentino, for which we also recover the trends in private investment rate, factor shares and profit share, for the years 2009-2015, using a firm-level dataset compiled by Ispat. The main results of this study are as follows: the macroeconomic trends under scrutiny observed in Italy since the second half of the nineties partly diverge from those emerged in the US. In particular, labor share presents a mixed trend during the selected time period, domestic investment has been recovering after the contraction occurred in the aftermath of the economic recession, and labor force participation exhibits a clear average positive trend. In addition, the overall picture hides considerable within-country heterogeneity (more in terms of levels than in terms of trends). For instance, labor force participation is still sensibly lower in the Mezzogiorno than in the rest of the country. As for Trentino, this region exhibits a relatively high level of investment rate, a relatively small wage dispersion (proxied by the Gini coefficient) in recent years and, in most of the years since 2002, a net turnover rate of firms which is higher than the average national one.

Keywords: market power, markup, labor share, capital share, investment, wage dispersion, economic dynamism

JEL Classification codes: E2, D2, J3, L1

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1. Introduction

In recent years, a number of papers have attempted to shed light on some dynamics in the US economy which are somehow puzzling and which raise some concerns. These include: a decrease in investment over output; a decline in both labor share and capital share, coupled with a rise in the profit share; a decrease in labor force participation; a rise in wage inequality; a slowdown in business and labor dynamism. In turn, these dynamics have implications, for instance, for welfare and resource allocation, as well as potential ramifications for policy, such as antitrust, monetary policy and income redistribution (De Loecker, Eeckhoutz & Unger, 2018). From the analysis conducted by a recent strand of literature, it emerges that the increase in firms' (product) market power, which can be measured by the price-cost margin, or markup[1], is one of the leading factors driving these macroeconomic trends. As an illustration, De Loecker, Eeckhoutz & Unger (2018), who calculate firm-level markups using the methodology developed by De Loecker & Warzynski (2012), show that the revenue-weighted average markup in the United States rose from 21% above marginal cost to 61% from 1980 to 2014. They also find increasing skewness in the across-firm distribution of markups over that period, with average markup growth coming from a spreading of the right tail and a shift in revenue shares toward higher-markup firms. IMF (2019) applies this method to a sample of 27 countries, and shows that between 2000 and 2015 most of the advanced countries experienced an increase in markups, which is not particularly alarming yet but which seems it has contributed to some extent to the contraction of private investment, labor share and R&D expenses.

Although some cross-country studies on market power, such as the one by IMF (2019), also include Italy in their sample, so far, few works have examined this topic specifically in this country. Giordano & Zollino (2017) computed macroeconomic total-economy estimates of Italy's markups since 1861, and also sectoral markups for the time span 1970-2012, using different methodologies. Their analysis points out that, despite a large variation of markups across sectors, which highlights the importance of disaggregated analysis, two features of Italy's economic history robustly stand out at both national and sectoral level: the fall of competition under Fascism, and the strengthening of competition after 1993. According to the authors, the decline in firms' markups since the nineties has been fostered by the completion of the EU Single Market, which increased competitive pressure in Italy, especially in the regulated services activities. Bugamelli, Schivardi & Zizza (2008) provide evidence of increased competitive pressure after the adoption of the euro, while Bugamelli, Fabiani & Sette (2015) show that, in recent years, import competition (especially from China) has contributed significantly to curbing price dynamics and the markups of Italian firms.

Thus, it seems that the trend displayed by the markups of Italian firms between the beginning of the nineties and the first decade of the new millennium differs from the dynamics observed in the US in the same period. However, Bugamelli, Schivardi & Zizza (2008) and Bugamelli, Fabiani & Sette (2015) do not employ a direct measure of markups. Moreover, the work by Giordano & Zollino (2017)

[1] From now on, in this study we refer to product market power simply as "market power". The indicator of product market power used in this study is product markup. Another variable which is often regarded as an indicator of (product) market power is market concentration. However, as IMF (2018) and Syverson (2019) point out, this measure should be interpreted with great caution, and can be misleading if used to assess the degree of market power. Indeed, market concentration includes no information about costs or profits, and necessarily requires a definition of market, which is often a point of contention. More importantly, concentration is an outcome, rather than an immutable core determinant of how competitive an industry or market is, and it can be associated with either less or more competition.

uses a set of methodologies for the estimation of markups which present some limitations (see section 2.1), and do not investigate the implications of variations in market power on the economy and the labor market. In addition, most of the extant studies reviewed in the next sections focus on market power on the product market without scrutinizing the presence, the extent and the direction of labor market power. Thus, to the best of our knowledge, a comprehensive study on markups and macroeconomic trends applied to the Italian context has not been conducted so far.

Our research project[2] consists of two main parts: in the first part, which is the object of this study, we first document the evolution of a number of macroeconomic trends in Italy, based on aggregate data (mainly from Istat, but also from cross-country datasets such as Ilostat) in order to understand if, how and to what extent this country differs in terms of such dynamics from the US or other countries, and whether there is relevant heterogeneity across the Italian macro-regions. Next, we restrict our analysis to a specific region, namely Trentino, and replicate some of the selected macroeconomic trends in this area exploiting firm-level data made available by Ispat. In the second part of the project, we will estimate corporate markups relative to the manufacturing sector in Trentino and in Italy, drawing upon De Loecker & Warzynski (2012)'s novel methodology. After that, we will see whether and how changes in market power help explain some relevant macroeconomic patterns observed in Italy as a whole, in its main macro-regions and in Trentino.

The balance of this work is organized as follows. Section 2 briefly reviews the literature on six macroeconomic variables which, according to De Loecker, Eeckhout & Unger (2018) and to other studies, may be affected by firms' markups, namely: (domestic) investment rate, labor share, capital share, labor force participation, wages/wage inequality, and economic dynamism. Section 3 illustrates the trends in the variables described in Section 2 in Italy, and it draws some comparisons with the US and/or the EU. Section 4 presents the recent dynamics in investment rate, factor shares and profit share in Trentino, derived from microdata from Ispat. Section 5 concludes. Finally, the Appendix describes the procedures used to calculate the macro-trends in Trentino starting from firm-level data, briefly illustrates the main methodologies used in the literature to calculate markups and explains how we estimate firm-level markups.

2. An overview of six macroeconomic trends which may be influenced by markup changes

In this section we shortly review the literature on the evolution and the determinants of six macroeconomic variables which may be affected by firms' markups, namely: (domestic) investment rate, labor share, capital share, labor force participation, wage dispersion, and economic dynamism.

We mainly look at works that relate variations in a certain macroeconomic indicator to changes in corporate market power/markups. Changes in markups have been mainly associated with changes in investment rate, capital share and labor share (which are also the variables that we could derive for Trentino using microdata), while their relation with changes in labor force participation, wage inequality and economic dynamism have received less attention so far. For this reason, when we

[2] This research project is part of the project "Firms and Workers at the crossroad: New challenges for the Italian economic systems" held by the School of International Studies (SIS) of the University of Trento. The members of the present project are Jasmine Mondolo (research fellow at SIS), Stefano Schiavo (ordinary professor at SIS) and Andrea Fracasso (ordinary professor at SIS).

review the potential determinants of the investment rate, labor share and capital share identified by the literature, we mainly focus on corporate markups, while, when we illustrate labor force participation, wage dispersion, and economic dynamism, we delve a bit more into other potential determinants.

2.1 Domestic investment rate

Capital investment is often regarded as a key driver of firm- and industry-level growth. Thus, the decline in investment rate experienced by the US and by other OECD countries from the early two-thousands raises some concerns, and the possible determinants of this trend has been the object of a number of empirical studies, some of which also account for market power. Indeed, as De Loecker, Eeckhout & Unger (2018) argue, higher markups typically lead to lower demand for goods and then to lower output, which, in turn, prompts firms to reduce their demand for capital and, therefore, their investment.

In particular, Gutièrrez & Philippon (2017b) use industry-level and firm-level data on private fixed investment in the US covering more than thirty years to show that underinvestment relative to measures of profitability and valuation (particularly Tobin's Q) can be attributable to changes in the nature or localization of investment (due for instance to the rise of intangibles or to globalization), tightened corporate governance, increased short-termism and also decreased competition. With regard to the latter, the authors show that industries with less competition (measured by higher indexes of market concentration, including the Lerner index) invest less. This result, which also holds after controlling for intangible intensity, firm age and Tobin's Q, has been incorporated in the quantitative model of the US economy built by Eggertsson, Robbins & Getz Wold (2018). This framework, characterized by imperfect competition, barriers to entry, the trading of pure profits, and realistic asset pricing, aims to provide a unified explanation of a set of somehow puzzling macroeconomic trends observed in the US in the last three decades: the aforementioned contraction of the investment rate despite historically low borrowing costs and a high value of empirical Tobin's Q, an increase of the latter to a level permanently above one, the decline in both the factor shares, accompanied by a rise of the profit share, and an increase in the financial wealth-to-output ratio, despite low savings rates and a stagnating capital-to-income ratio. The authors hypothesize that the rise of market power is a key force behind these trends. Then, using their estimates of markups and of real interest rates, they show that these stylized facts can be explained by an increase in market power and pure profits in the US economy (along with forces that have led to a persistent long-term decline in real interest rates).

Empirical evidence of the linkage between market power and investment has been found also in countries different from the US. As an illustration, Chapter Two of the World Economic Outlook-Spring 2019 issued by the International Monetary Fund (referred to as IMF, 2019, in the rest of this work) estimates firm-level and sector-level markups referring to 27 countries (16 advanced countries and 11 European transition economies, including Russia and Turkey) for the period 2000-2015. According to IMF (2019), a moderate rise in corporate markups has been experienced by most of the advanced economies during the first fifteen years of the new millennium. Then, the report looks at

some macroeconomic implications of this increase. With regard to investment, the regression analysis indicates that private fixed investment has declined by about 25%, on average, across advanced countries since the global financial crisis, compared with its pre-crisis trend, despite a large and persistent fall in borrowing costs, higher rates of corporate profit and higher expected returns on capital. Specifically, the average increase in markups since 2000 is associated with a 0.4 % decrease in the investment rate, while, when only firms in the top decile of the markup distribution are included in the sample, the average increase in markups is leads to a 2 % decrease in the investment rate. The average rise in firms' markups is associated with a larger decrease also in labor share and in innovation when only these top-decile firms are taken into account. These results are consistent with the finding by Autor et al. (2017a), who acknowledge the prominent role played by few, particularly dynamic firms, often referred to as "superstar firms", in the increase in average markups, and then in the impact of the latter on investment, labor shares and other macroeconomic variables.

However, it is possible that the relationship between markups and investment is not linear. In particular, Diez, Leigh & Tambunlertchai (2018), who estimate the evolution of markups of publicly traded firms in seventy-four economies from 1980 to 2016, identify a U-shaped relation between investment and markups, according to which higher markups are initially associated with growing investment, but, after a certain level, increases in markups become associated with lower investment.

Although numerous works address the linkage between market power and investment, to the best of our knowledge, only few of them focus on Italy. Moreover, most of them include the latter in a multi-country sample (e.g. IMF, 2019) or use a macroeconomic approach. For instance, Forni, Gerali & Pisani (2010) propose a dynamic general equilibrium model allowing for monopolistic competition in the labor, manufacturing and service markets. This model simulates the macroeconomic and spillover effects of an increase in the degree of competition in the Italian service sector, which, according to the authors, is characterized by relatively high corporate markups. The results indicate that a reduction of services markups to the levels of the rest of the euro area would have a positive effect on the levels of private investment, production and employment, and would be associated to an 11 % increase in the long-run Italian GDP.

2.2 Labor share

Another labor-market indicator which has frequently been object of study is labor share. In particular, in recent years, several researchers have attempted to shed more light on what is often defined as "the secular decline" in the US labor share, which contrasts with the historical stylized fact of stable labor share highlighted by Kaldor (1957). Many possible explanations have been put forward, such as the decrease in the relative price of investment goods due to information technology (e.g. Karabarbounis & Neiman, 2014), the introduction of labor-market institutional reforms leading to a reduction in the bargaining power of labor (e.g. Bental & Demougin, 2010), the change in the industry composition to the detriment of manufacturing (e.g. Armenter, 2015), the rapid expansion of trade and international outsourcing (e.g. Elsby, Hobyn & Sahin, 2013), and the increasing importance of intangible capital, associated with lower expenditures on labor (e.g. Koh, Santaeulàlia-Llopis & Zheng, 2016).

However, an emerging strand of literature underlines that these hypotheses are supported by mixed empirical evidence, and more importantly, that they assume there is a trade-off between labor and capital (namely, that firms have replaced expenditures on labor inputs with expenditures on capital inputs), which does not always occur. Then, it shows that the rise in the US corporate markups have played a prominent role in this decrease in the labor share. Barkai (2017), who developed a calibrated model which considers both labor share and capital share, empirically shows that a decline in competition plays a significant role in the decline in the labor share. He also illustrates that an increase in markups is necessary to match the simultaneous decline in the shares of labor and capital (the latter being discussed in section 2.3). Autor et al. (2017a) hypothesize that, due for instance to technological or institutional changes, those companies with superior quality, lower costs, or greater innovation have started to reap increasing rewards. Since these firms, which are defined as "superstar firms", have higher profit levels, they also tend to have a lower share of labor in sales and value-added. Thus, as they gain market share across a wide range of sectors, the aggregate labor share falls. The predictions of this model are supported by the authors' empirical analysis based on US firm-level data referring to the period 1982-2012. In addition, De Loecker, Eeckhout & Unger (2018) argue that a negative relation between the expenditure on inputs, including labor, and the markup is directly implied by the expression for a firm's markup (the latter being identified as the ratio of an input's output elasticity and its revenue share) derived by De Loecker & Warzynski (2012) using standard first-order conditions on firm's cost minimization. Moreover, Dixon & Lim (2018) estimate a neoclassical model of the time-varying relationship between labor share, corporate market power, and the elasticity of output with respect to labor input in the US during a long time-horizon, namely from 1947 to 2016. The authors argue that, during the second half of the twentieth century, labor share did not show a marked trend because changes in the elasticity of output with respect to labor input were offset by changes in corporate markups. In contrast, the fall in labor share from the early two-thousands has been associated with a considerable rise in the market power of firms.

Gutièrrez (2017) notices that these well-documented dynamics in labor share observed in the US since the beginning of the new millennium differ from those of other advanced countries, most of which have exhibited a quite stable trend in (non-housing) labor share. In this regard, some studies focusing on the OECD countries and Europe suggest that also there, labor share on average has recently fell, but not as remarkably as in the US, and, importantly, with relevant differences across countries. Specifically, Schwellnus, Kappeler & Pionnier (OECD, 2017) observe that the average OECD labor share has declined over the past two decades, but that in a number of OECD countries, including France, Italy and the United Kingdom, labor shares have remained broadly constant or have increased. Relatedly, a recent McKinsey's discussion paper by Manyika et al. (McKinsey Global Institute, 2019), which reviews the literature on the determinants of labor share, including market power, recognizes that declines in this variable across advanced economies have been widespread, but not uniform. According to this study, the adjusted labor share of income (based on the product between the ratio of total compensation of employees to GDP and the ratio of total employment to the number of employees, in order to account for self-employed households too) decreased by 4.5 % in Spain and by 2.5 % in Germany between 2000 and 2017, but, during the same period, rose by 2.2 % in France and by 1.7 % in the United Kingdom.

In another OECD Working Paper, Schwellnus et al. (OECD, 2018) shed more light on the determinants of the changes in labor share that occurred between 1995 and 2011 in 20 OECD countries (including Italy). The authors assert that countries with falling labor shares have witnessed both a decline at the technological frontier, which mainly reflects the entry of firms with low labor shares, and a reallocation of market shares toward "superstar" firms with low labor shares. Moreover, IMF (2019) shows that the (firm-revenue-weighted) average markup based on a sample of twenty-seven countries increased by 6 % during the period 2000-2015, and that this rise has contributed to the recent contraction of firms' labor shares. In particular, for the overall sample, the average increase in markups since 2000 is associated with a 0.2 % decrease in the labor share, whereas for the sample of top decile firms, the average increase in markups is associated with a 1 % decrease in the labor share.

Similarly, the cross-country, firm-level study by Diez, Leigh & Tambunlertchai (2018) on the relation between markups and investment, innovation, and labor share respectively (see also section 2.1) finds that the association between markups and labor share is generally negative. Moreover, Adrjan (2018), who uses a large longitudinal dataset of firms in the United Kingdom covering the period from 2005 to 2012, shows that firms with greater market power and higher ratio of capital to labor allocate a smaller proportion of their value added to workers.

A comprehensive analysis of the determinants of variations in labor share which also includes firms' product markups, as well as labor markups has been recently conducted by Mertens (2019). The author develops a parsimonious micro-founded production side theory offering three competing explanations for the fall of the labor share: an increase in firms' product market power, an increase in firms' labor market power[3], or a fall in firms' output elasticity of labor, which reflects a decreasing importance of labor in firms' production activities. In particular, he stresses that the assumption of competitive labor markets, employed for instance by Barkai (2017), Autor et al. (2017a) and De Loecker, Eeckhout & Unger (2018), makes it unclear whether the documented rise of market power reflects a rise in firms' product or labor market power. Moreover, he points out that, while the common production models assume constant output elasticities, it is possible that the latter vary. Then, when he applies his framework to microdata on German manufacturing firms, he finds that 70% of the decline in labor share occurred between 1995 and 2014 in the German manufacturing sector is explained by a decrease in the output elasticity of labor, while the remaining 30% is attributable to firms' increasing labor and product market power, and then to market distortions. These results suggest that it is important to take into account both firms' product and labor markups (which also have different policy implications), and that the common assumption of constant output elasticities of inputs may be rejected by the data.

Accordingly, despite a certain heterogeneity in terms of variations in the labor share within the group of OECD countries, it seems that changes in corporate market power may play a role in this regard

[3] In the real world, the labor market (as well as the product market) is often not perfectly competitive, but characterized by a wedge between the wage paid by a firm to its workers and the marginal revenue product of labor which implies an inefficient distortion of rents towards the firm or its employees. When the wage is smaller than the marginal revenue, it is the firm that owns some degree of labor market power, which is also known as monopsonistic market power. Possible sources of labor market power are employer collusion (employer use of non-compete agreements), 'job lock' mechanisms, regulatory barriers, market concentration and other labour market frictions such as search costs arising from limited information, application costs and barriers to workers' mobility due to housing costs or family constraints (CEA, 2016).

not only in the US. However, it is important to keep in mind that the computation of the labor share indicator may affect the results. First, the labor share of employees is easier to estimate than that of self-employed individuals because there are not direct measures of these workers' wage. Elsby, Hobyn & Sahin (2013) focus on self-employment in the US and conclude that a third of the decline in the headline measure of labor share is an artifact of statistical procedures used to impute the labor income of the self-employed. Secondly, labor share trends may be affected by the inclusion of income from the real estate sector. In this regard, Gutiérrez (2017) and Gutiérrez & Piton (2019) show that non-housing gross labor share remained stable in Europe and declined only in the US. Gutiérrez & Piton (2019) also observe that the common approach of using data from non-financial corporate sector is not enough to remove all housing income in several countries. In addition, according to Cette, Koehl & Philippon (2019), since labor share in many European countries was above its steady state value in the late seventies, and it was bound to revert to its long run average, empirical studies that take the period 1973-1983 as a starting point are likely to find a spurious decrease in the labor share. Cette, Koehl & Philippon study the joint impact of these three measurement issues (namely, accounting for residential real estate income, accounting for self-employment, start and end periods for the empirical analysis). After correcting for these three potential biases, they do not find a general decline in the labor share in their sample of advanced economies. When they focus on the US, they observe a sharp decrease in the labor share between 2000 and 2015, which, however, cannot be regarded as a "secular decline". Therefore, a proper analysis of the relation between markups and labor share should be based on an accurate estimation of both these indicators.

With regard to Italy, Torrini (2016) asserts that labor share increased in the first half of the seventies, declined slowly until 2001, and then rose again. The author suggests that the slowdown occurred between 1975 and 2001 was due in part to the recovery in profits, and in part to a steady increase in housing rents on GDP. He also hypothesizes that the trend reversal in the labor share, which started well before the onset of the crises, is mainly attributable to a compression in corporate markups, and to the difficulty experienced by Italian firms to be rewarded for their innovation efforts (product quality upgrading) in a more competitive environment. Torrini also highlights that, when discussing factor shares, it is necessary to specify the definition of value added used, the way self-employment labor income is dealt with, and the role played by the incidence of the public administration and of the housing sectors. For instance, the inclusion or exclusion of housing rents in the computation of the value added may cause differences in the estimation of labor share.

Microeconometric evidence of a negative relationship between markups and labor share in Italy has been provided by Dall'Aglio et al. (2015) and Perugini et al. (2017), who estimate labor share at firm-level, for a large sample of Italian companies (and also for companies from other five EU countries in Perugini et al., 2017), and investigate its main determinants. Both studies include, among the regressors, a proxy of firms' market power (the return on sales and the ratio between sales minus variable costs and sales, respectively), and find a significant and negative coefficient for this variable.

2.3 Capital share

Capital share is typically defined as the ratio between a firm's capital compensation, or capital cost, and its value added. Although this expression is quite simple and intuitive, there is not unanimous consensus on the way this indicator should be computed. The first approach, which is often referred to as the ex-post approach, assumes that all dollars not paid to labor are capital costs. Then, capital share is simply the residual of labor share, and profits are zero. However, there is another approach which allows to estimate capital compensation (given by the product between a rate of return on capital and capital stock), and then capital share. This method, pioneered by Hall & Jorgenson (1967), specifies an ex-ante required rate of return on capital which is derived from the standard model of production theory.

Following Hall & Jorgenson (1967), Barkai (2017) computes a series of capital costs for the US non-financial corporate sector over the period 1984-2014, during which the cost of borrowing in financial markets and the rate of return on capital sharply declined. In a typical model of firm production, firms respond with an increase in their use of capital inputs, and if the latter is larger than the decline in the required rate of return, capital share increases (as predicted by the so-called ex-post approach). However, the US non-financial corporate sector did not sufficiently increase its use of capital inputs to offset the reduction of the required rate of return, and as a result capital share declined. This is consistent with the previous findings by Karabarbounis & Neiman (2014) and by Rognlie (2015). Barkai (2017) also stresses that the decline in the capital share in percentage terms (30%) has been much more dramatic than the decline in the labor share (10%) during the period under scrutiny, and that it was accompanied by a substantial growth in profits. Then, he shows that these trends, as well as large gaps in output, wages, and investment, can be attributable to the decline in competition.

A decrease in capital share has been documented also by De Loecker, Eeckhout & Unger (2018). The authors argue that capital share in the US fell from around 12% in 1980 to around 8 % in 2010, but remind that this a quite volatile measure, since capital adjusts slowly over time and therefore is more subject to aggregate fluctuations. They also observe that, in the long run, capital share is correlated with the inverse of their markup measure: with a long enough horizon, capital investment adjusts and hence there will be a reduction in capital investment as markups increase.

Like Barkai (2017), also Eggertsson, Robbins & Getz Wold (2018) calculate capital share directly after estimating the return rate on capital, which they define as the rental rate of capital. The authors posit that, according to an arbitrage condition given by economic theory, the rental rate must equal the risk free rate (proxied by the return on the three-month treasury bill) plus the risk premium (proxied by the spread between the rate of return on corporate BAA bonds and long term treasury bonds) less expected inflation (approximated by a five-year moving average of realized inflation), and plus the capital depreciation rate. In addition, if the price of capital is not equal to the price of output, the rental rate on capital must account for expected price gains of holding capital. In line with Barkai (2017), Eggertsson, Robbins & Getz Wold (2018)'s estimates show a consistent decline in capital share from the beginning of the eighties onwards; moreover, while in 1980 labor, capital and taxes accounted for almost all of national income, in recent years there has been a "missing factor"

of income, which has increased to 17% by 2015, and which the authors regard as pure profits and thus term it profit share. Finally, Karabarbounis & Neiman (2018) revisit Barkai's calculations using a longer period (from 1960) and broadly replicate the results. In addition, they label the residual share "factorless income", highlighting the uncertainty over the measurement of the risk-adjusted user cost of capital and the capital stock. They also emphasize that profit shares appeared high in the sixties and the seventies, before falling in the early eighties, and that this pattern has been driven mainly by sharp swings in the interest rate.

As far as Italy is concerned, scant attention has been devoted to capital share and to its determinants so far. Torrini (2016) explores patterns in both factor shares in Italy from the fifties to recent years and asserts that capital share can be broken up into the gross profits of the corporate sector, the consumption of capital in the public sector, and the rents paid or imputed for the housing stock services. However, he treats capital share as if it were the complement of labor share.

2.4 Labor force participation

As De Loecker, Eeckhout & Unger (2018) suggest, a rise in market power and the corresponding increase in prices of goods sold implies a decrease in the aggregate output produced. The latter typically leads to lower demand for labor, which in turn should result in lower labor force participation and lower wages. Thus, an increase in corporate markups may also have a negative effect on the activity rates. The authors also report that labor force participation of both males and females has actually declined in the US in the last few decades.

Although the effect of market power on labor force participation has been under-researched so far, the literature has identified some other possible drivers of the recent decline in the US activity rates. As an illustration, according to Juhn & Potter (2006), who conduct a long-term analysis of participation rates in the US, the slowdown in the female participation rate during the 1999-2005 period (which also includes the 2000-2001 recession) is mainly attributable to weak labor market conditions and to persistent business-cycle effects from the long economic boom of the late 1990s, which may have driven labor force participation rates to unsustainably high levels. Rather, Falzone (2017) posits that changes in population shares are the main cause of the decline in male participation rate and in the participation rate of both women with the lowest and women with the highest levels of educational attainment. Also other studies focus either on demographic and behavioral changes (e.g. Toossi, 2012) or on cyclical factors (e.g. Erceg & Levin, 2013).

Van Zandweghe (2012) stresses the importance of understanding the sources of this well-documented reduction in labor force participation because of their different implications for the trajectory of the economy and the unemployment rate over a longer horizon. Indeed, the substantial influence of trend factors implies that part of this recent decline is likely to dampen the potential labor supply of the economy, since many workers have permanently left the labor force. Rather, the cyclical component of the contraction in labor force participation reverses its course as the economic recovery progresses. Then, Van Zandweghe (2012) uses a statistical procedure known as multivariate Beveridge-Nelson decomposition to estimate the contribution to both trend, long-term factors (i.e. demographic, cultural

and institutional trends) and cyclical, transitory factors (such as slack in the labor market) to the change in labor force participation between 2007 and 2011. His empirical analysis suggests that trend factors and cyclical factors account about evenly for the decline in the overall labor force participation. Similarly, Barnes, Gumbau-Brisa & Olivei (2013) find that, since 2008, trend movements have accounted for a significant portion of the trend under scrutiny. Moreover, they highlight that the cyclical response of the labor force participation rate over most of the Great Recession and the ensuing recovery has been smaller than usual given the estimated cyclical behavior of the employment-to-population ratio.

A number of studies (e.g. Vlasblom & Schippers, 2004; Cipollone, Patacchini & Vallanti, 2014; Balleer, Gomez-Salvador & Turunen, 2014) have scrutinized the pattern in labor force participation in Europe, where, in contrast to the US, there has been on average a steady increase in this variable during the last three decades. As an illustration, Cipollone, Patacchini & Vallanti (2014) examine 1994-2009 patterns in female labor force participation and its determinants in Italy and in other 14 EU countries, taking into account both individual characteristics, such as education, age and number of children, and country-level policies and labor market institutional factors, including labor market deregulation.

As far as Italy is concerned, to the best of our knowledge, the extant literature analyzing labor participation in our country does not assess whether the dynamics in corporate markups has influenced to some extent the variations in the activity rate. A recent study on the drivers of the Italian participation rate has been conducted by De Philippis (2017). According to the author, the increase in Italy's participation rate between 2004 and 2016 is mostly related to the rise in the population's share of highly educated individuals (who are more strongly attached to the labor market), and to the positive labor supply effects of the recent pension reforms. We may wonder whether the documented increase in competition and deregulation that occurred in the Italian economy between the beginning of the nineties and the beginning of the new millennium has also played a role in the steady increase in the Italian activity rate.

2.5 Wages and wage dispersion

According to De Loecker, Eeckhout & Unger (2018), a rise in market power and the corresponding increase in prices of goods sold contribute not only to the decline in labor force participation, but also in wages, due to the contraction of labor demand. Additionally, even if supply were perfectly elastic, real wages would decrease with market power because of the rise in the price of the output goods. The authors do not further delve into this issue, but assert there is ample evidence, in the US, of the stagnation of wages in the lower half of the distribution from the eighties. Notably, the calibrated standard general equilibrium model with imperfect competition built by Barkai (2017) shows that the slowdown in competition and the increase in markups in the US economy, which have led to a decline in labor share in the last three decades (see section 2.2), has been accompanied by large gaps in output, investment, and wages as well. Moreover, Barkai's model predicts that an increase in competition to its 1984 level would lead to a 24 % increase in wages.

The rise in market power may affect not (only) the absolute level of wages, but (also) wage differences across different groups of workers, and then it may fuel wage dispersion/inequality, which, from the late seventies, has increased substantially not only in the United States, but also in the UK and in many other countries (Atkinson & Piketty, 2009). In this regard, Eggertsson, Robbins & Getz Wold (2018) assert that, when markups are higher, workers are given a lower share of output, while capitalists get a larger share. Since, generally, individuals with higher incomes receive a consistent percentage of their earning as capital income, whereas the poorest individuals do not hold financial assets, this mechanism will tend to increase income inequality. Moreover, De Loecker, Eeckhout & Unger (2018) notice that the secular decline in the US wages mainly concern low-skill wages, suggesting that the increase in markups has mainly affected the compensation of low-skill workers. Autor et al. (2017a) contend that linking the rise of superstar firms and the fall of the labor share with the trends in inequality between employees should be an important avenue of future research.

However, at present there is very little empirical assessment of the relationship between markups and wage inequality. Han's (2014) paper is, to the best of our knowledge, the only one studying this relation while controlling for other covariates, including openness to trade. Han evaluates the effect of markups on several inequality indexes using aggregate data on 22 countries (18 of which are developed countries), covering the years from 1961 to 2004. The results indicate a considerable positive impact of markups on the top 5%, 1% and 0.1% income shares, a negative impact on the share of income of those between 10% and 5%, and no effect on the bottom 90%.

As well as product market power (to which we mostly refer in this work), also market power in the labor markets, or labor market power may contribute to wage inequality. Using linked employer-employee data, Webber (2015) computes firm-level measures of the labor supply elasticity facing each private non-farm firm in the US, and he provides the first direct evidence of a positive relationship between a firm's labor supply elasticity and the earnings of its workers. However, this effect is not homogeneous across workers, but is larger the lower the wage of the workers. Further, using counterfactual analysis, he estimates that a one standard deviation increase of the firm labor supply elasticity would decrease the variance of earnings distribution by 9%.

While empirical evidence on the relationship between market power and wage dispersion is still limited, a substantial body of research has investigated the possible determinants of wage inequality. A recent, comprehensive review of such strand of literature (particularly of its most recent contributions, since older studies are already surveyed in the literature reviews on this topic published earlier) has been performed by Nolan, Richiardi & Valenzuela (2019), who identify the following main drivers of wage inequality: globalization; technological change; finance, monetary policies, macroeconomic cycles and shocks; labor market institutions and labor market power; product market power; redistribution of market income by the state via taxation and social expenditure.

Starting from the seminal paper by Abowd et al. (1999), several studies employing micro-data have attempted to decompose levels and changes in overall wage inequality in between-firm and within-firm components and have highlighted the relative importance of the between-firm one. As an illustration, Dunne et al. (2004) show that dispersion in firms' wages, as well as in productivity, increased between 1975 and 1992 in the US manufacturing, and much of this was a between-plant phenomenon. This result is consistent with the findings by Faggio, Salvanes & van Reenen (2010)

for the UK. Recently, Song et al. (2019), who rely on a massive, matched employer-employee database (which allows to observe the same workers over time and across firms), show that two-thirds of the rise in the variance of (log) earnings occurred in the US between 1978 and 2013 is attributable to a rise in the dispersion of average earnings between firms. In studying the dynamics of between-plants wage dispersion, some authors have focused on market-driven explanatory mechanisms, such as investments in computer technology (e.g. Dunne et al., 2004), dispersion in productivity (e.g. Faggio, Salvanes & van Reenen, 2010) and international trade (e.g. Helpman et al., 2017). Other works have instead attributed the rise in the dispersion of firms' wage premiums to the changes that have occurred in wage setting institutions. As an illustration, Card, Heining & Kline (2013) argue that the inequality growth observed in West Germany between the late eighties and the beginning of the new century may have been fueled by changes occurred in the German wage bargaining system since the early nineties (in particular, the possibility for German firms of opting-out from national contractual agreements).

Although the research literature on wage inequality is rich in partial analysis focusing on specific determinants or individual countries, there exist far fewer cross-country studies (such as the IMF studies by Jaumotte et al., 2013 and by Dabla-Norris et al., 2015, respectively) that include several potential drivers of wage dispersion and attempt to identify the individual contribution of such drivers. However, Nolan, Richiardi & Valenzuela (2019) argue that it is difficult to properly disentangle the impact of specific factors, that the possible interactions between them has been neglected so far, and that the importance of institutions and policies is likely to be under-estimated. Moreover, they posit that more evidence on the evolution of market power in both product and labor markets and on the role market power plays in recent inequality trends is a "particular priority".

As for Italy, several papers have attempted to identify the factors underpinning the changes in wage inequality in the past decades. As an illustration, a recent study by Devicienti, Fanfani & Maida (2019) shows that workers' heterogeneity has been a major determinant of increased wage inequalities from the eighties until the early two-thousands, while variability in firm wage policies has declined over time.

2.6 Economic dynamism

A working paper recently released by the European Central Bank (ECB, 2019) documents the evolution of market concentration, markups and economic dynamism, derived from both aggregate data at sectoral level and microdata[4], across a group of four relevant economies of the euro area (i.e. Italy, Germany, France and Spain) during the years 2006-2015. Following ECB (2019), the term "economic dynamism" used in this work encompasses business dynamism and labor-market dynamism. The former typically refers to the rates of firm entry and firm exit, while the latter concerns

[4] The main conclusions of this study are that, in the last few decades, the aggregate markup of the portion of euro area under scrutiny has been fairly stable, and has gone through a marginal decline since late nineties/early two-thousands which is driven largely by developments in manufacturing sector, and potentially by the impact of trade and monetary integration in the euro area. However, ECB (2019) simply uses the ratio between output and input (labor and materials) costs as a proxy of markup.

job flows and can include labor reallocation, job -to-job transitions, non-employment to employment transitions and employment to non-employment transitions, and/or job creation and job destruction.

Market economies are characterized by a continuous reallocation of resources (capital and labor) across firms and sectors. This reallocation raises aggregate productivity directly, as resources move to from less to more productive firms (and less efficient firms are replaced by productive, and often young firms), but also indirectly, since the increased availability of resources allows these firms to expand further. However, such economic dynamism can be hindered by incumbent firms with high market power, which may be used to deter entry through the threat of a price war or privileged access to partner firms, or lobby for the establishment of occupational licenses. Economic dynamism can also be curbed by rigidities in the exit margin (e.g. insolvency frameworks that prevent restructuring or resolution, weak banks that want to avoid recognizing losses, or political pressure), which allow weak firms to inefficiently stay in the market (ECB, 2019; McGowan, Andrews & Millot, 2018). Recent studies by Alfaro, Charlton & Kanczuk (2008), Hsieh & Klenow (2009), Bartelsman, Haltiwanger & Scarpetta (2013) and Restuccia & Rogerson (2013), which developed models of resource allocation across firms with heterogeneous productivity levels, highlight that misallocation of resources, possibly driven by the presence of distortions, can explain a significant part of aggregate productivity differences across countries. Moreover, Lazear & Spletzer (2012) emphasize that increased mobility of employees across jobs increases labor productivity.

The Business Dynamics Statistics provided by the Census Bureau reveal that the past few decades have been marked by a secular decline in the US firm entry and firm exit rates. Decker et al. (2014, 2016), who use firm-level data covering the period 1976-2011, found that the shift in economic activity from smaller and younger firms (which are the ones with the highest pace of both job creation and job destruction in the US) toward larger more mature firms over the sample period helps explain the decreasing pace of business dynamism. Furthermore, much of the decline in business dynamism occurred within detailed industry, firm-size and firm-age categories. Changes in the industry composition toward more dynamic sectors have a muting effect, but they are not sufficient to reverse the firm age and size effects. Moreover, Decker et al. (2017) show that decline in business dynamism and diminished allocative efficiency played a role in the slowdown in the pace of aggregate labor productivity growth. De Loecker, Eeckhout & Unger (2018) document a rise in the size of listed firms and a reduction in their number since 2000, and they interpret these two facts as an increase in the consolidation of corporate ownership, and hence market power. They also find that markups are positively related to firm size within sectors, as predicted by standard models of competition.

As far as labor-market dynamism is concerned, several potential alternative explanations for the decline in job flows in the US have been put forward, including demographic change, a more skilled workforce, lower population growth, decreased labor supply, technological change, changed volatility of production, and government policies (see for instance Davis & Haltiwanger, 2014 for a review). De Loecker, Eeckhout & Unger (2018) suggest that, in an environment characterized by corporate market power, when productivity shocks occur, firms adjust their variable inputs to a lesser degree than they would in a competitive market. This is consistent with the finding by Decker et al. (2014), according to which, in the US economy, it is not the volatility of productivity shocks, but rather the responsiveness of firms' output and labor force decisions to the existing shocks that has

declined over the last three decades. Thus, De Loecker, Eeckhout & Unger (2018) suggest that the rise in market power can rationalize the decrease in labor reallocation across firms even if the observed shocks to firm productivity has remained constant.

ECB (2019) investigates business dynamism and labor reallocation in the euro area (which is approximated by the group of its largest four economies, namely Germany, France, Italy and Spain), and compares them with the US ones. In particular, it estimates two indicators of what it defines job reallocation, namely the unemployment-to-employment and the employment-to-unemployment transition rates[5] from 2000 to 2017 in the euro area and in the US. The authors argue that, while labor-market dynamism in the US declined over the last two decades, in the euro zona it has not shown a clear trend. ECB (2019) also documents the decline in business dynamism in the US between 1980 and 2015. Then, they posit that it is not easy to replicate such analysis for the euro area and then make comparisons because, for instance, EU data suffer from severe asymmetries in coverage (especially before 2006), because business demography is quoted in terms of establishments (defined as the physical location a business operates in, and which can be more than one in the same firm) in the US, and in terms of firms in the EU, and because the definition of births and death can vary across different countries: in the US, the focus is on employer establishments, namely units of firms with at least one employee, while in the euro area, the unit of measurement is the firm (which corresponds to at least one establishment), irrespective of whether it has employees or not.

As mentioned in Decker et al. (2014), young firms (i.e. firms that are five years of age or younger) are typically an important source of job creation. In this regard, Criscuolo, Gal & Menon (2014) discuss preliminary cross-country evidence from a rich and unique micro-aggregated firm-level database (which is the output of the first wave of an OECD project known as DynEmp) on employment dynamics of firms classified by size, age and sectors, observed in 18 countries (17 OECD countries and Brazil) over a ten-year period. Specifically, it demonstrates that, among small and medium sized enterprises (SMEs), young firms play a central role in creating jobs, whereas old SMEs tend to destroy jobs. In addition, the paper shows that young firms are always net job creators throughout the business cycle, even during the financial crisis. The results also highlight large cross-country differences in the growth potential of young firms, pointing to the role played by national policies in enabling successful firms to create jobs.

Concerning Italy, few studies specifically address dynamism in the Italian labor market. Cefis & Gabriele (2009) analyze job flows in Trentino from 1991 to 2001 using firm-level data from INPS provided by the local Istat bureau. The authors argue that job creation rate and net employment growth move pro-cyclically, whereas the job destruction rate varies anti-cyclically. In addition, the magnitude of job flows in Trentino is in line with the average values for Italy, a fact that, according to the authors, can be interpreted as the direct effect of national institutions governing the labor market and thereby constraining local performance; rather, the contribution of entrant firms to the job creation process is lower than the corresponding contribution at national level. The authors do not directly investigate the effect of markups changes. However, they reckon that the positive relation between the GDP

[5] The authors estimate the unemployment-to-employment and the employment-to-unemployment transition rates (which are also defined as the job-finding and the employment-separation rates, respectively) from aggregate data following Shimer (2012b), and use the redesign adjustment suggested by Elsby, Hobijn & Sahin (2013).

growth rate of the local economy and the rate of job creation-job destruction confirms the role played by macroeconomic conditions in generating job flows; in particular, it implies that higher competition leads to higher job creation for "winning" firms and higher job destruction for "loser" firms. More recently, d'Agostino, Pieroni & Scarlato (2014) have assessed the effects of the labor market reforms, aimed to enhance flexibility, implemented at the beginning of the new millennium in Italy. To this purpose, they use an unexploited panel dataset of work histories for the years 2003-2010 and resort to an estimation method based on Markov chains to measure the effects of the reforms on individual employment. Their estimates show that, contrary to the goals of the reforms, there are a small positive effect on job creation and an increased substitution of permanent contracts with temporary contracts, especially for young people and for workers in the depressed areas of Southern Italy.

3. Macroeconomic trends in Italy based on aggregate data

In this Section, using aggregate data compiled by Istat and, to a lesser extent, by some international organizations, such as Eurostat, ILO (International Labor Organization) and OECD, we show how the variables illustrated in Section 2, namely investment rate, factors shares, labor force participation, wage dispersion and economic dynamism, changed in Italy during the period 1995-2018 (or a shorter one, in case of limited data availability). We also make some comparisons with the US and/or the European Union in order to assess whether, how and to what extent Italy differs from other countries. When possible, we investigate these trends in four Italian macro-areas (i.e. North East, North West, Centro and Mezzogiorno), and in Trentino as well, since part of our research project focuses on this region. In addition, when data are available, we scrutinize both the total economy and the manufacturing sector only, which will be the main object of our subsequent quantitative analysis. To derive these macro-trends, we mainly resort to national data compiled by Istat, and, to a lesser extent, to cross-country datasets made available by some international organizations, such as, ILO (International Labor Organization) and OECD.

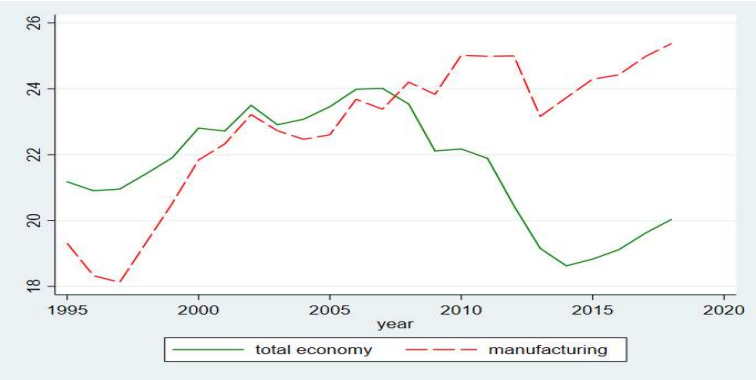
3.1 Investment trends in Italy

Data on aggregate investment trends in Italy can be recovered from the "National Accounts" section of Istat Statistics, which reports annual data on gross fixed capital formation ("investimenti fissi lordi"). A limitation of this indicator lies in the impossibility to break it down in its private and domestic components and to disentangle tangible and intangible assets. Thus, the picture that emerges from the analysis of investment based on gross capital formation may partially change if private investment only were investigated.

Figure 1 plots the Italian domestic investment for the total economy as percentage of national gross value added, as well as the investment attributable to the manufacturing sector only (as percentage of gross value added from manufacturing): total investment over output peaked in 2007 (amounting to 24 %), and then rapidly decreased until 2014, the year in which investment reached its lowest value of the 1995-2018 time-period. In recent years, total investment has been showing a positive trend, growing at a rate which is similar to that of investment in manufacturing sector. The latter has been

characterized by a more stable, positive average investment trend and, since 2008, despite a contraction between 2008 and 2009, and later from 2012 to 2013, it has been outperforming the economy as a whole in terms of investment.

Figure 1 Domestic investment rate in Italy, total economy and manufacturing, 1995-2018.

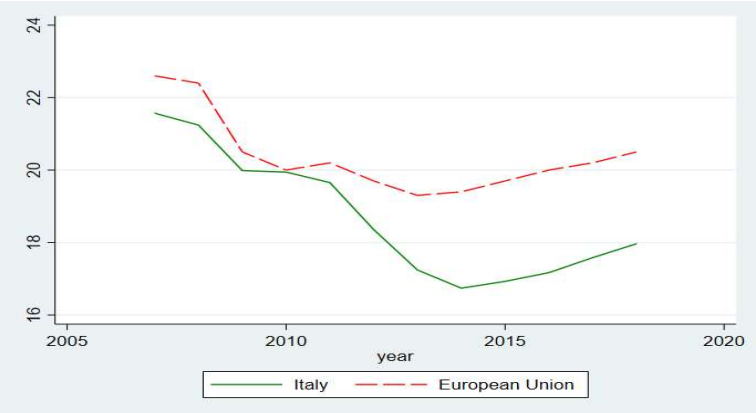


Domestic gross fixed capital formation over gross value added, percentage. Source: Istat

The dynamics of the two indicators diverge especially in the years subsequent to the economic recession, and do not sensibly change when the investment rate is replaced by absolute investment.

Figure 2 offers a comparison between the domestic investment rate (gross fixed capital formation over GDP) in Italy and the investment rate attributable to the whole European Union for the period 2007-2018. Investment over output in the EU fell from 22.6 % to 20.5 % between 2007 and 2009, and further declined from 2011 to 2013. Anyway, except in 2010, when investment over GDP amounted to about 20% in both Italy and in the average European Union, the EU investment has been higher than the Italian one also in the aftermath of the economic recession. In the last few years, the two series have been following a similar path, but the gap between the two is still relevant: while in 2010 it amounted to about 0.06 %, in 2015 it was equal to 2.83 %.

Figure 2 Domestic investment rate in Italy and in the European Union, 2007-2018.

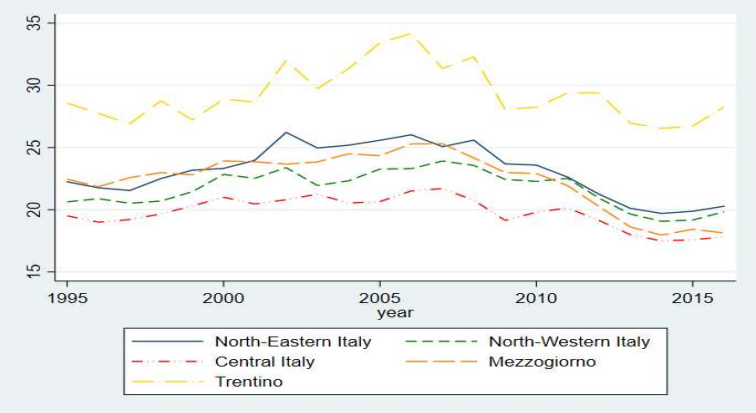


Domestic gross fixed capital formation over gross domestic product, percentage. Source: Eurostat

The gradual recovery of European investment may have been partly fostered by the "Investment Plan for Europe" proposed in November 2014 by the European Commission, which was supposed to mobilize at least 315 billion euro in private and public investment.

More detailed and disaggregated information on investment patterns in Italy can be obtained by looking at the data on the Italian macro-regions (**Figure 3**). It can be noticed that investment over gross value added in the Mezzogiorno, which exhibited a positive trend until 2010 and then started declining, systematically outperforms the investment rate in Central Italy, and, until 2011, was also higher than the investment rate of the North-West region. However, caution is required in interpreting these data, since, as mentioned before, it is not possible to isolate the private component of this variable. Anyway, it is interesting to observe that Trentino stands out in terms of investment rate along the entire time frame.

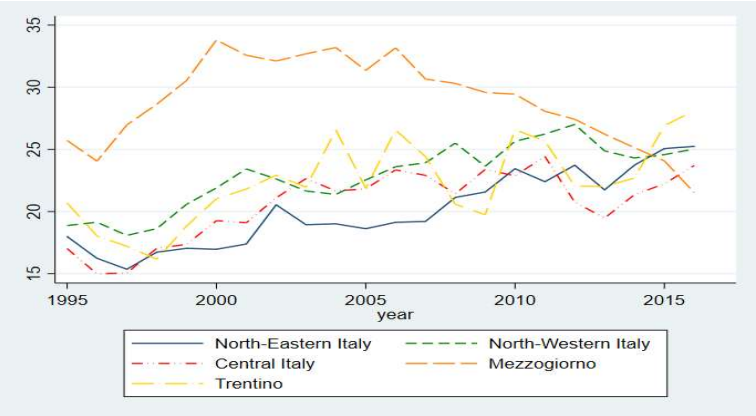
Figure 3 Domestic investment rate in the Italian macro-regions and in Trentino (total economy), 1995-2016.



Domestic gross fixed capital formation over gross value added, percentage. Source: Istat

Figure 4 illustrates that the investment attributable to the manufacturing sector of Trentino shows a less clear trend, compared to the total economy one. The most striking element in this figure is probably the relatively high investment rate in the Mezzogiorno (characterized by a sharp increase from 1997 to 2000 and by a gradual decline particularly from 2007 onwards) compared to the rest of Italy. Access to firm-level national data on firms' assets, which allow to identify private investment, may shed more light on this somehow puzzling finding.

Figure 4 Domestic investment rate in the manufacturing sector of the Italian macro-regions and of Trentino, 1995-2016.



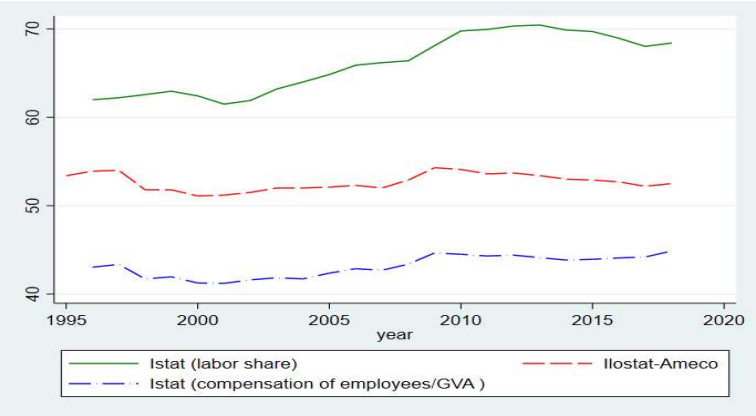
Domestic gross fixed capital formation over gross value added, percentage. Source: Istat

3.2 Trends in labor share in Italy

Data on Italian aggregate labor share can be derived from both Istat Statistics and Ilostat. The two labor share series based on these two different data sources and referring to the years 1995-2018 are plotted in **Figure 5**. Looking at this figure, it can be noticed that the two indicators differ from each other not only in terms of absolute level (the labor share construct based on Istat data systematically and remarkably outperforms the one based on Ilostat data), but, more importantly, also in terms of trend. In particular, Ilostat labor share slightly decreased from 2009 to 2017, while Istat labor share peaked in 2013 and then slightly declined too from 2013 to 2017. Anyway, the latter shows an average positive trend over the selected period, while Ilostat indicator does not display a clear prevailing direction. The main source of such divergence seems to lie in the way the two indexes are computed (an issue which has been dealt with by a number of researchers and briefly illustrated in section 2.2). Istat defines labor share as labor compensation over value added at current prices. Labor compensation is measured as the sum of compensation of employees (which includes both wages and salaries and employers' social contributions), an estimate of the compensation of self-employed based on the attribution of the same average hourly compensation to self-employed as to employees (which is debatable), and a share of net taxes on production (which are allocated proportionately to labor and capital according to their shares in value added). Data on this variable are available, also at sectoral level, from 1996 to 2018. ILO, which for the EU uses data on labor share (available from 1960 to 2018) stored in Ameco (i.e. the annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs) measures labor share as the total compensation of employees over GDP, both provided in nominal terms. Total compensation refers to the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for the work done by the latter during the accounting period. Thus, it seems that the numerator of the Istat labor share includes more elements than the Ilostat-Ameco one. Moreover, the former uses gross value added at the denominator, while the latter uses GDP. However, the ratio generally changes only marginally by replacing a certain measure of output with another one.

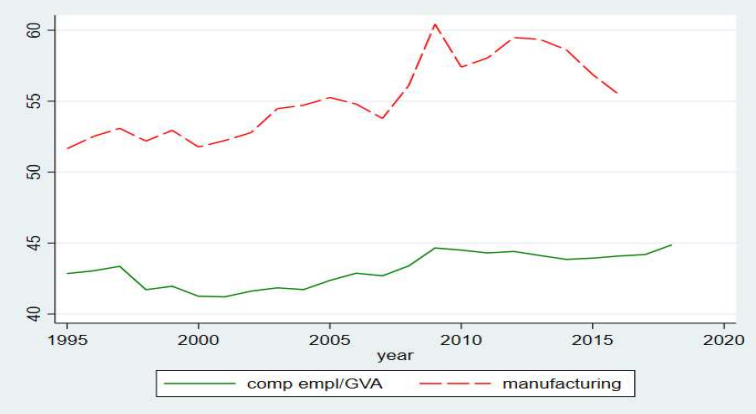
Interestingly, the trend in the labor share indicator calculated as the ratio between compensation of employees and on gross value added, whose data come Istat as well and which is plotted in Figure 5 (in order to avoid confusion with the aggregate labor share directly recovered from Istat, we simply refer to this variable as compensation of employees over GVA) is very similar to the trend in Ameco labor share, apart from a few years towards the end of the sample. Moreover, compensation of employees over GVA is remarkably higher in the manufacturing sector than in the total economy (**Figure 6**).

Figure 5 Italian labor share series based on Istat data and on Ilostat-Ameco data, 1995-2018.



Labor share (proxied by compensation of employees over gross value added in one of the series), percentage. Source: Istat and Ilostat-Ameco

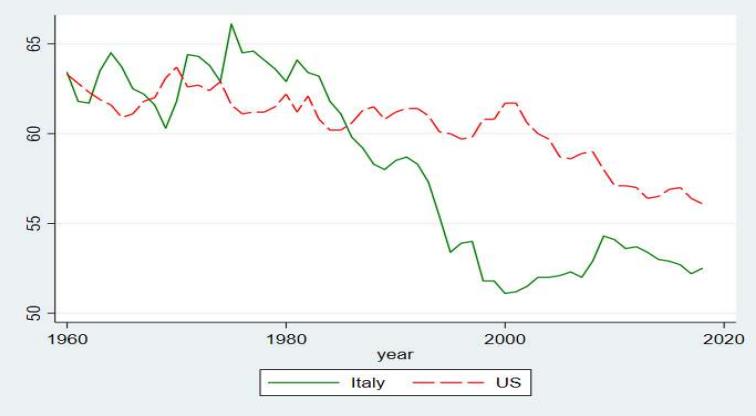
Figure 6 Italian labor share in the total economy and in the manufacturing sector, 1995-2018.



Labor share proxied by compensation of employees over gross value added (available until 2016 for manufacturing), percentage. Source: Istat

Data on labor share from Ilostat, which is a cross-country dataset, can be used to draw some comparisons between Italy and other economies. **Figure 7** plots labor share for both Italy and the US observed over a considerable time horizon, from 1960 to 2018.

Figure 7 Labor share in Italy and in the US, 1960-2018.

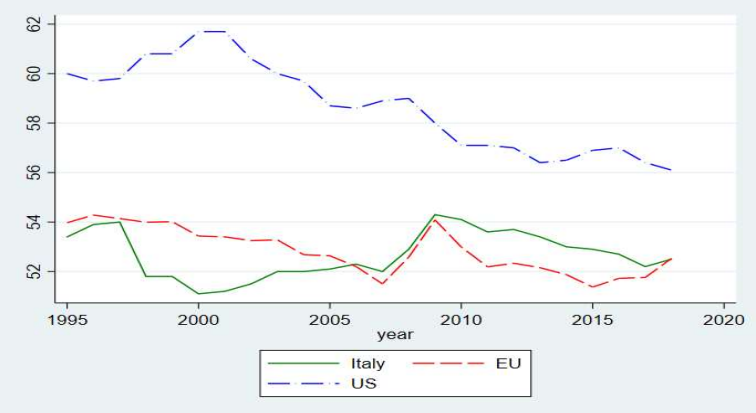


Labor share, percentage. Source: Ilostat-Ameco

Figure 7 shows a steady average decline in the US labor share over time, and a sharp drop in the Italian labor share, which peaked in 1975 (amounting to 66.1 %) and scored its lowest value (51.1 %) in 2000. From 1986 onwards, the level of Italian labor share has been systematically lower than the level of labor share in the US. More specifically, the two series overlap in 1974, both amounting to 62.9 %; rather, 2000 is the year recording the largest gap between the two labor-share series. Since 2000, the US labor share has been going through the well-documented phase of decline, while Italian labor share shows a mixed trend.

After considering the US, we assess whether Italy remarkably differs from the rest of Europe in terms of labor share trend. To this purpose, in **Figure 8** we plotted the average labor share in Italy, in the European Union (and in the US, too) for the period 1995-2018.

Figure 8 Labor share in Italy and in the EU, 1995-2018.



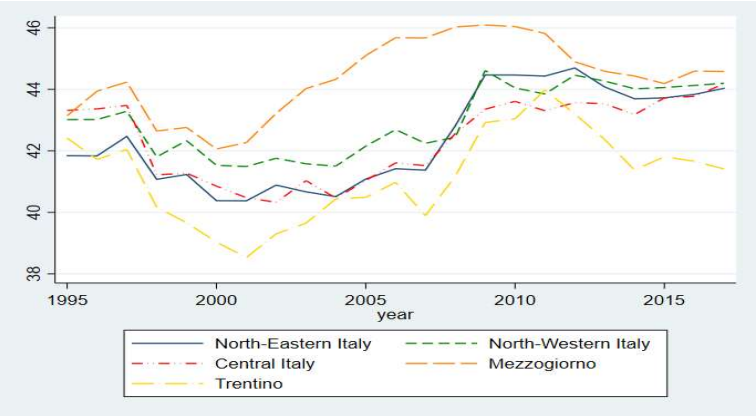
Labor share, percentage. Source: Ilostat-Ameco

A look at Figure 8 prompts some considerations: in the European Union, the average labor share gradually declined from 1995 to 2007, and then rapidly raised to 54.1 % in 2009, experiencing an

increase of about 2.6 percentage points in two years (probably due to its typically countercyclical behavior). Next, labor share further decreased from 2009 to 2015, and then started growing again. Thus, the Italian performance diverged from the European experience in the period 1995-2005, while it has become more similar to the rest of the EU in more recent years. Moreover, despite its negative trend since 2000, the US labor share has been systematically higher than both the Italian and the EU labor shares.

Finally, Istat also includes regional and sectoral data on compensation of employees and on gross value added. The ratio between these two variables can serve as a proxy of labor share, and then used to assess how the latter varies across different areas of the country.

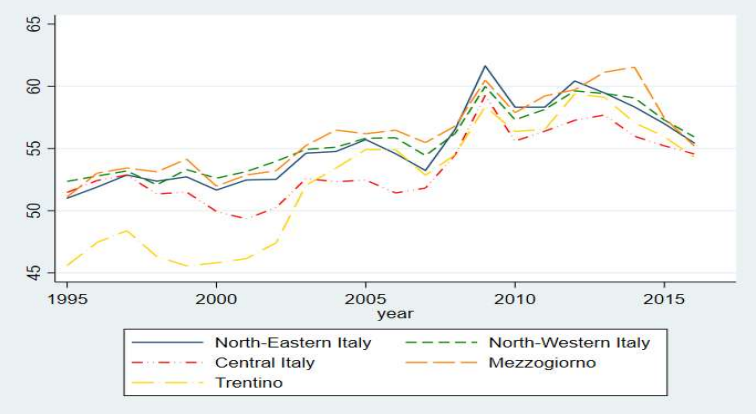
Figure 9 Labor share in the Italian macro-regions and in Trentino, 1995-2017.



Labor share proxied by compensation of employees over gross value added, percentage. Source: Istat

According to **Figure 9**, labor share sharply increased from 2000 especially in the Mezzogiorno. Brunello, Lupi & (2001) observe that labor share had already increased particularly fast in the South during the 1970s, mainly as a consequence of the elimination of institutions that allowed the presence of significant wage differentials. In Trentino, this variable reached its lowest value (38.53 %) in 2001 and its peak (about 44 %) in 2011. Finally, when we look at labor share in the manufacturing sector (**Figure 10**), we can notice that the pattern in the Mezzogiorno is less striking than the one recorded for the total economy; anyway, its value was always higher in this area than in Central Italy, and in some years (e.g. 2013) it exceeded the labor share of Northern Italy as well.

Figure 10 Labor share in the manufacturing sector of the Italian macro-regions and of Trentino, 1995-2016.



Labor share proxied by compensation of employees over gross value added, percentage. Source: Istat

3.3 Trends in capital share in Italy

Istat calculates capital share simply as the residual of labor share, as it can be easily observed in **Figure 11**. Due to the way capital share is derived, this figure can be misleading, and the trend of this variable may remarkably change if a proper estimation method (like the one used in Section 4 to calculate capital share in Trentino starting from microdata) were employed.

Figure 11 Labor share and capital share in Italy, total economy, 1996-2018.



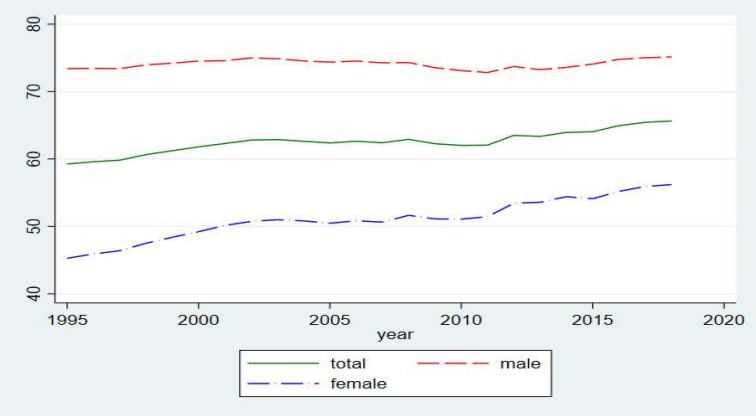
Labor share and capital share (the latter calculated simply as the residual of labor share), percentage. Source: Istat

3.4 Trends in labor force participation in Italy

The recent dynamics of the Italian labor force participation are captured by **Figure 12**. The activity rate increased from about 59.3 % in 1995 to about 65.6 % in 2018; as expected, female labor force

participation was always remarkably lower than male force participation[6]; however, the gap between the two fell over time, from about 28.14 % in 1995 to about 18.94 % in 2018. Moreover, the male activity rate slightly decreased between 2009 and 2011 (from 73.54 % to 72.83 %), and then recovered in recent years.

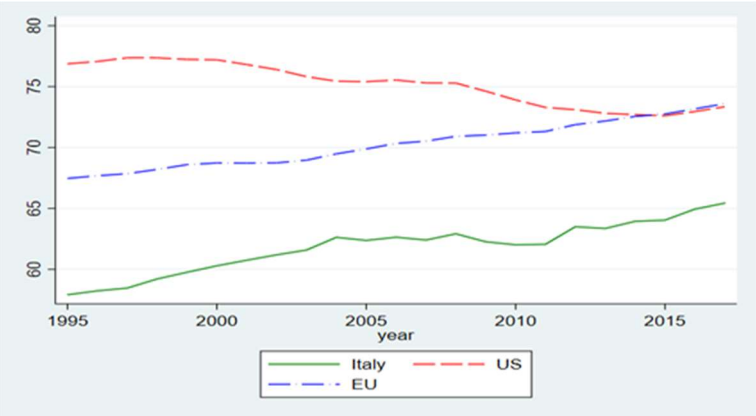
Figure 12 Labor force participation rate (total, male and female) in Italy, 1995-2018.



Labor force participation rate (age 15-64), percentage. Source: Istat

Figure 13 compares the Italian participation rate with the participation rate of the European Union and of the US. While, as discussed in Section 2.4, the activity rate in the US declined (from 76.9 % in 1995 to 72.6 % in 2015), the activity rate in the EU steadily increased over time, and in the last few years available is very similar to the US one. Rather, it is higher than the Italian activity rate during the whole period.

Figure 13 Labor force participation rate in Italy, the EU and the US, 1995-2017.

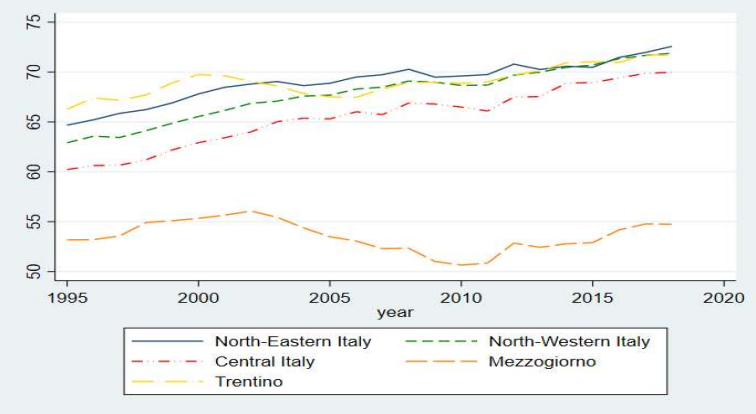


Total labor force participation rate (age 15-64), percentage. Source: OECD

[6] The values for total labor participation rate (15-64) reported by Istat are slightly higher (by an amount varying between 1.3% and 1.5%) than the ones reported by OECD for the years 1995-2003 although both the organizations collected these data from the Labor Force Survey. It is possible that Istat has revised upwards the estimates for the years 1995-2003.

Heterogeneity in terms of labor force participation may lie not only within the EU, but also within Italy. Accordingly, we disentangled the contributions of the four macro-regions and of Trentino to the national trend. These four series are represented in **Figure 14**, which offers a quite mixed picture. While both Central and Northern Italy experienced, on average, a positive trend over the time frame under scrutiny (with North-West Italy catching up with North-East Italy in the last five/six years available), the Mezzogiorno, which systematically displayed a relative low level of activity rate compared to the other three macro-regions, went through a phase of decline in average labor force participation from 2003 (thus, before the beginning of the economic recession) to 2010. This contraction was followed by a recovery; however, in 2018, the labor force participation rate in the Mezzogiorno was still only 54.75 % (against about 70 % in Central Italy, 72.56 % in North-East Italy and 71.2 % in North-West Italy), an amount which is very close (even slightly smaller) to its 1998 one. Looking at Trentino, it can be noticed that labor force participation slightly declined from 2001 to 2006 (from 69.63 % to 67.47 %), and subsequently recovered, reaching its highest value (71.73 %, which is very similar to the average rate concurrently recorded in the whole North-East) in 2017.

Figure 14 Labor force participation rate in the Italian macro-regions and in Trentino, 1995-2018.

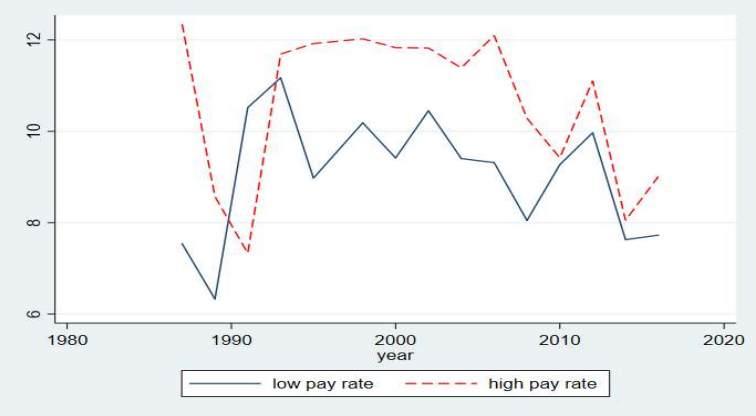


Total labor force participation rate (age 15-64), percentage. Source: Istat

3.5 Trends in wage dispersion in Italy

While data on total domestic wages and salaries, and on total compensation of employees are available from 1995 onwards, data on Italian hourly wages are available for the years 2014, 2015 and 2016 only, and then they do not allow to derive the medium-term trend of this variable. With regard to wage inequality, two indicators of earnings dispersion for which data on our country are available are the low pay rate and the high pay rate. The former refers to the share of workers earning less than two-thirds of median earnings, while the latter captures the share of workers earning more than one-and-a-half time median earnings. OECD reports these two indicators, for Italy as well as for the other OECD countries, from 1987 to 2016, with two-year intervals (except for the three-year one between 1995 to 1998) between one observation and the subsequent one.

Figure 15 Low pay rate and high pay rate in Italy, 1987-2016.



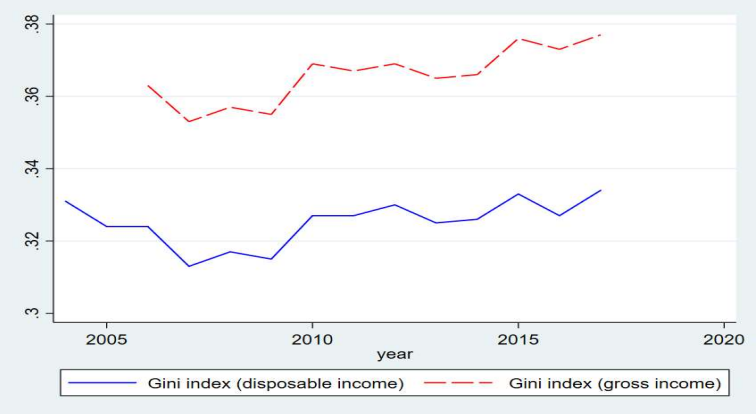
Low pay rate and high pay rate, percentage. Source: OECD

As **Figure 15** reports, the low pay rate in Italy sharply increased from 1989 to 1991 (from 7.54% to 10.52 %) and peaked in 1993 (with a value of 11.17 %). Then, it fluctuated within the range between 7.63 % (in 2014) and 10.5 % (in 2002). In the last available year (2016), the low pay rate (equal to 7.73 %) was about 1.4 % higher than the low pay rate recorded at the beginning of the selected time span, but 3.44 % lower than the 1993 one. Moreover, the low pay rate exceeded the high pay rate only once, in 1991. The low pay rate recorded in Italy in recent years has been relatively low, compared to the average OECD level (amounting to 7.7 % and to 15.6 %, respectively, in 2016).

A more effective indicator of wage dispersion is based on data on wages or incomes at worker level, like the Gini coefficient. Annual data on this indicator for the OECD countries since the early two-thousands (with several missing values for some countries) are available in the OECD Income Distribution Database (IDD) and are also reported in the OECD Stat database. **Figure 16** shows the Gini coefficient based on the gross income (before taxes) of Italian workers and the Gini coefficient based on disposable income (after taxes and transfers)[7]. Focusing on the latter, for which data are available since 2004, we observe that wage dispersion declined between 2004 and 2007, and then rose. In 10 years, between 2007 and 2017, the Gini index increased by 0.017 points. If we compare the Italian data with those referring to other countries, we can see, for instance, that in 2017 the level of the Gini coefficient in Italy was very similar to the level of this index found in Spain (0.334 and 0.333, respectively), and was higher than the one measured in other Western-European countries, such as France (0.292), Germany (0.289) and Sweden (0.282); however, the Gini coefficient suggests that wage dispersion in Italy in the whole period 2004-2017 is less pronounced than in the UK, which, in 2017, exhibits a Gini index equal to 0.357.

[7] These series are based on the definition of income which has been used by OECD since 2012. Details on income definitions and on income components and on the way can be found at this link: http://www.oecd.org/els/soc/IDD-ToR.pdf

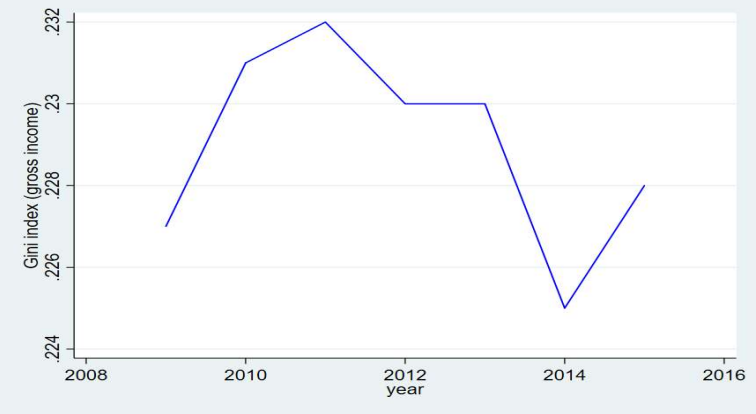
Figure 16 Wage dispersion in in Italy, 2004-2017.



Wage dispersion in Italy measured by the Gini coefficient (calculated using both the gross income and the disposable income). Source: OECD

Data on wage dispersion are available also for Trentino, but for a shorter time frame. In a recent report on income distribution in Trentino, Ispat (2019) reports the Gini coefficient of the income distribution of workers fully employed in the private sector in Trentino, computed for the years 2009-2015. The variations of the Gini coefficient suggest that wage dispersion peaked in 2011 and reached its lowest value in 2014, but it increased only marginally from the beginning to the end of the available period.

Figure 17 Wage dispersion in Trentino, 2009-2015.



Wage dispersion in Trentino measured by the Gini coefficient (based on gross income). Source: Ispat

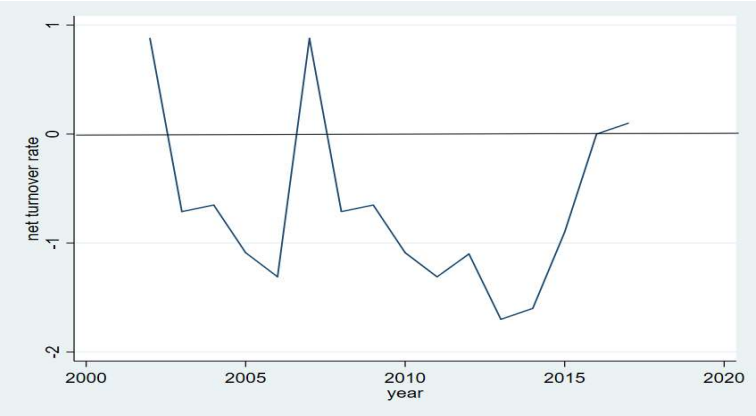
3.6 Trends in business dynamism in Italy

Since the indicators of labor dynamism mentioned in section 2.6 require the use of individual-level data to which we do not have access, in this section we only look at business dynamism in Italy. Every year, Istat publishes in its website, in the "news section", an update about the recent trends in business demography of Italian firms. Each of them covers six consecutive years (the last one

available in March 2020 refers to the period 2012-2017) and reports the birth rate (i.e. the number of enterprise births in the reference period divided by the number of enterprises active in that period, in percentage terms), the death rate (i.e. the number of enterprise deaths in the reference period divided by the number of enterprises active in that period) and, in recent years, also the net turnover rate (i.e. the difference between the birth rate and the death rate) of Italian firms at national, regional and macro-sectoral level. A birth (death) amounts to the creation (dissolution) of a combination of production factors with the restriction that no other enterprises are involved in the event. Then, births (deaths) do not include entries into (exits from) the population due to mergers, break-ups, split-off or restructuring of a set of enterprises, as well as entries into (exits from) a sub-population resulting only from a change of activity[8]. For the years 2008-2016, data on birth rate and death rate are also reported by Eurostat, which collects data on business demography from the national statistical institutes of the EU members[9]. However, Eurostat data for Italy, especially the ones referring to the death rate, do not perfectly coincide with Istat data, probably because, unlike Istat, Eurostat does not regularly replace the estimates of the death rate with the official values once the latter become available. In addition, Eurostat itself recognizes that it is difficult to harmonize data coming from countries which use differ definitions of business birth and death. For these reasons, we do not make comparisons between Italy and the EU in terms of business dynamism.

Figure 18 plots the average net turnover rate of Italian firms based on Istat data and referring to the period 2002-2017.

Figure 18 Business dynamism in Italy, 2002-2017.



Net turnover rate, percentage. Source: Istat. Note: the value of the death rate (which is used to calculate this indicator) in 2017 is an estimate.

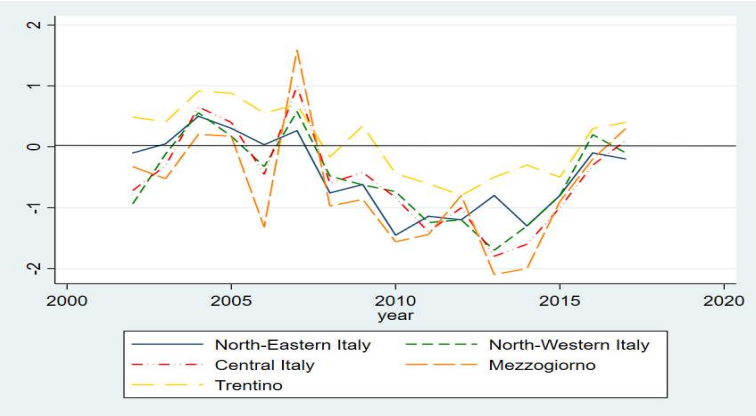
This indicator, which was negative in 11 out of 16 years (15 if we do not include 2017, since the measure of death rate in this year is still an estimate), peaked in 2007, then went through a phase of

[8] Indicators of business dynamism can be also computed using annual data on the number of firm registrations and cancellations to the business register, which are compiled by the Italian Chamber of Commerce. However, the inclusion criteria partly differ from the ones adopted by Istat; for instance, registrations (cancellations) to the business register can be also attributable to firm entries into (exits from) the population due to mergers, break-ups, split-off or restructuring of a set of enterprises).

decline and in 2013 inverted again its trend. In 2016, the birth rate and the death rate were approximately the same.

Similar dynamics emerge for the single macro-regions and for Trentino from the analysis of **Figure 19**. In Trentino, the birth rate exceeded the death rate in about half of the years under scrutiny. The most striking increase between 2007 and 2008 is observed in Mezzogiorno, which is also the area that experienced the lowest net turnover rate (-2.1% in 2013).

Figure 19. Business dynamism in the Italian macro-regions and in Trentino, 2002-2017.



Net turnover rate, percentage. Source: Istat. Note: the value of the death rate (which is used to calculate this indicator) in 2017 is an estimate.

4. Recent trends in investment rate and factor shares in Trentino based on microdata

In this section, we illustrate the recent trends in investment rate, labor share and capital share in Trentino, calculated starting from firm-level data. The dataset we used to compute these indicators, provided by Ispat ("Istituto statistico della provincia autonoma di Trento"), covers a representative group of limited liability companies ("società di capitali") located in Trentino (namely, firms which have their headquarters in Trentino, and also some local affiliates of multinational firms) and operating in the following sectors: manufacturing, mining, construction, services, and supply of energy, gas and water. Ispat arranges these sectors in three groups: group 1, which corresponds to manufacturing and mining; group 2, corresponding to construction; group 3, referring to services and to supply of energy, gas and water. Following Ispat, in the next tables group 1 and group 3 are simply labelled "industry" and "services", respectively, while the sum of these three groups is referred to as "total economy".

The available data refer to the period 2009-2015. After applying some constraints in order to delate outliers[10], we ended up with a sample of 21,965 observations, which are distributed over time, across sectors and firm size classes as it is shown in **Table 1**. If we consider, for instance, year 2012, we see that about 20.1 % of firms operate in the industry sector, 15.4 % in the construction sector and 64.52

[10] We applied the following constraints to the original sample: strictly positive cost of employees, value added, revenues, tangible assets and number of employees; positive intangible assets and amortization of tangible and of intangible assets. Moreover, we excluded firms which enter the dataset for less than three years.

% in the service sector. Moreover, in 2012, 92.2 % of the sampled firms are small firms (i.e. firms with less than 50 employees). Thus, Table 1 suggests that two relevant features of the Italian economy as a whole, namely the spread of small and small-medium enterprises and the importance of the tertiary sector, are also observed in Trentino.

Table 1 Distribution of the sampled firms across sectors and class sizes in Trentino, years 2009-2015.

year	Total economy	Industry	Construction	Services	class size 1 (<10 employees)	class size 2 (10-49)	class size 3 (50-99)	class size 4 (100 or more)
2009	3,020	635	472	1,913	1,647	1,131	141	101
2010	3,039	615	480	1,944	1,687	1,105	148	99
2011	3,392	685	538	2,169	1,958	1,173	154	107
2012	3,346	673	514	2,159	1,943	1,143	155	105
2013	3,230	646	498	2,086	1,849	1,119	152	110
2014	3,036	601	471	1,964	1,737	1,056	139	104
2015	2,902	595	427	1,880	1,660	1,001	132	109

Source: author's elaboration based on Ispat data

For each of the selected variables, namely investment rate, factor shares and also profit share, we first computed the relative indicator for each observation, and then, using the share of value added of each firm in the total economy and in the relative sector, we calculated a weighted average for the total economy and for each of the three macro-sectors (see the Appendix for more information).

Table 2 reports the weighted average rate of investment in tangible and intangible assets in Trentino for the years 2010-2015. The investment rate in both tangible and intangible assets fell between 2010 and 2015 in all the three macro-sectors, particularly in the service one, probably also as a consequence of the economic recession. Then, the picture that emerges from the analysis of micro-data on private domestic investment in this region partly diverges from the one based on aggregate data on gross fixed capital formation, where this negative trend is less pronounced.

Table 2 Average investment rates in Trentino, 2010-2015.

Tangible assets				
year	total economy	industry	construction	services
2010	16.97	14.15	9.96	19.7
2011	15.79	10.43	8.37	20.12
2012	13.98	12.15	8.77	15.8
2013	10.49	5.55	4.85	13.9
2014	12.29	14	4	12.45
2015	9.33	12.5	3.77	8.16

Intangible assets				
year	total economy	industry	construction	services
2010	2.9	2.58	0.46	3.46
2011	2.5	2.02	1.04	3.02
2012	3.32	4.49	1.6	2.91
2013	2.85	4.02	0.9	2.48
2014	2.75	3.54	0.64	2.59
2015	1.84	2.21	1.07	1.72
Total assets (tangible + intangible assets)				
year	total economy	industry	construction	services
2010	19.87	16.73	10.42	23.16
2011	18.29	12.45	9.41	23.14
2012	17.3	16.64	10.37	18.71
2013	13.34	9.57	5.75	16.38
2014	15.04	17.54	4.64	15.04
2015	11.17	14.71	4.84	9.88

Weighted average investment rate, percentage. Source: author's elaboration based on Ispat data

Table 3 condenses the values of the weighted average labor shares. Looking at this table, we observe that, between 2009 and 2014, labor share declined in industry, while it grew in construction and services. Moreover, in all the three macro-sectors, labor share fell by at least 2.5 percentage points from 2014 to 2015.

Looking now at **Table 4**, we observe that the share of capital of both tangible assets and total assets increased in all the macro-sectors between 2009 and 2012, and subsequently fell. These results confirm that, when capital share is properly estimated, the factor shares can either rise or decrease at the same time.

Table 3 Average labor shares in Trentino, 2009-2015.

year	total economy	industry	construction	services
2009	62.9	64.3	68.37	61.17
2010	61.57	61.98	69.89	60.01
2011	62.4	62.68	71.96	60.7
2012	63.93	63.72	75.36	62.35
2013	64.35	63.79	76.09	63.08
2014	65.86	62.35	77.44	66.23
2015	62.48	59.86	74.79	62.5

Weighted average labor share, percentage. Source: author's elaboration based on Ispat data

Table 4 Average capital shares in Trentino, 2009-2015.

Tangible assets				
year	total economy	industry	construction	services
2009	12.94	12.20	9.16	14.01
2010	13.64	13.53	10.39	14.22
2011	18.36	20.22	11.94	18.30
2012	18.74	21.47	12.19	18.15
2013	14.07	14.04	10.17	14.61
2014	13.14	14.20	9.43	13.06
2015	12.81	14.09	8.48	12.60
Intangible assets				
year	total economy	industry	construction	services
2009	2.51	4.44	0.66	1.79
2010	2.80	5.03	0.69	1.85
2011	2.79	4.36	0.82	2.18
2012	2.57	3.94	0.75	2.07
2013	2.40	3.78	0.64	1.90
2014	2.20	3.46	0.58	1.72
2015	1.91	2.76	0.77	1.55
Total assets (tangible + tangible assets)				
year	total economy	industry	construction	services
2009	15.45	16.64	9.82	15.8
2010	16.44	18.56	11.08	16.07
2011	21.15	24.58	12.76	20.48
2012	21.31	25.41	12.94	20.22
2013	16.47	17.82	10.81	16.51
2014	15.34	17.66	10.01	14.78
2015	14.72	16.85	9.25	14.15

Weighted average capital share, percentage. Source: author's elaboration based on Ispat data

After computing both the factor shares, we were able to derive the residual share, which, in line with Eggerstoon, Robbins & Wold (2018), we simply define as profit share. The profit share of each observation simply corresponds to the complement of the sum of the two factor shares. First, we used the capital share based on total assets; after that, since it is often difficult to estimate the value of intangible assets, we employed the capital share based on tangible assets only. The weighted average profit shares obtained using these two slightly different computations are displayed in **Table 5** and **Table 6**.

Table 5 Average profit shares in Trentino, 2009-2015.

year	total economy	industry	construction	services
2009	21.65	19.05	21.82	23.03
2010	21.99	19.45	19.03	23.91
2011	16.46	12.75	15.28	18.83
2012	14.76	10.87	11.70	17.43
2013	19.18	18.39	13.10	20.42
2014	18.80	19.99	12.55	18.99
2015	22.80	23.29	15.96	23.35

Weighted average profit share, percentage. Source: author's elaboration based on Ispat data

Table 6 Weighted average profit shares including the share of intangible assets in Trentino, 2009-2015.

year	total economy	industry	construction	services
2009	24.16	23.5	22.48	24.82
2010	24.79	24.5	19.73	25.76
2011	19.24	17.11	16.10	21.00
2012	17.33	14.81	12.45	19.50
2013	21.58	22.17	13.74	22.31
2014	21.00	23.45	13.13	20.71
2015	24.7	26.06	16.73	24.90

Weighted average profit share including the share of intangible assets, percentage. Source: author's elaboration based on Ispat data

In both the tables, the average profit share dropped between 2009 and 2012 and then increased.

5. Conclusions

In recent years, a number of papers have attempted to shed light on some dynamics observed in some economies, especially in the US, which raise some concerns and which may be affected by changes in corporate market power. In this preliminary study, we first looked at the trends, based on aggregate data, of a number of relevant macroeconomic variables, namely domestic investment rate, labor share and capital share, labor force participation, wage dispersion and economic dynamism, observed in Italy since the mid-nighties, and drew some comparisons between Italy and other countries. Since national data may hide relevant within-country heterogeneity, when possible, we also split the country in its four macro-regions. Because part of our research project focuses on Trentino, we derived the selected macro-trends based on aggregate data for this region too. Then, we recovered the trends in

private investment rate, factor shares and profit share in Trentino for the years 2009-2015 using a firm-level dataset compiled by Ispat.

The main considerations on the macroeconomic trends in Italy based on aggregate data can be summarized as follows:

- In line with the European Union, the rate of national domestic investment (based on aggregate data on gross fixed capital formation) fell since the beginning of the economic recession, but it has exhibited a better performance in more recent years;
- Italian labor share increased during the first decade of the twenty-first century and then remained quite stable. In Trentino, labor share peaked in 2011 and after that declined;
- Since Italian capital share is calculated by Istat as the complement of labor share, this indicator is potentially misleading, and cannot be compared with the US one estimated by Barkai (2017) and by Eggertsson, Robbins & Getz Wold (2018);
- Labor force participation in both Italy as a whole and in Trentino between 1995 and 2018 shows an average positive trend;
- National wage inequality, proxied by the Gini coefficient, increased between 2004 and 2017; in Trentino, wage dispersion marginally increased between 2009 and 2015;
- The average net turnover rate of Italian firms is negative in more than half of the period 2002-2017; Trentino performs better, compared to the national average, in terms of this indicator of business dynamism.

The main findings of our analysis of macro-trends in Trentino based on firm-level data on private limited companies can be summarized as follows:

- Private investment rate declined between 2010 and 2015;
- Labor share increased between 2009 and 2014 and remarkably fell between 2014 and 2015;
- Capital share rose between 2009 and 2012 and then decreased;
- Profit share declined between 2009 and 2012 and subsequently inverted its trend.

Accordingly, the macroeconomic trends under scrutiny observed in Italy in recent years partly diverge from those emerged in the US; in particular, labor share presents a mixed trend during the selected time period, domestic investment has been recovering after the contraction occurred in the aftermath of the economic recession, and labor force participation exhibits a clear average positive trend. In addition, the overall picture hides considerable within-country heterogeneity.

The study of macro-trends in Trentino based on aggregate data is complemented with the analysis based on firm-level data, which also allows to estimate capital share. One of the main limitations of the microeconomic analysis lies in the time frame, which is relatively short and is likely to be affected by the economic recession. However, such analysis only represents the starting point of the core part of our research project, which relies on firm-level data referring to the whole country and available for a longer time frame (from 2001 to 2014).

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*Note: the articles marked with an asterisk are quoted in the Appendix.

Appendix

A1. The estimation of the investment rate, the labor share and the capital share based on microdata

Investment rate

In order to recover the average rate of (private) investment of Trentino's private limited companies, we first computed the investment rate of each sampled firm using two slightly different methods:

$$\text{investment rate}_{it\ \text{(y assets, method1)}} = \frac{y\ assets_{it} - y\ assets_{it-} + amortization\ charge\ of\ y\ assets_{it}}{value\ added_{it}} \quad (1)$$

$$\text{investment rate}_{it\ \text{(y assets, method2)}} = \frac{y\ assets_{it} - y\ assets_{it-1} + y\ assets_{it} * amortization\ rate\ of\ y\ assets_{jt}}{value\ added_{it}} \quad (2)$$

where i is a firm of the sample, j identifies a sector at ateco two-digit level and "y assets" consists of tangible assets, intangible assets or both tangible and intangible assets ("total assets"). While data on the amortization charge are available at firm level, the amortization rate has been derived for each ateco2 on annual basis.

Finally, we computed the annual average weighted investment rate of tangible and intangible assets for the total economy and for the three macro-sectors, using, as weights, the percentage of value added of a firm on the total value added of the total or sectoral economy:

$$\text{weighted average investment rate}_t \text{ in X} = \sum_{t=1}^{n} \left(investment\ rate_{it} * \frac{value\ added_{it}}{total\ value\ added\ of\ X} \right) \quad (3)$$

where X represents the total economy, the industry sector, the construction sector or the service sector.

Since the results do not sensibly change when firms' investment rates are calculated using the second method, we only show the results based on the first method.

Labor share

First, we obtained firm-level labor shares by simply dividing, for each year (t), a firm (i)'s cost of employees by the company's value added. Then, we built a weighted average for the total economy, and for each of the three macro-sectors:

$$\text{labor share}_{it} = \frac{cost\ of\ employees_{it}}{value\ added_{it}} \quad (4)$$

$$\text{weighted average labor share}_t \text{ in X} = \sum_{t=1}^{n}\left(labor\ share_{it} * \frac{value\ added_{it}}{total\ value\ added\ of\ X} \right) \quad (5)$$

where X represents the total economy, the industry sector, the construction sector or the service sector.

Capital share

In order to construct the capital share in Trentino starting from firm-level data, we first estimated the rental rate of capital. To this purpose, we resorted to the following formula, which is a slightly simplified version of the one used by Eggertsson, Robbins & Getz Wold (2018):

$$\text{rental rate of capital}_t = \quad i_t - MA\pi(CPI) + d + (1 - d) * MA\pi(K) \quad (6)$$

where i_t is the interest rate, proxied by the return on Italian six-month ordinary treasury bills, MAπ(CPI) is the five-year moving average of the inflation rate based on changes in the CPI (Consumer Price Index), d is the depreciation rate of capital (which captures the "intrinsic" rate of obsolescence, and then does not typically coincide with the amortization rate derived from the companies' balance sheets), and MAπ(I) is the five-year moving average of the inflation rate of capital goods.

While for sectors different from manufacturing we used an approximation of the depreciation rate, namely the average amortization rate, for the manufacturing sector (which is the sector on which we will mainly focus), we estimated a depreciation rate, whose expression can be derived from the equation of the value of capital goods at replacement cost (see Card, Devicienti & Maida, 2014, p. 105):

$$\text{d} = 1 - \frac{K\ at\ the\ replacement\ cost_{t+1} - K\ (book\ value) at\ current\ prices / I_t}{\frac{Pt}{Pt-1} * K\ at\ the\ replacement\ cost_{t+1}} \quad (7)$$

where K stands for capital goods and P_t/P_{t-1} is the ratio between the price of these goods in a given year and the price in the previous year.

Data on gross fixed investment and on capital goods (tangible and intangible) measured both at the book-value and at replacement cost are available from 1995 to 2016 in the "National accounts" section of Istat Statistics database. Moreover, the ratio P_t/P_{t-1} can be derived from the ratio between the stock of assets at current prices and the stock of assets at previous prices.

After estimating the rental rate of capital, we multiplied it by capital stock in order to obtain the return on capital for each firm-year observation. Subsequently, we calculated firms' capital shares as the ratio between the return on capital and the firm's value added. Finally, we computed the weighted average capital share for the total economy and for the three selected macro-sectors:

$$\text{return on capital}_{it} = rental\ rate\ of\ capital_{it} * capital\ stock_{it} \quad (8)$$

$$\text{capital share}_{it} = \frac{return\ on\ capital_{it}}{value\ added_{it}} \quad (9)$$

$$\text{weighted average capital share}_t \text{ in X} = \sum_{t=1}^{n}\left(capital\ share_{it} * \frac{value\ added_{it}}{total\ value\ added\ of\ X} \right) \quad (10)$$

The estimation of the factor shares also allowed us to derive the residual share, which we simply define as profit share:

$$\text{profit share}_{it} = 1 - labor\ share_{it} - capital\ share_{it} \quad (11)$$

$$\text{weighted average profit share}_t \text{ in X} = \sum_{t=1}^{n}\left(profit\ share_{it} * \frac{value\ added_{it}}{total\ value\ added\ of\ X} \right) \quad (12)$$

,

where X represents the total economy, the industry sector, the construction sector or the service sector. The indicator of capital share is first calculated using both tangible and intangible assets, and then using tangible assets only.

A2. The estimation of corporate markups: a short review of the main methodologies

Markup is simply defined as the ratio between price and marginal cost. However, a proper estimation of the markup (and also of the Lerner index, which is calculated as the ratio between price minus marginal cost and price) is not straightforward, since marginal costs are not observable. The empirical methods developed in empirical industrial organization during the twentieth century often required very detailed market-level data with information on prices, quantities sold and characteristics of products which were often not available to both researchers and government agencies (De Loecker & Warzynski, 2012).

An important contribution to this strand of literature is given by Hall (1988), who suggests measuring marginal cost using the observed change in input cost as output rises or falls from one year to the next. In particular, he manipulates the Solow residual equation of the standard growth-accounting model to relax the assumptions of perfect competition in the product market and of constant returns to scale, and shows that, in this more realistic context, the Solow residual is not solely a measure of technological change, but a weighted sum of technological change and the growth rate of the capital-output ratio, where the weights are a function of the markup. Hall's methodology, which allows to derive industry-level markups by estimating a production function, is used in a number of studies (e.g. Domowitz, Hubbard & Petersen, 1988; Morrison, 1988; Waldmann, 1991; Norrbin, 1993; Roeger, 1995; Klette, 1999). Giordano & Zollino (2017) employ Morrison (1998) and Roeger's (1995) approaches, as well as Crafts & Mills's (2005) method, to estimate total-economy markups in Italy for seven consecutive periods covering a very long time span (from 1861 to 2011). However, they observe that all the three methodologies employed present numerous data and computation-related issues when applied to Italy in the long run, and they produce quite different markup series. Subsequently, the authors use EU-Klems and Istat data and rely on the extension of Roeger's model (which relaxes the assumption of perfect competition in the labor market, as well as that in the goods' market) developed by Bassanetti, Torrini & Zollino (2010) to obtain more robust total-economy, and also sectorial markup estimates for Italy from 1970 to 2012.

De Loecker &Warzynski (2012) argue that important econometric issues are not addressed yet in the series of modified approaches based on Hall's (1988) one[11]. As an illustration, such methods do not properly control for unobserved productivity shocks, and since productivity is potentially correlated with the input choice (because firms that have a large positive productivity shock may respond using more inputs), markup estimates could be biased. In addition, all the approaches mentioned before produce industry-level markups. By combining optimal input demand conditions obtained from standard cost minimization with the standard definition of markup (i.e. price over marginal cost), De Loecker &Warzynski (2012) show that the markup is identified as the ratio of an input's output elasticity and its revenue share. While the latter can be easily computed using firm-level data that are generally available, output elasticity can be recovered by estimating a production function. In doing so, the authors mainly draw upon the method proposed by Levinsohn & Petrin (2003), who solve the

[11] Recently, Hall (2018a, 2018b), who observes that, since the publication of his seminal paper in 1988, much improved data have become available, develops and applies a direct empirical approach, where marginal cost is measured as the ratio of the observed change in cost to the observed change in output, that allows to easily recover an average measure of market power (the markup or the Lerner index) using sectoral productivity data from Klems. The results of his empirical analysis suggest that the sellers in many industries in the US economy have substantial market power. Moreover, Hall (2018b) argues that, despite the sampling variation, the estimates give reasonable support to the hypothesis that the overall Lerner index rose over the period from 1988 through 2015.

simultaneity problem by treating unobserved productivity as a function of observed firm-level decisions (i.e. demand for intermediate inputs). Using this approach, De Loecker, Eeckhout & Unger (2018) and De Loecker & Eeckhout (2018) estimate markups over the period 1980-2016, in the US and in the world economy (proxied by 134 countries) respectively, and find that the average markup remarkably rose both in the US and in most of the world.

Accordingly, De Loecker &Warzynski's (2012) approach provides estimates of firm- and time-specific markups while controlling for unobserved productivity and allowing for flexible production technologies. Moreover, it allows to properly estimate total factor productivity (TFP). Although this variable has often been object of study, as Dixon & Lim (2018) observe, the conventional measure of TFP growth uses labor share (profit share) as a proxy for the elasticity of output with respect to labor (capital) input, and will be biased if there is imperfect competition.

However, recently some scholars have argued that the markup found by the aforementioned studies for recent years is likely to be overestimated. In an article included in the symposium "Markups" of the Journal of Economic Perspectives (Summer 2019), Basu (2019) observes that, if the average markup in the US in recent years were equal to 1.6, as argued by De Loecker, Eeckhout & Unger (2018), according to the relation between markup, economic profits and returns to scale, there would be an extremely high and implausible average economic profit, on the order of 35 percent of firm sales. In addition, there is a relevant discrepancy between the estimated output elasticity of capital and the one implied by their estimate of the average returns to scale. Basu (2019) contends that also other studies report end-of sample estimates of the average markup that are too large to be credible and that greatly overshoot what is required to explain the decline in labor share. Accordingly, he concludes that future research should aim to full understanding of markup trends and their economic effects, and then should attempt to explain why most markup estimates based on micro data are implausibly large and grow too fast in relation to the macro facts to be explained (and also why most macro data appear to indicate that markups are low and stable, but the investment rate is sending a different signal). Similar considerations are made, in another article of the symposium, by Syverson (2019), who recognizes that researchers that estimate markups directly using accounting data are left to make choices among imperfect options. Syverson (2019) also argues that firms may have market power in both the product and the factor markets, and then that markups may not reflect only market power in the product market as it is often assumed. Despite these considerations, De Loecker &Warzynski's (2012) approach made a prominent contribution to the literature on markups.

A3. The methodology used in our research project to estimate markups

Building upon the study by De Loecker &Warzynski (2012), we determined firm-level markups for a sample of manufacturing companies in Trentino starting from microdata compiled by Ispat. To this purpose, we first estimated a revenue-based, gross output production function with three factor inputs (labor, capital and materials), using a Cobb-Douglas specification. In particular, output is proxied by the deflated sum of sales and change in inventories, labor by the number of workers, capital by the deflated stock of tangible assets, and materials by the deflated sum of purchases of materials and services. While labor and materials are regarded as variable or free inputs and are treated as endogenous, capital, whose level is assumed to be decided by the firm before the productivity shock takes place, is considered exogenous.

The production function is estimated by means of a two-step procedure. In the first step, we removed the random-error term from the output using a third-degree polynomial which includes the three inputs, their second and third-degree powers, a series of interaction terms between them and an indicator of exports (namely, another variable that may affect productivity). The output variable obtained in this way, labelled ŷ, was used in the second step, in which we resorted to an IV approach to estimate the production function. In both the regressions, we also added year and sectorial dummies (at ateco2 level). This second regression, which employs a GMM estimator, allows to recover the elasticities of materials, labor and capital with respect to output, labelled ϑ_m , ϑ_l and ϑ_k , respectively. Indeed, in the Cobb-Douglas specification, the latter correspond to the coefficients of the relative inputs.

After estimating the input coefficients and elasticities, total factor productivity (ω) and markups based on materials (μ_m) and markups based on labor (μ_l) can be easily derived in this way:

$$\omega = \hat{y} - \beta_l l - \beta_k k - \beta_m m \qquad (13)$$

$$\mu_m = \frac{\vartheta_m}{\alpha_m\text{^}} \qquad (14)$$

$$\mu_l = \frac{\vartheta_l}{\alpha_l\text{^}} \qquad (15)$$

where $\hat{y}$ is the estimate of expected output obtained from the first-stage regression, β_l, β_k and β_m are the estimated coefficients of inputs l (labor), k (capital) and m (materials), respectively, $\vartheta_m$is the elasticity of materials with respect to output, α_m^ is the adjusted revenue share of materials (namely, the revenue share multiplied by the exponential of the estimate of the error term derived in the first-stage regression[12]), ϑ_l is the elasticity of labor with respect to output and α_l^ is the adjusted revenue share of labor.

[12] De Loecker & Warzynski (2012) assert that this correction is important since it eliminates any variation in expenditure shares that comes from variation in output not related to variables impacting input demand including input prices, productivity, technology parameters, and market characteristics, such as the elasticity of demand and income levels.

Given the assumption of perfect competition in the market of intermediate goods, a negative difference between μ_m and μ_l means that the wage given to workers by the firm is lower than their marginal revenue, and implies a monopsony in the labor market; conversely, a positive difference (namely, $\mu_m < \mu_l$) implies efficient bargaining between workers and firms (see Dobbeleare & Mairesse, 2013, for a discussion on different types of product and labor market regimes and their relations with markups).

In the first part of our research project, we tried to estimate firm-level markups for the manufacturing firms in Trentino included in the sub-sample described in Section 4. In doing so, we ran across some issues, such as the limited number of observations, which induced us to estimate a unique production function for the whole manufacturing, although it is likely that different manufacturing sectors are characterized by different production functions; in addition, some observations are characterized by very low or very high values of value added, revenue shares or other variables, and/or have missing values for some years. Further, data on exports, which we would use to calculate an export indicator to include in the OLS regression, are not available. For these reasons, and since the estimation of markups is the object of the second part of our research project, during which we will be given access to regional and national data on a higher number of variables (including exports) and covering a longer time-span, we decided not to present our preliminary estimates. Two facts that are robust across several slightly different model specifications and sub-samples are that μ_l is significantly higher than μ_m, and that the annual weighted average μ_m (weighted by each firm's share of value added on total value added) is systematically lower than the corresponding unweighted average. Accordingly, it seems that firms in Trentino own some monopsonistic market power, and that smaller firms charge higher product markups.