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Market power and productivity trends in the European economies. A macroeconomic perspective.

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Abstract

Recent empirical investigations have documented an upward trend in profit rates, markups, and concentration over the last decades, bringing a renewed interest in market power and its causes and consequences. While most studies have focused on the US, recent works identify similar patterns in other advanced economies as well. In light of such results, a growing concern is emerging about the negative effects of declining competition. Do we observe a similar pattern in the EU countries? This paper relies on national accounting data to investigate these issues for four major EU countries: France, Germany, Italy and Spain. We find that, despite some common trends, EU countries are differentiated and followed different trends relative to the US. The upward markup trend is less pronounced than in the US and markups are positively correlated with productivity and investments, including on innovation; while imported inputs and Global Value Chains have pro-competitive effects. In the EU, despite country and sector specificities, increased concentration and market power are generally of less concern than in the US, while a larger role for the most efficient firms might increase efficiency.

Keywords: productivity growth, markups, market power, global value chains.
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1 Introduction

Recent empirical investigations have documented a broad upward trend in profit rates, markups, and concentration over the last decades, bringing a renewed interest in market power and its causes and consequences. While most studies have focused on the US, recent works (Diez et al., 2018, 2019; Calligaris et al., 2018; De Loecker and Eeckhout, 2018) identify similar patterns in other advanced economies as well. In light of such results, a growing concern is emerging about the negative effects of declining competition. While, on one side, a certain degree of market power (and profitability) is necessary for firms to have an incentive to invest in innovative products and processes, on the other side weakening competition will probably fail to provide incentives to try to escape competition through innovation (Aghion et al., 2005) or other productivity-boosting enablers such as management practices (Van Reenen, 2011). As its market power rises, a firm can increase its profits by charging higher prices and reducing output, which, in turn, leads to a lower demand for labor and capital. By reducing investment and employment, rising markups can generate economic slack. In the short-run, this may imply a trade-off for monetary policy. Rising markups may lead to higher inflation, potentially calling for restrictive policies. Yet, firms with greater market power may reduce output and investment, which instead would imply a more accommodating monetary policy stance. In the long-run, real wages will need to fall to restore an inflation rate consistent with the Central Bank's target, leading to lower participation rate and employment, and thus to lower potential output Autor et al. (2020). Several authors have recently tried to link the observed increase in concentration to other recent macroeconomic trends such as the observed drops in productivity growth (Baqaee and Farhi, 2019; Aghion et al., 2019), in investment rates (Gutiérrez and Philippon, 2017; Diez et al., 2018; Eggertsson et al., 2018), and in the labor's share of income (Barkai, ming; Eggertsson et al., 2018; De Loecker and Eeckhout, 2017; Autor et al., 2020). Other studies, however, point into the opposite direction. For instance, Autor et al. (2017) and Crouzet and Eberly (2019) find a positive relation between concentration and productivity growth, although the latter finds a positive relation only in some sectors, such as Retail and Wholesale trade and, to some extent, the High-tech. As pointed out by Van Reenen (2018), if the rising concentration and markup levels reflect technological changes favoring a reallocation of output to more efficient firms rather than weakening competition, we may expect to eventually observe higher productivity, lower prices and higher real wages. This possibility raises a number of issues that need to be addressed in order to ascertain whether and to what extent increases in the average level of market power must be held accountable for the aforementioned trends.

In this paper we provide an overview of the main findings of the literature and

discuss the main evidence for four major European countries: France, Germany, Italy and Spain. Our aim is identify the main stylized facts for markups and productivity dynamics in the EU countries as compared to the US. This descriptive evidence is helpful in setting the stage for further investigations on the causes and consequences of market power and productivity dynamics in the EU. The literature focusing on EU countries is relatively scarce. Moreover, micro-level analyses typically focus on one country, while direct cross-country comparisons are difficult due to data availability. Our paper contributes to fill this gap. To do so we rely on national accounting data (EUROSTAT and EU KLEMS), which ensures cross-country comparability and allows us to provide for the first time an aggregate cross-country analysis for EU countries. The evidence gathered in this paper helps answering some important questions and puzzles regarding recent trends. Some of these questions are: Were trends in the EU different from the US? What are the drivers of aggregate and sector markup trends in the EU economies? What are the common factors across EU countries?

We find that the four EU sample countries are heterogeneous. After a declining trend from 1995 to 2007, especially for France and Italy, markups show country-specific dynamics with an increase in cross-country dispersion after the 2008 financial crisis. However, in all four EU countries markups are lower than in the US. Productivity dynamics are also heterogeneous with Germany being the only country with no clear sign of a productivity slowdown. The country-level aggregate markups and productivity series do not seem much correlated. At a more disaggregated level, however, there is a positive correlation between markups and productivity. These correlations apply both to cross-sectional country-industry markups (period averages) and over time. Moreover, country-industry markups are correlated negatively with the labour share and positively with the investment share, including on innovation. Import penetration does seem much associated with markups, but further analysis reveals that the type of goods imported matters. Considering imported inputs and global value chains (GVC) there is a clear negative correlation between markups and (backward) GVC participation. This correlation holds after controlling for several factors as well as country-industry and year fixed effects.

Overall, our results highlight that despite the EU single market, France, Germany, Italy and Spain had specific trends. Nonetheless, markups remained lower and market power did not play the same role as in the US. In the EU the association between markups and productivity is positive. This is in line with the idea that the EU economy is now more fragmented and competitive relative to the US. Market shares reallocation towards the most productive firms may still be beneficial in terms of efficiency while the risk of monopoly rents does not seem imminent. Global value chain participation and the use of imported inputs may have contributed to moderate markup increases.

2 Background literature on markups

The main issue of the literature regards the drivers of markups. Several mechanisms can lead to markups increases. They may reflect different market structures and forms of interactions between firms. A number of studies postulates a positive relation between productivity and market power, at least at the firm level, and a crucial role of technological advancements in linking the two. In contrast with this evidence, several works suggest that rising market power may eventually undermine aggregate productivity growth, even if it is driven by a reallocation of resources to most productive firms.

In what follows we briefly review the literature highlighting the role of productivity, of reallocation of marker shares within and between sectors, of innovation activity of firms and of Global Value Chains (GVC).

2.1 Productivity

The association between markups and productivity is of primary importance to gauge whether increased concentration and market power represent a major concern. However, theoretical considerations show that the relation between these variables is non-trivial and causality can go in either direction, implying that the issue is mainly empirical.

The sign of the relation between market power and productivity depends on the degree of market power. Diez et al. (2018) find support for this hypothesis using data on publicly traded firms from 33 advanced economies.[1] They find that at low levels of markups, an increase in market power is associated with more investment, but the relation is eventually reverted for higher markup levels, and particularly for firms operating in industries with high levels of market concentration. In a study on a large sample of French manufacturing firms over the period 1998-2007, Bellone et al. (2014) find a positive association of markups with firms' productivity and a negative relation with variables describing the competitive environment such as the size of the local markets where firms operate or the degree of import penetration. They also find markups to be positively related to productivity and export participation, the size of the effect growing with the wealth and the distance of the destination countries, which, the authors speculate, suggests quality differentiation across markets. Aghion et al. (2005) propose a model in which innovation increases with competition for low initial competition levels; at higher levels of market competition, however, innovation decreases, as the potential payoffs decline. Aghion et al. (2019) and De Ridder (2019) provide theoretical frameworks, based on innovation-led endogenous growth, that link

[1] But they take investment (both on physical capital and R&D) as the dependent variable rather than productivity or a measure of innovation.

the rise in concentration to a slowdown in aggregate productivity. In Aghion et al. (2019), high-productivity firms exploit IT improvements to expand their reach into new markets. Since these firms also enjoy higher markups, we observe a temporary surge in productivity coupled with rising average markup. But eventually they run into a high-productivity incumbent: at this point, both firms curtail their efforts at creative destruction, knowing they will face stiffer competition. In De Ridder (2019), the rise of intangible inputs gives firms with low adoption costs a competitive advantage that can be used to deter (potential) competitors from developing higher quality products, thus reducing the rate of creative destruction and innovation. Crouzet and Eberly (2019) find that the relation between intangibles, markups and productivity may vary across sectors. Their evidence points to a positive association between intangible investment by industry leaders and productivity gains in the Consumer and High-tech sectors. By contrast, in the Healthcare sector (and to a less extent in High-tech), intangible investment is associated with rising markups, suggesting that it may have been used by leading firms to exert market power.

2.2 Reallocation

Firms and industries may have different characteristics, implying that researchers must pay attention not only to within-firm dynamics but also to between-firms and between-sectors reallocation.

A common result in the literature is that, while aggregate markups have increased across all major industries, their distribution has broadened and become more skewed upward over time. Baqaee and Farhi (2019) generalize the growth accounting methodology to account for deviations from perfect competition, and decompose the estimated changes in aggregate productivity into two components: technical change, and variations in allocative efficiency. They find that the reallocation of market shares to high-markup firms accounts for about half of measured aggregate TFP growth in the US over the period 1997-2015. Nevertheless, they also show that eliminating the misallocation resulting from the large and dispersed markups would raise aggregate TFP by about 15%. The increase in average markups, then, seems to be led by a reallocation of market shares towards higher-markup firms rather than by a generalized increase in price-cost margins. Such result, found by De Loecker and Eeckhout (2017) in their study on publicly listed US firms, is confirmed by Calligaris et al. (2018), Diez et al. (2019), Hartman-Glaser et al. (2019), Autor et al. (2020) who also describe similar dynamics in other advanced economies. Diez et al. (2019), for a panel of private and listed firms from 20 (mostly advanced) countries, find evidence of a U-shaped relationship between markups and firms size, with markups declining with firms size, except for firms in the top 5 percentile of the distribution of firm sales. Suggested expla-

nations include lax antitrust enforcement of mergers and acquisitions (Grullon et al., 2019) or, on the contrary, growing federal regulation creating entry barriers, and thus reducing competition (Andrews et al., 2016; Gutiérrez and Philippon, 2017). While this explanation may apply relatively well to the US, it would hardly be the case of EU countries, which instead have undergone major product market deregulation since the 1990s, and where competition law and policy is widely seen as stringent in international comparison (IMF, 2019).

2.3 Innovation

Given the broad-based nature of changes in markups and their distribution across countries and industries, a case could be made that some common underlying forces have changed the nature of competition, allowing firms that better adapt to new technologies to capture outsized market power. This is the thesis of Autor et al. (2017, 2020) who find evidence of a positive relationship between the growth of concentration and the growth of patent intensity and labor productivity both in the US and in other OECD countries. They speculate that this is explained by greater competition resulting from globalization and improved abilities of consumers to find low-cost or high-quality firms, made possible by advances in information technology. Bessen (2017) finds a positive relation between industry concentration in the US and the use of IT systems, which in turn is associated with enhanced performance of the top firms within each industry. The paper shares the idea that higher concentration may be part of an efficiency-enhancing shift, but the author suggests that this is explained by a growing role of scale economies and network effects rather than by increased competition. Other works also stress the role of technological change in driving market power and markups. Guellec and Paunov (2017) point out that in markets where competition is based on digital innovation, "winner-take-all" dynamics allow winners to extract a rent, by raising the price of output and/or lowering the price of inputs, and this mechanism is reinforced by globalization, which allows successful firms to expand beyond their national markets. Calligaris et al. (2018) find that firms in the top-digital sectors display on average higher markups than firms operating in low-digital sectors and that this gap is larger nowadays than in the past. Aghion et al. (2019) build a model of endogenous growth through innovation and creative destruction that links the recent trends of productivity and markups to the IT improvements in the mid-1990s to mid-2000s which allowed the most efficient firms to expand their boundaries.

2.4 Entry barriers and technology diffusion

The findings on increases in concentration and markups resulting from few successful firms' innovation capacity raise the question of why the great majority of firms lags

behind, apparently unable to exploit technological advancements and to benefit from knowledge spillovers. Akcigit and Ates (2019) suggest that data-dependent production processes allow large and established firms not just to exploit data-network effects, but also to prevent potential competitors from entering markets where incumbents' success rests on hard-to-reproduce (or hard-to-buy) intangible assets, such as large proprietary consumer databases. Moreover, large and more productive firms are more likely to be able to acquire relevant complementary managerial and technical skills (Andrews et al., 2016; Bessen, 2017), to exploit patent protection through the creation of patent thickets (Bessen, 2017; Guellec and Paunov, 2017), or to use big data in financial markets to reduce the cost of capital (Begenau et al., 2018). Finally, Akcigit and Ates (2019) and Guellec and Paunov (2017) also highlight that large firms frequently buy patents of potential competitors or successful startups. While the macro market power literature has widely investigated the links between average industry-level market power (although often using concentration as a measure of market power) and technology adoption, less attention has been devoted to the drivers of markups dispersion between firms within and between industries. Cassiman and Vanormelingen (2013) estimate the impact of innovation activities on firms' markups for a panel of 4,600 Spanish manufacturing firms between 1990 and 2008. They find that both product and process innovations are associated with higher markups although the effect is stronger for smaller firms. The intensity of competition also matters. Product innovations do not lead to sizeable markups increases in atomistic nor in monopolistic markets, while process innovations only play a role in less competitive markets where cost savings are more likely retained by firms.

2.5 Global Value Chains

International trade and participation into Global Value Chains (GVC) may also affect markups. Trade openness is typically thought to yield pro-competitive effects. Moreover, it is well known that the most productive firms tend to be larger and are more likely to internationalize and being involved into GVC operations. But larger and more productive firms also tend to face more rigid demand, i.e. have more market power, and can set higher markups. These firms can benefit from GVC-related cost reductions as they are only partially passed into lower prices, thus, allowing them to increase their markups (Antràs, 2019). GVC participation and, more specifically cost reductions stemming from the use of imported inputs, can therefore represent a specific channel affecting markups. De Loecker et al. (2016) document that Indian firms importing inputs from abroad increased their markups after an input trade liberalization. The 2020 World Development Report (World Bank, 2020) shows evidence suggesting that the correlation between markups and GVC participation might actually be am-

biguous. For instance, for firms in developed countries GVC participation is associated with rising markups, while the opposite holds for firms in developing countries. The sign of the correlation is thus likely to depend on the modality through which firms participate into GVC. Different positioning implies different bargaining power. Lead firms in GVC, while incurring in increased fixed costs due to complex internationalization strategy, may benefit from input cost reductions (or quality improvements) relative to other GVC particpants. The GVC-driven increased markups are also likely to contribute to a lower labour share (Karabarbounis and Neiman, 2014).

If cost reductions due to imported inputs may imply higher markups for the firms involved, the aggregate country-level effect remains ambiguous. When cost reductions are only partially passed-through, it is possible to have rising markups and declining prices. This may force local competitors to lower their prices as well, but without the benefit of GVC-related cost reductions, thus forcing them to reduce their markups. GVC may thus increase market power of (lead) firms involved but at the same time yield pro-competitive effects on their competitors (or on GVC-firms in low-end tasks). The net effect at the country-industry level is thus ambiguous.

While we are not aware of any paper addressing directly the relationship between GVC and markups at the country or industry level, the idea that GVC may contribute to moderate price increases is in line with some macro-level findings. For instance, de Soyres and Franco (2019), Bianchi and Civelli (2015) and Auer et al. (2017) argue that GVC and lower input prices have contributed to lower inflation. Using disaggregated data for the EU, Chen et al. (2009) show that openness reduces both prices and markups while raising productivity.

3 Measurement issues

The most commonly used measure of market power in the macroeconomic literature are concentration indexes. They are simple to calculate and intuitively appealing. But they also suffer from several shortcomings.[2]

First, concentration indexes are calculated on revenues and do not take into account profits nor price-cost margins, which instead define the extent of market power more accurately.

Second, any meaningful concentration measure requires an appropriate definition of the relevant market. This is not obvious both from a geographical point of view as well as with respect to the degree of substitutability between different goods/services.

Third, concentration is a market outcome rather than a determinant of the level of competition: focusing on it may be misleading as it can be negatively associated with

[2] A deeper discussion can be found in Syverson (2019).

price-cost margins (as is the case with monopolistically competitive markets) and positively correlated with competition and welfare to the extent that higher concentration might arise from increased product substitutability.

Because of these shortcomings, markups may be preferable to simpler concentration indexes. In fact, markups are the most rigorous measure of market power on theoretical grounds. However, markups also presents important issues in terms of data requirements and measurement methods.

A direct estimate of markups requires data on prices and marginal costs at the firm level. As the latter are not readily available, different estimation methods have been proposed.

The demand approach (Berry et al., 1995), used in the micro literature, requires assumptions on market competition and consumers' behaviour and to estimate the demand function using data on prices, market shares and product attributes.

The production approach of De Loecker and Warzynski (2012) and De Loecker and Eeckhout (2017) uses accounting data to estimate a firm's production function, and notably the output elasticity of variable inputs as, following Hall (1988), markup is equal to the ratio between the elasticity of output to a variable input and the share of revenues the input is paid.

The production approach is relatively parsimonious both in terms of assumptions and data inputs, but it is not exempt from critiques related to the identification of variable costs and the possible discrepancies in accounting practices, simultaneity and selection biases, functional dependence problems (Ackerberg et al., 2015), the biases introduced by multi-product firms or by the use of industry-level price deflators.

An alternative approach, that we adopt in this paper, is to measure markups as the ratio of price to average variable cost, which is equal to the ratio between revenues and total variable costs, once both of these are divided by quantity produced. Certainly simpler than the former, this method, relying on national accounts data, improves the comparability across countries and sectors at the cost of assuming equality between average variable cost and marginal cost, which would only be true if marginal cost was constant at all quantity levels.

3.1 Markup estimation methods

The demand approach (Berry et al., 1995) requires to define a model of competition and consumers' behaviour, and to derive a demand system that can be estimated using data on prices, market shares and product attributes. Given the estimated elasticities of substitution across the goods considered, markups can then be recovered from the first-order conditions, after specifying a model of competition. Due to the large amount of data (and assumptions) it requires, such approach, while appropriate for market-level

studies, is ill-suited for larger and less homogeneous aggregates.

The production approach, recently made popular by De Loecker and Warzynski (2012) and De Loecker and Eeckhout (2017), uses accounting data to estimate a firm's production function, and notably the output elasticity of variable inputs. It relies on the work of Hall (1988) showing that, under cost minimization, for any variable input, the firm's markup is equal to the ratio between the elasticity of output to that variable input, and the share of revenues the input is paid. In formula for every firm i at time t:

$$\mu_{it} = \frac{\beta^{\nu}_{it}}{s^{\nu}_{it}} \tag{1}$$

where μ is the multiplicative markup and β^{ν} is the elasticity of output with respect to the variable input ν obtained from the firm's production function, and s^{ν} is the share of revenues paid to the variable input supplier.

The production approach is more parsimonious as it only needs panel data on firms' inputs and output together with assuming cost minimization, the existence of (at least) one input of production that can be adjusted without frictions and some identifying assumptions to avoid bias from the potential correlation between productivity shocks and variable input levels.

However, a number of issues have recently been raised regarding the production approach. The demarcation between variable and fixed costs does not coincide with the accounting classification of expenses. While most of the literature adopts the Cost of Goods Sold (COGS) as the variable costs, Syverson (2019) points out that there are several categories of costs not included in COGS that can be deemed as variable and, vice versa, that some costs in COGS might arguably be fixed. Also, discrepancies may arise in accounting practices across sectors and countries, and even across firms when we extend the analysis beyond the limited sample of publicly listed firms. A further reason for caution is the potential bias that can derive from the application of industry-level deflators to firms' or from imposing a common technology across firms in an industry. Finally, Raval (2020) remarks that while Hicks-neutral productivity is generally assumed, if productivity is instead labor augmenting, and inputs are complements, more productive firms will have lower output elasticities of labor and higher elasticities of materials than less productive firms, which may lead to systematically different markups estimates when different inputs are used.

A different method, based on aggregate macroeconomic data, is used by Eggertsson et al. (2018) who exploit the fact that under constant returns to scale production, markups are proportional to the profit share (PS) of the economy (in particular, they are equal to the inverse of the share of production not accounted for by pure profits) in formula:

$$\mu = \frac{1}{1 - PS} \tag{2}$$

As the profit share is computed by subtracting labor and capital income from output, the main weaknesses here lie in the estimation of the latter depending on factors which are difficult to measure or uncertain, and in the omission of overhead costs.

An alternative approach to measuring markups, also based on aggregate data, is to look at the ratio of price to average variable costs, which is equal to the ratio between revenues and total variable costs, once both of these are divided by quantity produced. Certainly simpler than the production approach, both these alternative methods, relying on national accounts data, also improve the comparability across countries and sectors.

Applying a related approach to plant-level data, Shuichiro and Mari (2019) also approximate output elasticities from cost shares and estimate markups as revenues divided by the total costs (which is equivalent to the cost share of an input divided by the revenue share of that input). Such "cost approaches", by imposing that first-order conditions are always met, could be inconsistent with the timing assumption traditionally presumed, as labor hiring and capital installation may take longer than purchasing intermediate inputs. Thus, such approaches may be appropriate in the medium to long run, and indeed the markup dynamics estimated for Japan by Shuichiro and Mari (2019) are consistent with the theoretical predictions, exhibiting a positive correlation with prices, output, and productivity, and a negative relation with unit costs, which is not always the case with markups computed with the production approach.

Beyond the above methodological questions, cross-country studies must deal with the additional issue of data harmonization and comparability.[3] In this paper, to compare the evolution of markups across four major European economies, we need reliable and comparable data. National accounts data are highly harmonized at the European level and guarantee representativeness at national and sectoral level. In this work, we thus rely this data source. In particular, we calculate markup μ as the ratio of price to average variable cost, which is equal to the ratio between revenues and total variable costs, once both of these are divided by quantity produced assuming equality between average variable cost and marginal cost, which would only be true if marginal cost was constant at all quantity levels. In formula:

$$\mu = \frac{Output}{Intermediate\ Consumption + Compensation\ of\ Employees^*} \tag{3}$$

[3]For further details, related to this paper, on markup measurement at the micro and macro level, see the work by Rinaldi and Oropallo (mimeo, 2020).

where

$$Compensation\ of\ Employees^{*} = CE + \frac{CE}{Employees\ Domestic} Self\ Employed \quad (4)$$

Differently from De Loecker and Warzynski (2012) and De Loecker and Eeckhout (2017) our measure of markup is not estimated but it is a direct one observed ex-post. To calculate it we can use two different data sources: national accounts (NA) or structural business statistics (SBS) with significant difference depending on the data sources. To check the robustness of our markup measure we compare the NA markup series to the one obtained using SBS data calculated as:

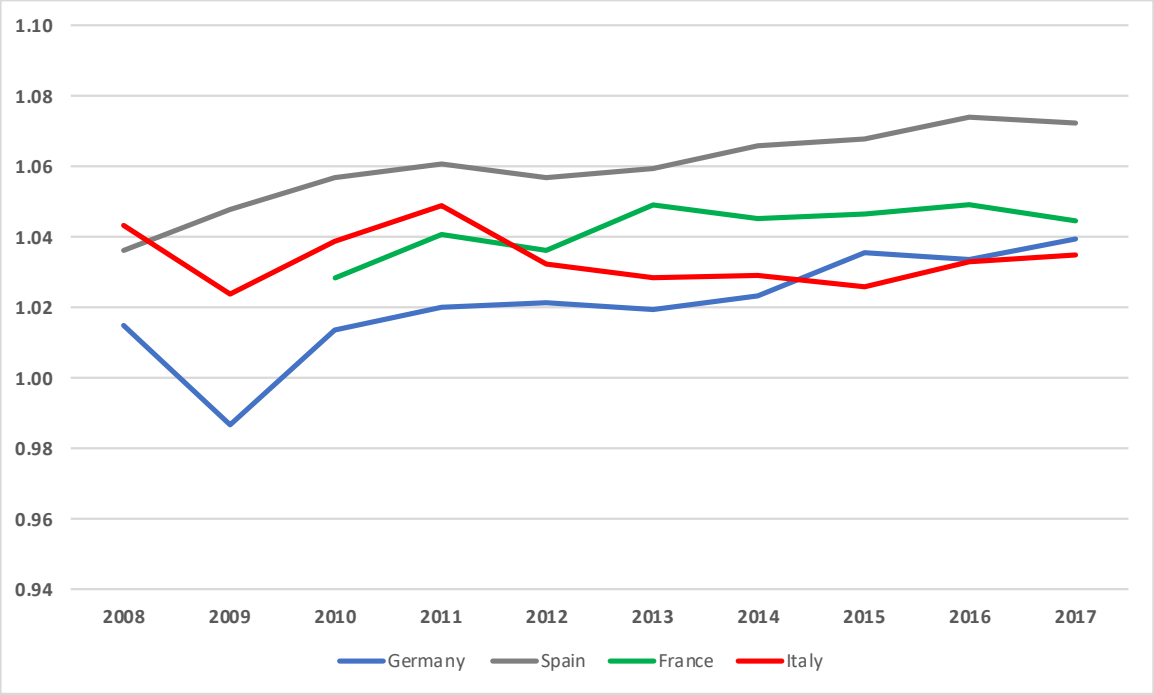
$$\mu = \frac{Turnover}{Purchase\ of\ goods\ and\ services + Personnel\ cost^{*}} \quad (5)$$

where

$$Personnel\ cost^{*} = Personnel\ costs + \frac{Personnel\ cost}{N.\ Employees} N.\ Unpaid\ Employed \quad (6)$$

Figure 1 represent the ratio between our markup calculated using NA data and the ones obtained using SBS in Manufacturing for the 4 countries included in our sample. In the time span from 2008 to 2017 the difference between the two markups is lower for Germany and Italy and higher for Spain. Overall the measures are quite similar in our sample with the differences amounting to few percentage points. Relative to the NA markup series the ones calculated using SBS tend to increasingly underestimate markups over time, especially for Spain, Germany and France, while Italian NA and SBS data seem more consistent.

Figure 1: Ratio between μ_{NA} and μ_{SBS} for Manufacturing



Source: elaborations on Eurostat data (Rinaldi and Oropallo).

4 Evidence and stylized facts

4.1 Cross-country trends

Most empirical studies on market power and productivity developed so far focused their attention on the US emphasizing that the increasing extent of imperfect competition in the US firms might partly explain aggregate productivity slowdown. On the other hand, the evidence for the European countries is still scant and as a consequence comparative analysis for markups dynamics is at the very beginning. This paper aims at providing some evidence in this respect and to offer new evidence on markup and productivity trends within the EU market economies. Therefore, the main question is: what are the markups dynamics in the EU? Are they similar to the US ones?

To get the sense of the differences between aggregate markup size and dynamics between the US and four big EU countries, Germany, Italy, Spain and France, Figure 2 shows markups for the market sectors over the years 1995-2017.[4] The main evidence can be summarized as follows.

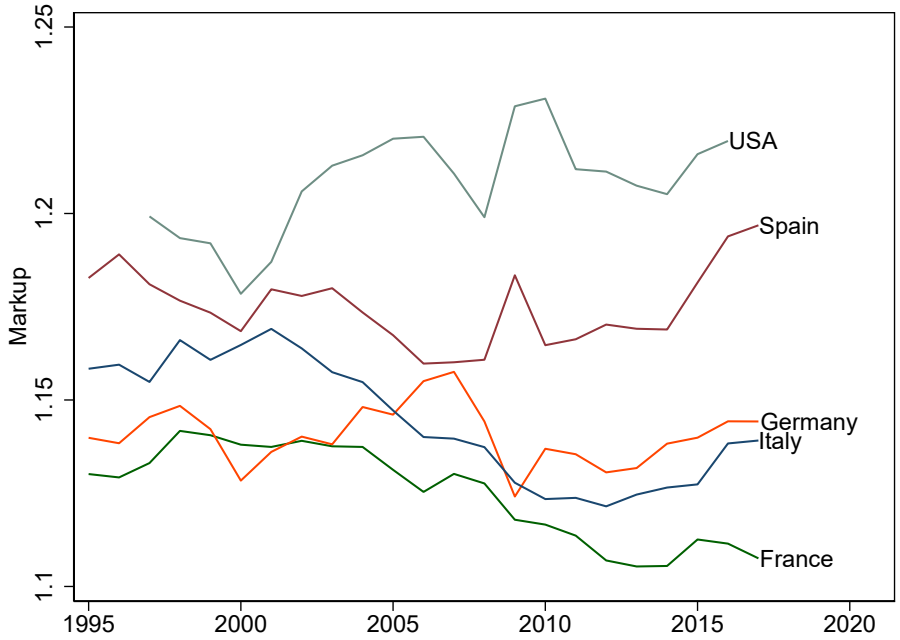
Stylized fact 1 - *Aggregate markup dynamics of EU countries are differentiated,*

[4]Table 1 in the Appendix reports the correlation matrix. Correlations are generally low and non-significant, except for Italy and France, confirming that aggregate markups followed differentiated trends.

but markups are lower and do not seem to follow the increasing trend observed in the US. Markups were instead stable or on a decreasing trend at least until the 2008 financial crisis.

In the US, markup increased steadily since 2000 outpacing the EU economies. In Spain there has been a slight decreasing trend between 1995 and 2006, followed by a rising tendency started after the financial crisis. Italy, Germany and France kept a decreasing dynamics since the beginning of the period up to 2008 when Germany and Italy experienced an upward trend while France slowed down. The declining trend that characterized all the EU countries between 1995 and 2000 was likely driven by the improvements in intra-EU competition fostered by both the inception of the Single Market in 1993 and of the monetary union in 1999. Then the cyclical drop started in 2008, because of the financial crisis, hugely affected the competitive environment in the European economies (Weche and Wambach, 2018) who experienced a sharp fall in average market power (markups). But, since 2010, many EU economies, Spain, Germany and Italy among them, started a process of industry restructuring associated to a rise in firm level markup likely affecting the aggregate figures for the market sector (Figure 2). Firm level markup estimates for EU firms reveal a significant heterogeneneity within them, with some countries (Spain, Italy and Germany) showing increasing average post crisis trend and others (France) markedly decreasing dynamics.

Figure 2: Aggregate markup trends in US, France, Germany, Italy and Spain.



4.2 Markups by country

We now concentrate more deeply on country level data. There are several factors associated with markup dynamics, the most important one being productivity. Different cross-country productivity dynamics might help explaining the observed heterogeneity in markup trends. We thus ask: are markups associated with productivity at the country level?

Figure 3 shows markups, labor and total factor productivity (TFP onwards) index numbers for Italy, Germany, Spain and France.[5] Overall, country-level data suggest the following:

Stylized fact 2 - *Aggregate markup and productivity dynamics of EU countries are heterogeneous with no clear association between country-level series.*

The heterogeneity of markup dynamics is evident across the four countries with Spain displaying significant fluctuations over the whole period. Italy and Spain experienced the largest TFP slowdown. For Italy this applies to labour productivity as well. In France, TFP grows until the financial crisis and then stops, while labour productivity starts growing again after 2010, although more slowly. Relative to its European peers, Germany shows positive productivity dynamics before and after the financial crisis, with a fast V recovery. Comparing markups and productivity at this level of aggregation does not provide a homogeneous figure as each country displays specific trends; however, the overall association between markups and productivity seems to be positive. The sluggish productivity growth of Italy and France is accompanied by markup reductions. In Spain, the productivity slowdown matched a slight tendency towards a reduction of markups until the crisis. After the crisis however TFP and labour productivity of Spain start to visibly diverge. At the same time, after the crisis markups start to increase following labour productivity and in the last year a slight TFP increase. The association between markups and productivity is more visible in Germany after 2000. Productivity increases are closely matched by markups increases either before, during and after the crisis. Looking at the correlations confirms the above description. Pooled correlation between markup growth and TFP growth is positive (0.4004) and is statistically significant at the 1% level. Similarly, the correlation with labour productivity growth is positive (0.3884; $p < 0.01$).[6] Markup-TFP growth rates country-level correlations, however, are heterogeneous: positive for France (0.4769; $p < 0.05$) and Italy (0.4350; $p < 0.05$), positive but higher for Germany (0.7028; $p < 0.01$), and zero

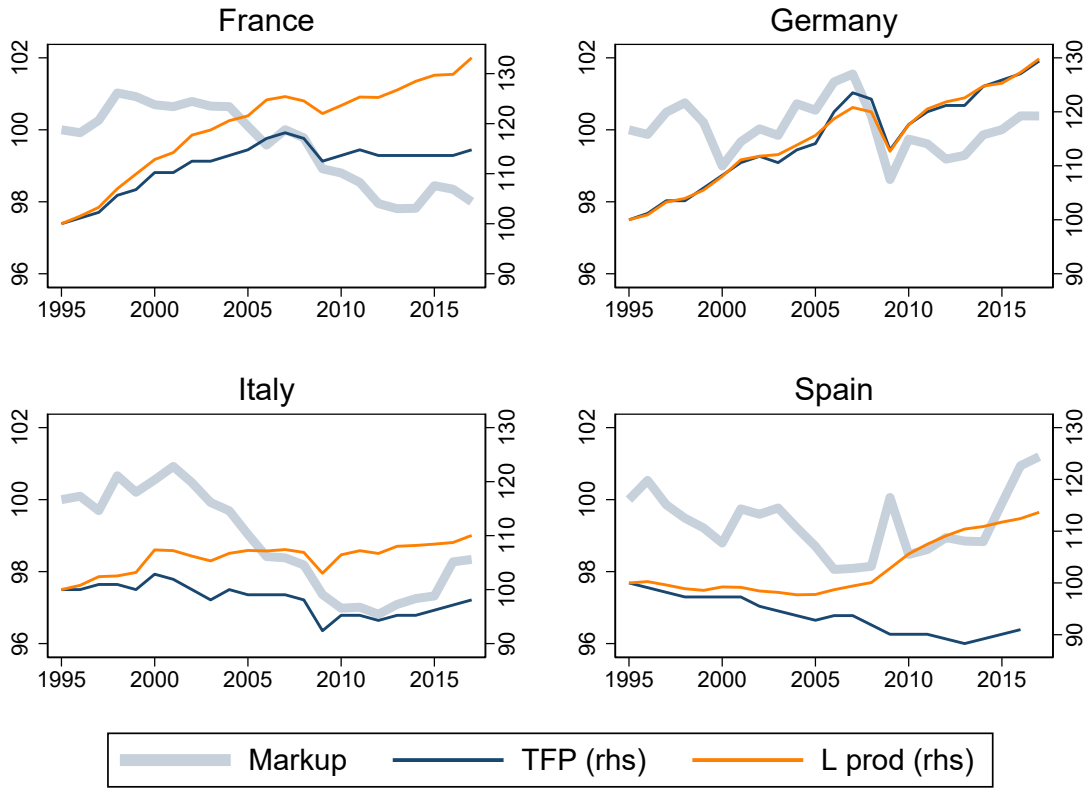
[5] The Appendix also reports the TFP and labour productivity trends, see Figures 13 and 14. The TFP series are correlated and shows two groups: i) USA, Germany and France (except for the last years) with increasing productivity; ii) Spain and Italy with stagnating productivity growth. The TFP correlation matrix is showed in Table 2 the Appendix.

[6] Not surprisingly, TFP and labour productivity growth rates are highly correlated (0.7932; $p < 0.01$).

(−0.0438; insignificant) for Spain. Similar results hold for labour productivity.[7]

All in all, aggregate markups and productivity trends seem to display a positive correlation for the four EU countries analyzed together, but the picture is heterogeneous at the country-level.

Figure 3: Aggregate markups and productivity trends in France, Germany, Italy and Spain.



While aggregate trends raise important questions on the different degrees to which EU countries experienced the productivity slowdown, they do not seem to improve our understanding of markup dynamics in the four sample EU country. Arguably, more disaggregated data are needed and more factors must be considered. A first step in this direction is to consider that, by construction, markup movements result from both output and cost components. It is thus informative to decompose markups and ask: what is the role of output and cost components in aggregate markups trends in the EU?

We investigate this in Figures 4 and 5, where we single out output, intermediate cost and labour cost. We find that, despite the heterogeneous dynamics, markup

[7] See Table 3 in the Appendix for details.

components show a similar pattern in all the four EU countries analyzed:

Stylized fact 3 - *Since 1995, intermediate costs have increased more than output, thus contributing to attenuate markup growth, while labour costs did not contribute much to markup changes. The heterogeneous markup dynamics result from the different balance of these forces.*

Markups can be decomposed as follows:

$$\frac{\Delta\mu}{\mu} \approx \text{Output effect} + \text{Int. cost effect} + \text{L cost effect} \tag{7}$$

$$\text{Output effect} \equiv \frac{\Delta \text{ Output}}{\text{Output}} \tag{8}$$

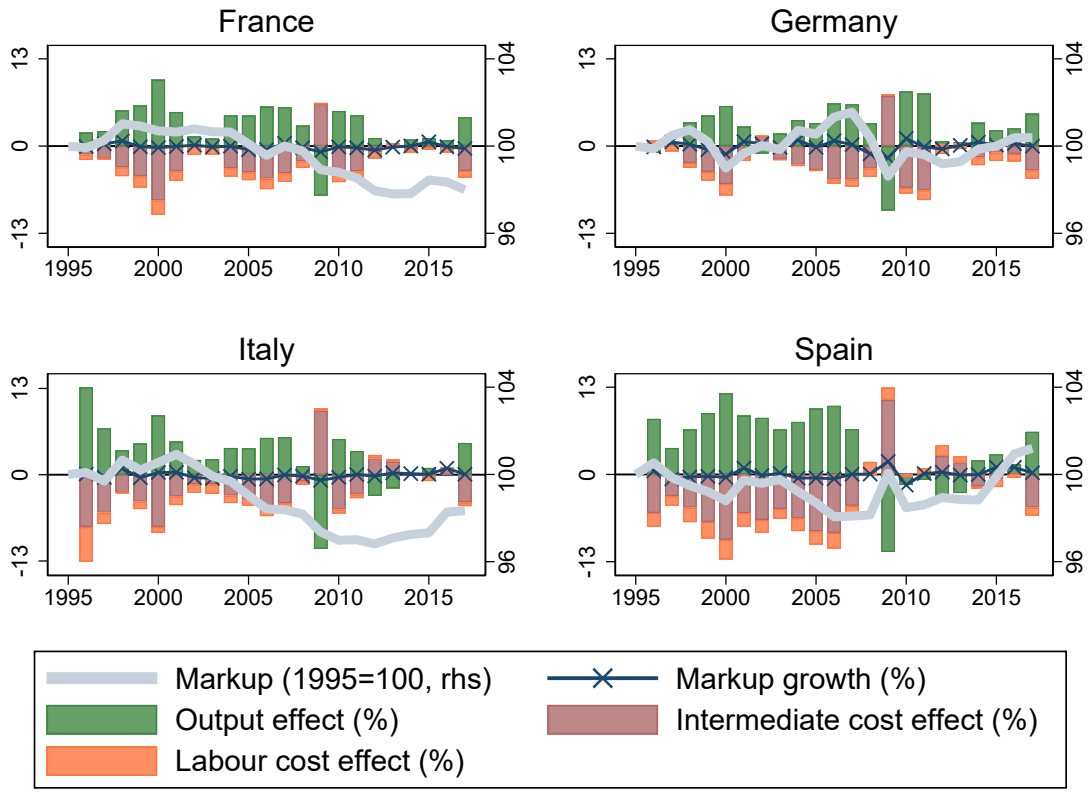
$$\text{Int. cost effect} \equiv -\frac{\Delta \text{ Int. cost}}{\text{Int. cost}} \frac{\text{Int. cost}}{\text{Int. cost } + \text{ L cost}} \tag{9}$$

$$\text{L cost effect} \equiv -\frac{\Delta \text{ L cost}}{\text{L cost}} \frac{\text{L cost}}{\text{Int. cost } + \text{ L cost}} \tag{10}$$

Figure 4 displays the contribution of each component to annual markups growth. Intermediate costs constitute the majority of costs and their importance has increased over time from about 58% to about 65%, and symmetrically the share of labour costs has reduced from about 42% to 35%. In the Figure, this implies that the intermediate cost effect is larger than the labour cost effect. Markup growth has therefore been moderated mainly by intermediate costs rather than by labour costs.[8]

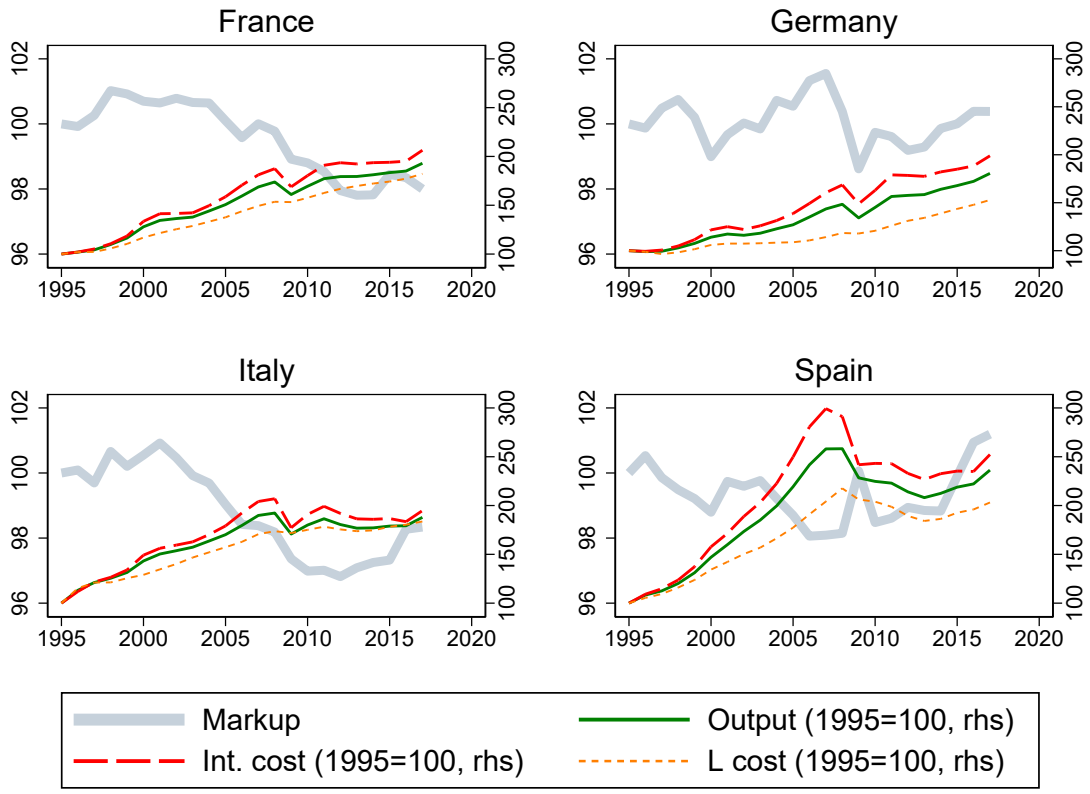
[8]It is important to note that the components of the labour share of output also enter into the national-accounting-based definition of markup. Other things equal, i.e. given intermediate costs, a reduction in the labour share must be associated to markup increases; but intermediate costs are not constant and we have seen that they matter much more than labour costs for markup growth. Therefore the correlation between markups and labour share is not obviously negative and remains an empirical matter, as we discuss later in the paper.

Figure 4: Decomposition of markups growth.



In Figure 5, we display more clearly the evolution of each component over the entire period by setting 1995 to 100. In France and Germany, all the components grow over the period. In Italy and Spain, instead, they stop after the financial crisis. Some common trends emerge. In all countries, since 1995, labour cost has increased less than output and less than intermediate cost. This is most visible in Spain and Germany. On the contrary, intermediate cost has increased more than the other components. These two cost entries have therefore increased more (intermediate cost) and less (labour cost) than output. This implies that while the labour share of output has decreased in all countries, the intermediate cost share has increased. Growth in labour costs has not been large enough to significantly moderate markups growth, however increasing intermediate costs contributed to avoid markup increases. Aggregate markups dynamics are the results of these opposite forces.

Figure 5: Components of markups.



4.3 Markups by industry

To gather further evidence on markup trends, we must move beyond country-level aggregates and consider markups by industry. If countries are differentiated, the same applies to industries as they may differ greatly in terms of market structure, degree of competition and technological aspects. This consideration poses the following questions: Are markup dynamics similar across industries within each country? Did industries follow similar trends across countries?

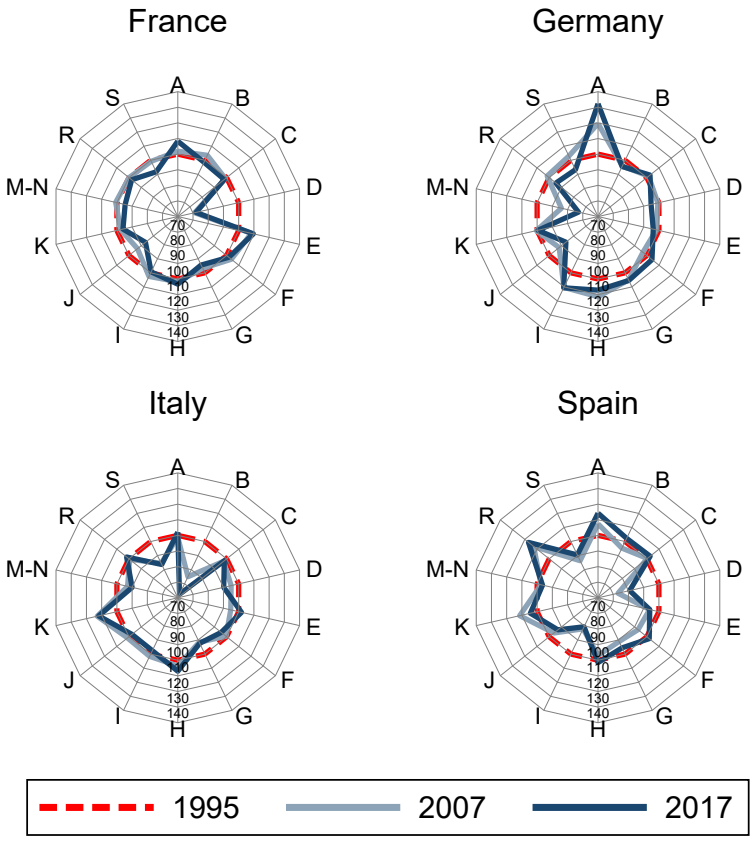
We summarize markup trends of France, Germany, Italy and Spain for each industry over the period 1995-2017 in Figure 6 (1995=100). Again, considering markups by country and industry gives a very heterogeneous picture.

Stylized fact 4 - *Markup dynamics are highly heterogeneous both across the industries of each country and across countries for each industry. This applies particularly to primary and service sectors, while markups in manufacturing are more aligned across countries and more stable over time.*

Markups have increased in Agriculture (A) in France, Germany and Spain. Manufacturing (C) markups are found to be particularly stable relative to other industries.

Electriticy-gas (D) markups decline in all countries; this is particularly pronounced in France. Transportation (H) markups instead slightly increase in all countries. All in all, a common pattern is not immediately visible. At this level of aggregation, trends seem mostly driven country-industry specificities.

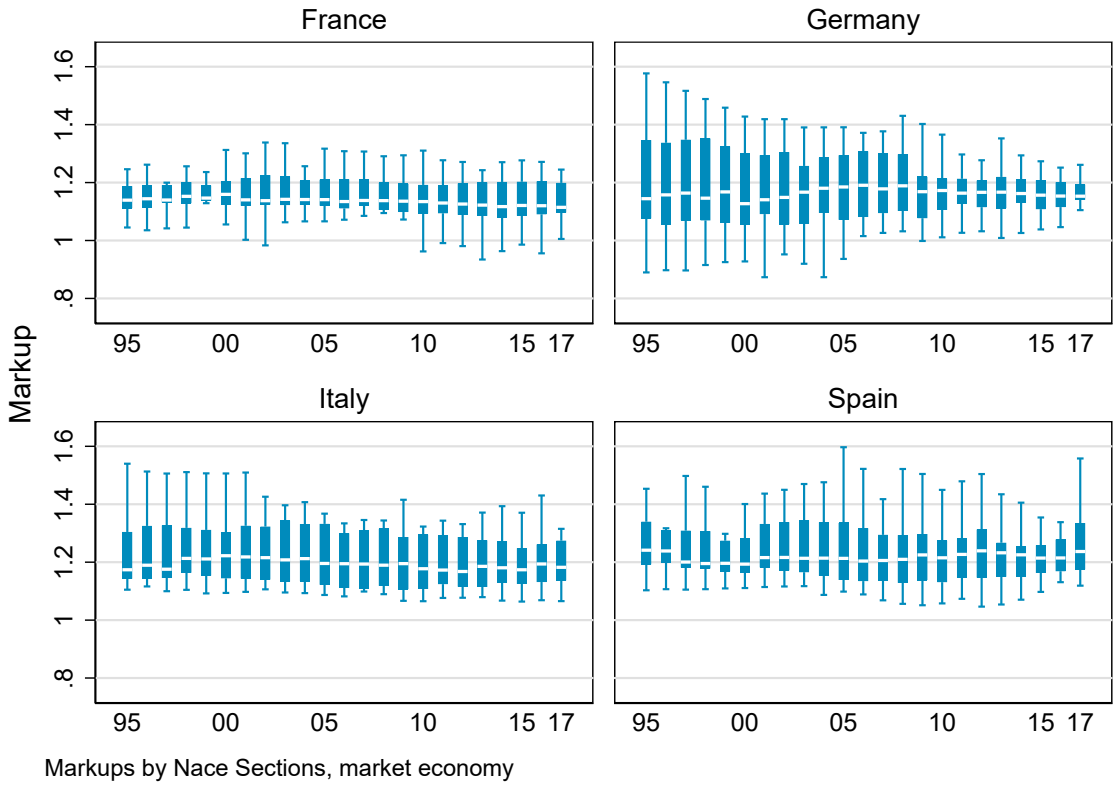
Figure 6: Markups by industry over time (1995=100).



Looking at each industry of each country separately allows to appreciate the heterogeneity in markup trends, however, a cross-industry view provides a different perspective on such heterogeneity. In some industries markups increased while they decreased in others, yet despite the differentiated trends, industry markups may have converged towards some level or they may have diverged. This perspective might be informative of the broader market power dynamics. Higher dispersion may signal increasing market power in less competitive sectors, while closer markups may be due to more similar degrees of competition across industries. We thus ask: how did the distribution of markups by industry change over time?

We display the evolution of the cross-industry distribution of markups in Figure 7. The top and bottom sides of the boxes represent the 75th and the 25th percentiles, while the segment inside the boxes is the median; the whiskers are the upper and lower adjacent values.

Figure 7: Distribution of markups by industry over time.

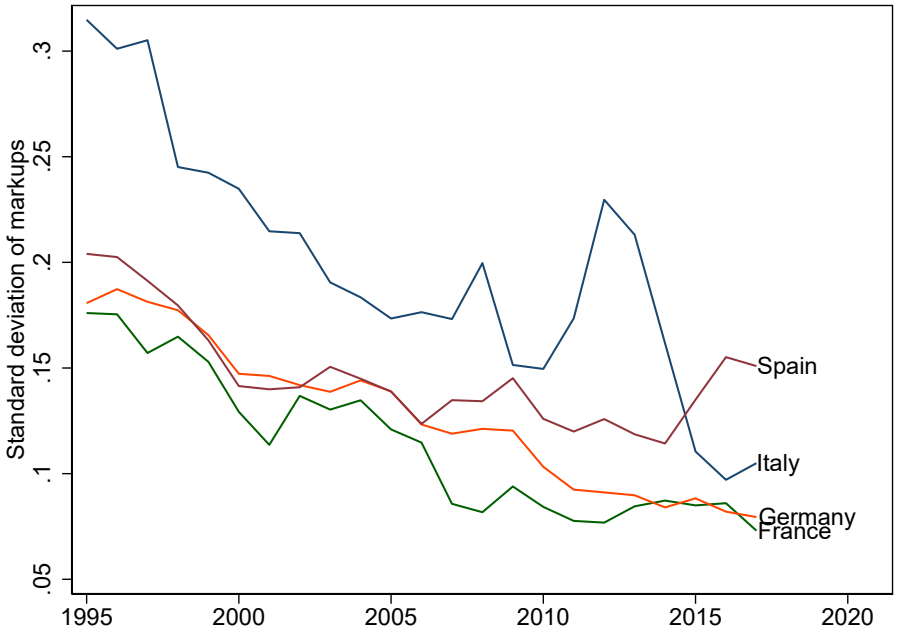


Again, EU countries present differentiated patterns. The dispersion of the markup distribution has slightly reduced over time. This tendency is very clear for Germany and to some extent for Italy. The convergence of industry markups is less visible in France, but the dispersion was already much lower in 1995 relative to the other countries. In Spain markups seem to converge until 2000, then slightly diverge and converge again up to 2015.[9] This evidence points towards country-specific dynamics, even though the marked reduction in dispersion for Germany and maybe Italy seems worth of further investigation.

A somewhat more consistent picture emerges instead by looking at the standard deviation of markups between industries. Despite countries specificities, there is a general tendency towards less dispersion of markups between industries that applies to all four countries to some degree.

[9] A similar pattern emerges by looking at the interquartile range over time, see Figure 15 in the Appendix. The interquartile range clearly decreases for Germany. It also decreases for Italy, especially after 2005. France has a lower interquartile range at the beginning of the period of analysis, but it slightly increases over time, showing some reduction in the last tow years. For Spain, the interquartile range seems to diminish until 2000, then it peaks in 2005 to diminish again until 2015 and then increase in the last two years.

Figure 8: Standard deviation of markups by industry over time.



Stylized fact 5 - *Markups have become less disperse between industries, with some differences across countries. Markups distribution has become visibly more concentrated in Germany and to some extent in Italy, signaling a tendency towards convergence of the different industries. The pattern is less clear for France and Spain.*

Using the more detailed country-industry data, we can exploit the higher level of variability and reformulate our initial question on the association between markups and productivity. Country-level aggregate series can mask the highly heterogeneous industry trends, making the correlation hardly visible. More disaggregated data may instead provide a different picture. We thus ask: are country-industry markups correlated with productivity and other main economic variables?

Looking at markups together with other important economic variables provides a clearer picture. In Figure 9 and 10, we investigate whether country-industry markups are associated with TFP, investment labour shares and import penetration. For the sake of clarity, we first display the cross-sectional scatters based on country-industry period-averages, in Figure 9, and then analyze the dynamics by demeaning the country-industry series, in Figure 10. In this way, we can visualize separately correlations between and within country-industry groups. A few common elements start to emerge from the heterogeneous dynamics discussed above. Despite the relatively high level of aggregation of the data, some patterns are clear and in line with our expectations.

Stylized fact 6 - *(a) Cross-sectional evidence: industries with higher markups are also more productive and have higher investment share, but lower labour share and*

lower import penetration. (b) Time-series evidence: within industries, markup growth is correlated positively with productivity growth and, to a lesser extent, to investment share increases, while negatively with labour share reductions and uncorrelated with import penetration.

Industries with higher productivity tend to have higher markups, and those with faster productivity growth also tend to increase their markups faster. This may signal the fact that efficiency improvements tend to increase market power of firms, perhaps by granting larger market shares. On the contrary, industries with higher labour shares are characterized by lower markups, and those that increase their markups more tend to reduce their labour shares. Again this negative association is consistent with the available evidence from the USA. Markups are associated with higher investments, including on in innovation; however, changes over time do not seem correlated. Lastly, there is a negative association between markups and import penetration. This may signal the fact that import competition has pro-competitive effects.

Figure 9: Between country-industry patterns: Markups vs. TFP, labour share, investments, imports; country-industry period averages.

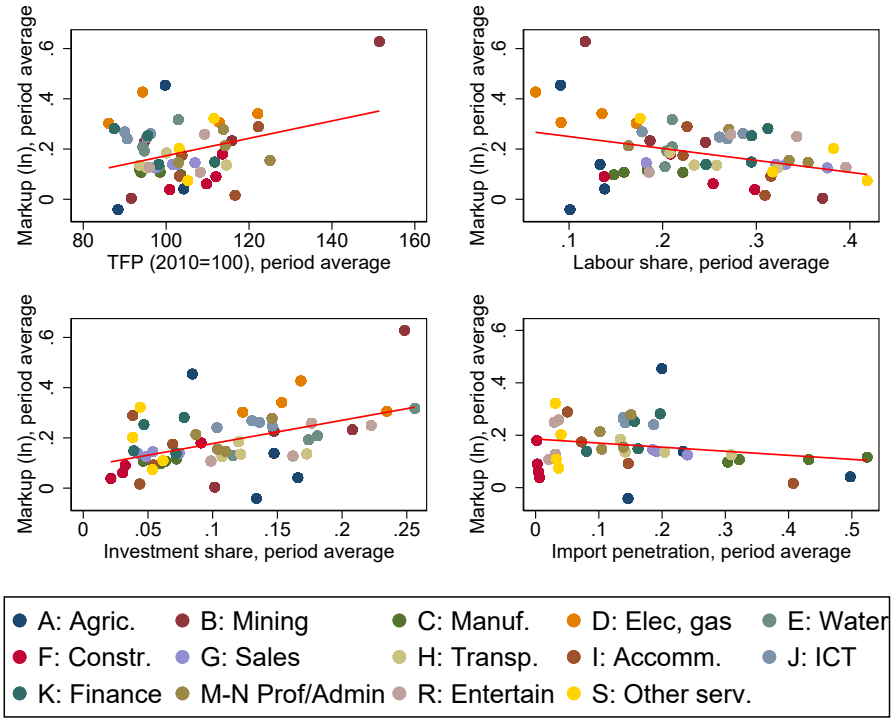
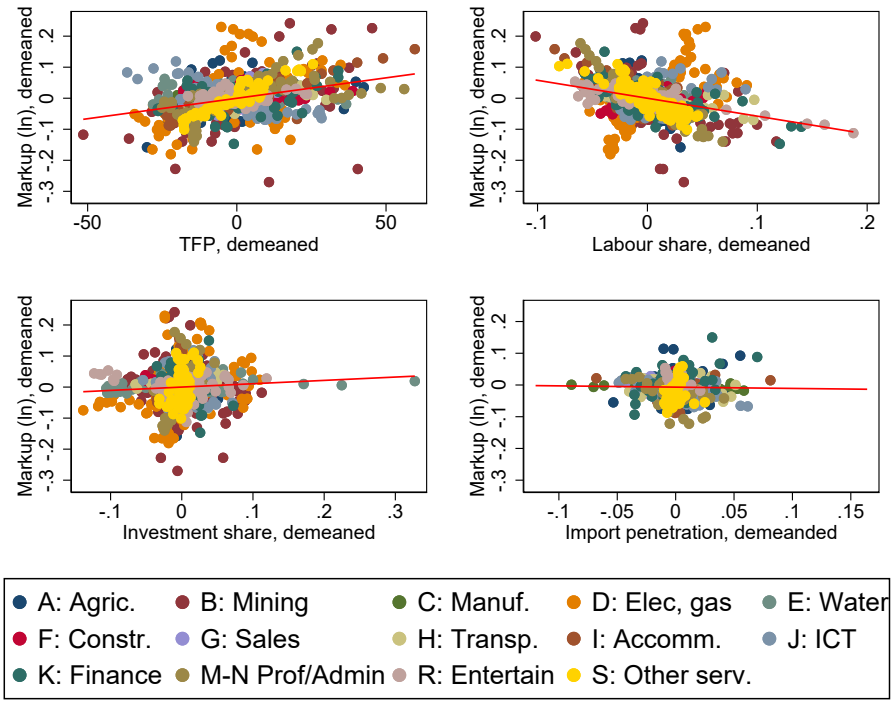


Figure 10: Within country-industry patterns: Markups vs. TFP, labour share, investments, imports; demeaned country-industry series.



4.3.1 Markups and GVCs

The evidence on the importance of intermediate cost (Figure 5) together with correlations between country-industry markups and productivity, labour share, investment and import penetration leave room to questions on the role of international trade. Trade openness is usually thought to yield pro-competitive effects. Import competition is one channel through which domestic firms get exposed to competition. When looking at the correlation between import penetration and markups, however, its role does not seem very important: industries that import more tend to have lower markups, but the correlation is not particularly strong (Figure 9), while changes in the degree of import penetration do not seem correlated with markup changes (Figure 10). Aggregated imports capture different things from imported final goods to imported intermediate goods, raw materials and primary products. Different types of imports may have a different role in different industries and in different countries. We now investigate this possibility and ask: do Global Value Chains play a role in markup dynamics?

To help answering this question, in Figure 11, we display country-industry markups against a measure of GVC participation, foreign value added content of exports (explained more in detail below). As a further check, in Figure 12 we net out the effect of the other factors considered in this paper as well as of country-industry and year

specificities. The pattern that emerges is very clear.

Stylized fact 7 - *Markups are negatively correlated with (backward) Global Value Chain participation and the use of imported inputs.*

In the figures, we consider foreign value added content of exports. This is a measure of the share of foreign value added incorporated into exports of each country-industry. This measure is derived from cross-country input-output tables (TiVA) using a methodology by Koopman et al. (2010) and Koopman et al. (2014).[10] A higher FVAX share signals a deeper integration into GVC and, more specifically, a more intense backward participation due to the use of intermediate inputs. 11 shos that there is a clear negative correlation between GVC participation and markups: a higher GVC participation tends to be associated with lower markups.

In Figure 12, we explore this correlation further. Since we know that markups are correlated with other country-level variables, we need to check whether GVC play a role even after we control for other factors. Thus, we first run a panel regression of markups controlling for TFP, labour share, investment and import penetration, we then check how the residuals are correlated with FVAX share (the regression includes country-industry and year fixed effects). The correlation is now even stronger: GVC participation clearly contributes to explain markups variability. Higher GVC participation is correlated with lower markups, other things equal.

[10] On this matter also see Borin and Mancini (2019). For methodological details on the TiVA database and indicators see the TiVA-OECD guide available at https://www.oecd.org/sti/ind/tiva/TiVA2018_Indicators_Guide.pdf.

Figure 11: Markups and backward GVC participation (foreign value added in exports).

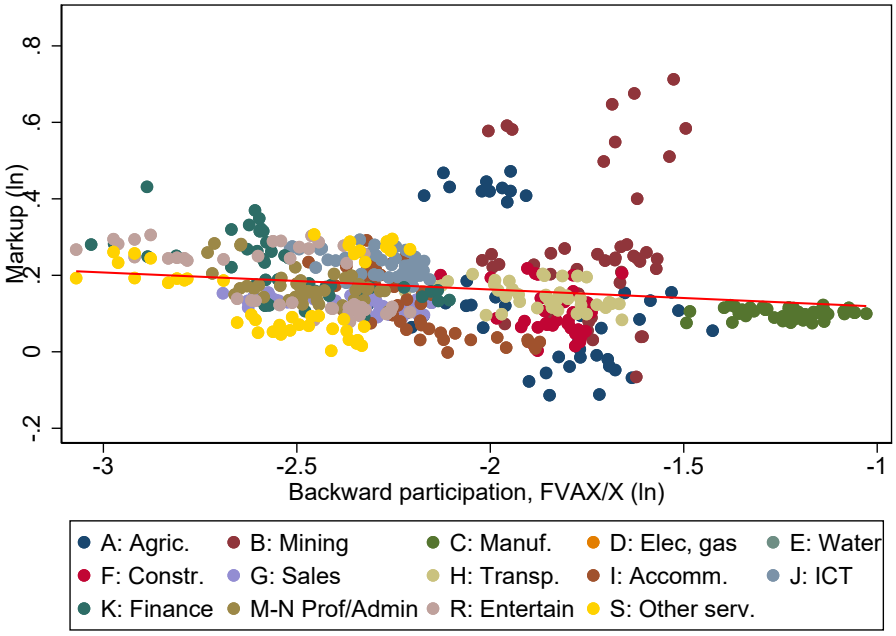
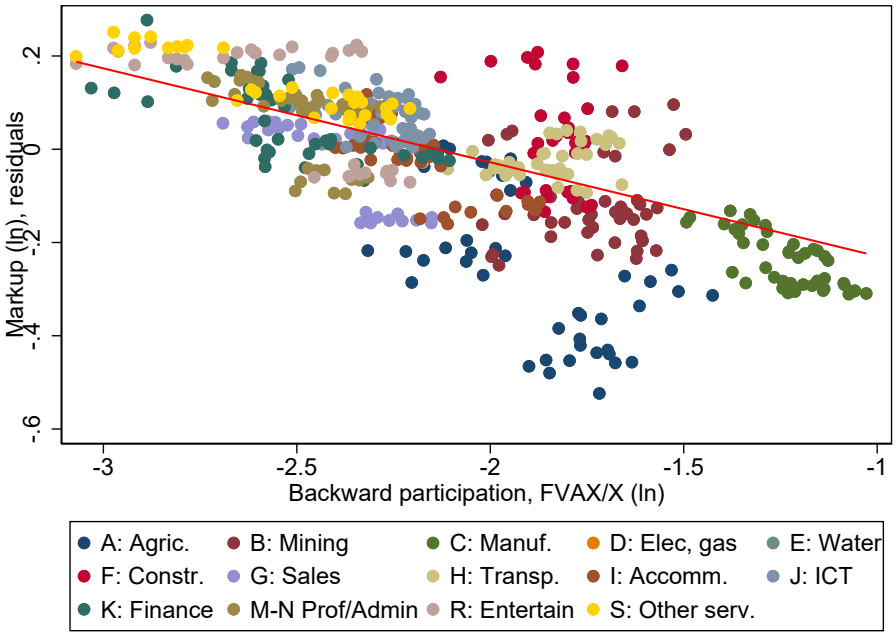


Figure 12: Markup residuals and backward GVC participation (foreign value added in exports).



5 Conclusion

In the EU markup dynamics have been different than in the US. Focusing on four major EU countries, namely France, Germany, Italy and Spain, we singled out some stylized facts based on aggregate country and country-industry national accounts data. While markups have been increasing in the US at least since 1995, the same does not apply to EU countries. Country-level dynamics have been heterogeneous, but markups were more stable or even declining at least until the 2008 financial crisis, while they were already increasing in the US. After the crisis markups kept increasing in the US and started increasing also in Spain, Italy and Germany, but not in France. In all the four sample EU countries, markups remained lower than in the US since 1995. Some researchers have connected increasing market power, concentration and markups in the US to the productivity slowdown. The same story does not apply to EU countries according to aggregate data. Country-level markups and productivity dynamics are not closely related, while country-industry markups are positively correlated with productivity either across-industries and over time. This positive association suggests that rather than hampering efficiency, higher markups might come together with productivity gains in the EU. At the same time, Global Value Chain participation and the use of imported inputs, activities typically done by the most performing high-markup firms, are instead strongly correlated with lower markups in EU countries. These international activities seem to simultaneously be productivity enhancing (through cost reductions or better quality inputs) and yield aggregate pro-competitive effects, although the precise mechanism needs to be better characterized. Relative to the US, the EU market appears less characterized by rising market power and rents, on the contrary it may be too fragmented, so that some degree of concentration towards the most efficient firms could enhance efficiency, rather than posing an imminent threat to competition. Markups and productivity gains could, however, imply lower labour shares with possible impacts on inequality calling for economic and social policy measures. Whether this is in fact the case is an open question left for further studies. Future research needs to address several issues from measurement problems to bridging micro and macro evidence, to the precise identifications of the mechanisms and the channels linking markups, productivity and other economic variables. The descriptive evidence gathered in this paper is helpful in setting the stage for deeper investigations on the causes and consequences of market power and productivity dynamics in the EU.

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A Tables and Figures

Table 1: Aggregate markup correlations, MARKET ECONOMY.

	USA	France	Germany	Italy	Spain
USA	1.0000				
France	-0.4929**	1.0000			
Germany	0.0685	0.2988	1.0000		
Italy	-0.6417***	0.8894***	0.2115	1.0000	
Spain	0.0194	-0.0803	-0.1818	0.2576	1.0000

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Figure 13: Aggregate TFP trends, MARKET ECONOMY.

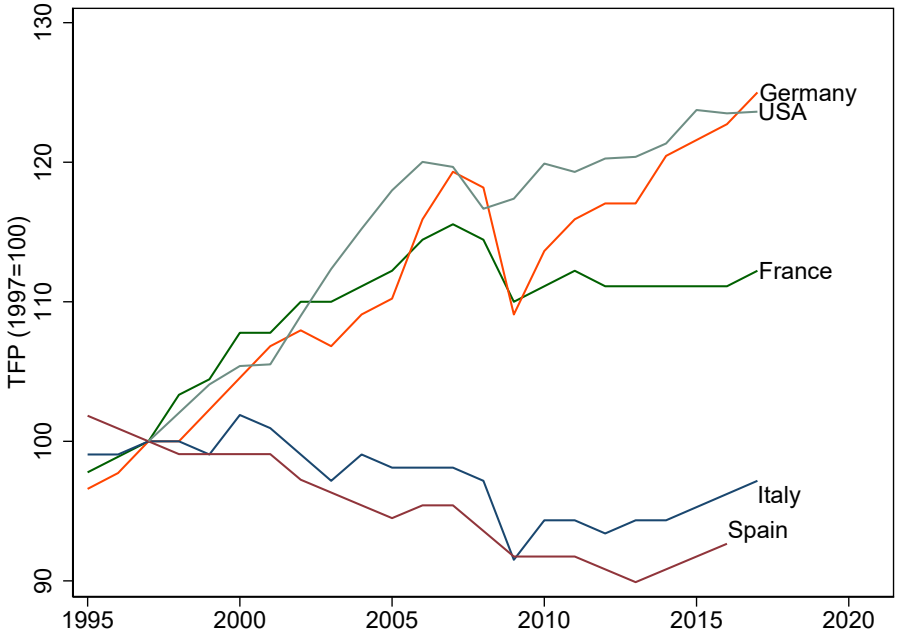

Table 2: Aggregate TFP correlations, MARKET ECONOMY.

	USA	France	Germany	Italy	Spain
USA	1.0000				
France	0.8320***	1.0000			
Germany	0.9264***	0.8435***	1.0000		
Italy	-0.7136***	-0.4428**	-0.5727***	1.0000	
Spain	-0.9032***	-0.7561***	-0.8650***	0.8669***	1.0000

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 3: Markups and productivity correlations by country (growth rates), MARKET ECONOMY.

	Markup	TFP	L prod	Markup	TFP	L prod
		France			Germany	
Markup	1.0000			1.0000		
TFP	0.4769**	1.0000		0.7028***	1.0000	
L prod	0.4362**	0.9010***	1.0000	0.6938***	0.9440***	1.0000
		Italy			Spain	
Markup	1.0000			1.0000		
TFP	0.4350**	1.0000		-0.0438	1.0000	
L prod	0.2877	0.9236***	1.0000	0.1934	0.0837	1.0000

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Figure 14: Aggregate labour productivity trends, MARKET ECONOMY.

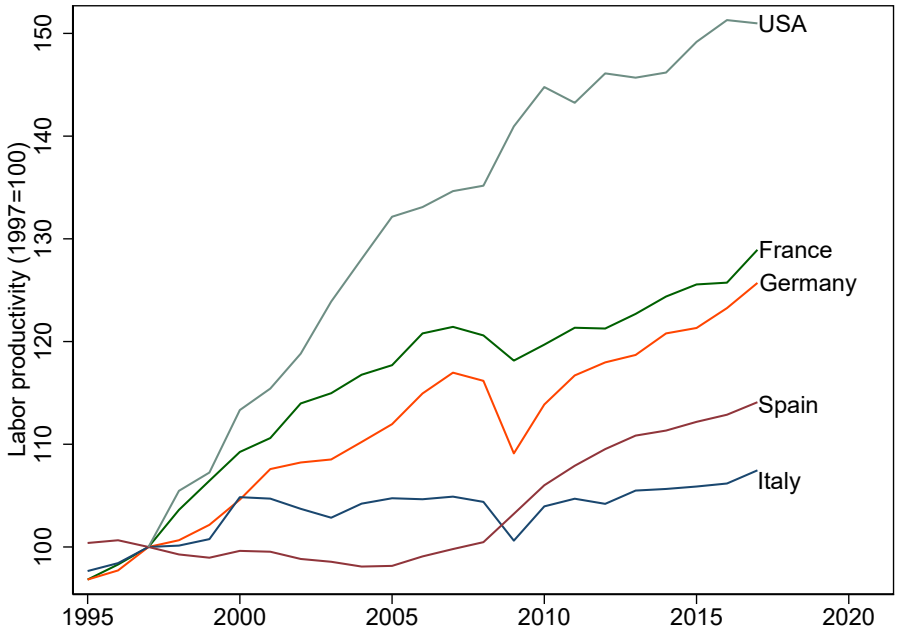

Figure 15: Interquartile range of markups by industry over time.

Figure 16: Aggregate markup trends, TOTAL ECONOMY.

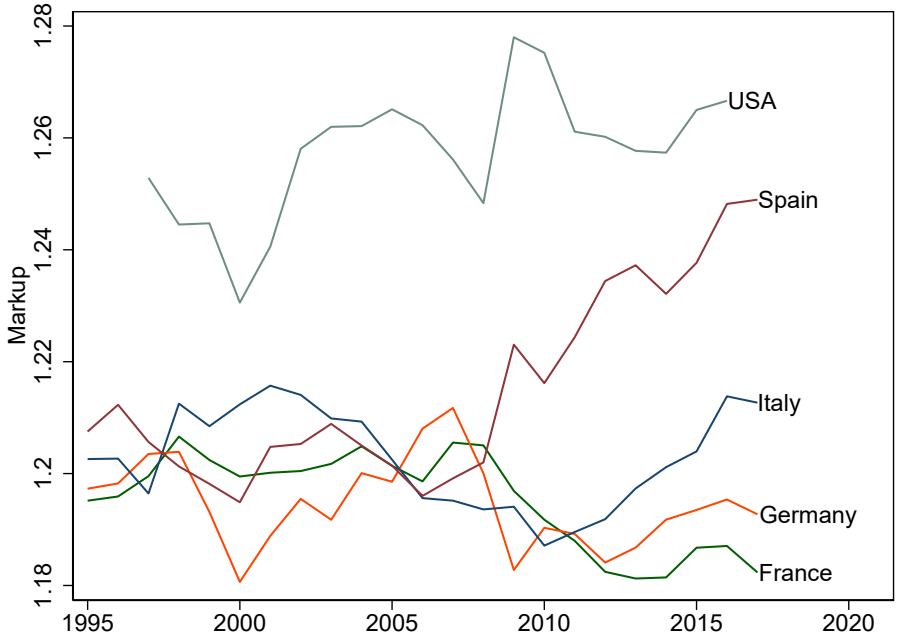

Figure 17: Aggregate TFP trends, TOTAL ECONOMY.

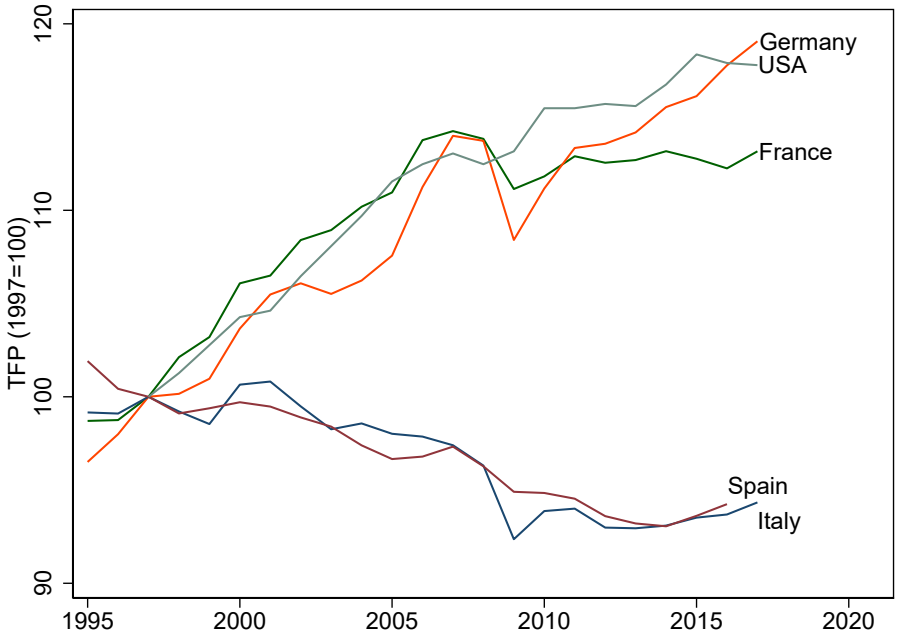

Figure 18: Aggregate TFP trends, TOTAL ECONOMY (St.Louis FED data).

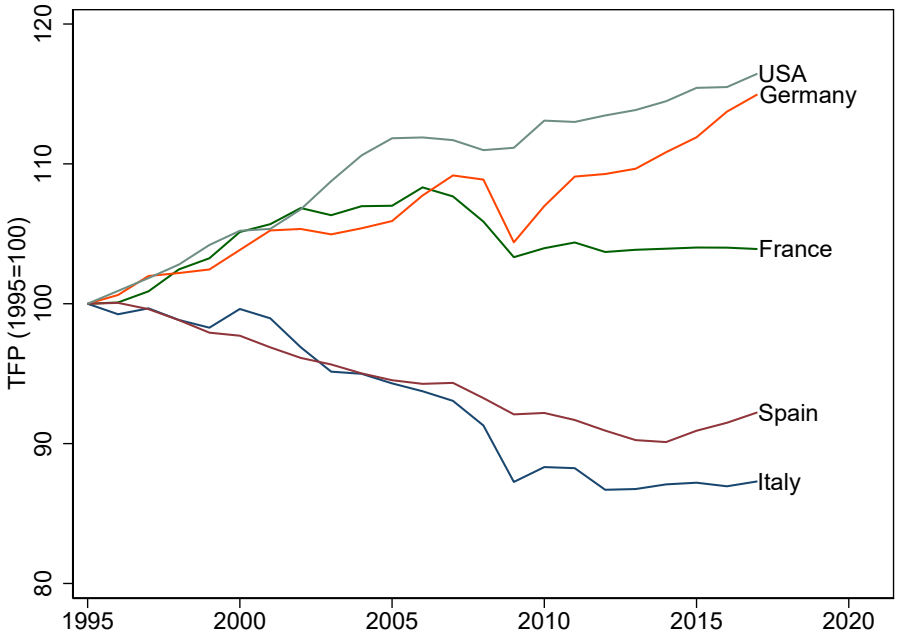

Figure 19: Aggregate labour productivity trends, TOTAL ECONOMY.

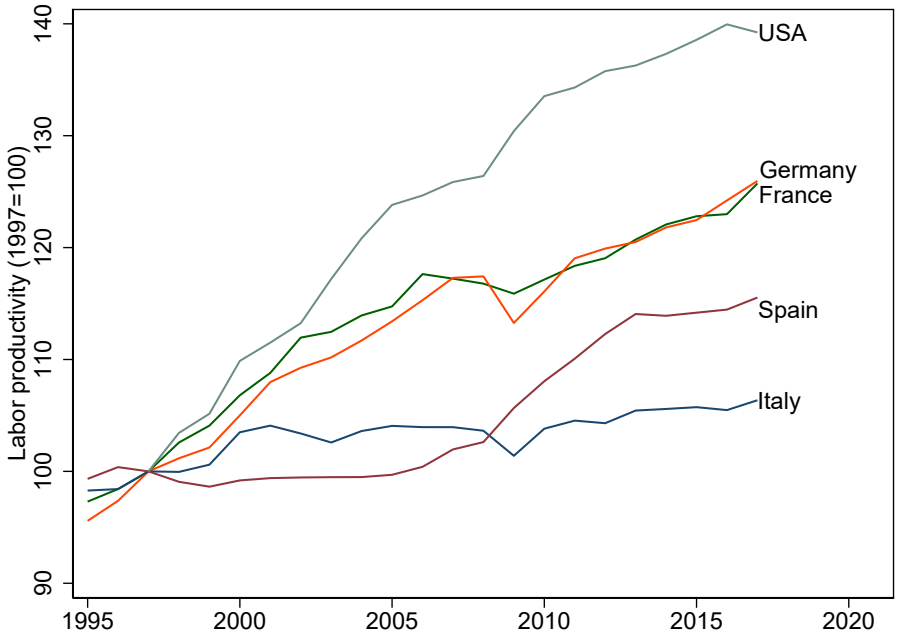

Table 4: Classification of industries (ISIC rev. 4 - NACE rev. 2).

Code	Description
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defense; compulsory social security
P	Education
Q	human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Act. of households as employers
U	Activities of extraterritorial organisations and bodies

Market Economy (Business Economy): all industries excluding L, O, P, Q, T, U.