Protecting competition in a changing world

Evidence on the evolution of competition in the EU during the past 25 years

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European Commission
Directorate-General for Competition
COMP.PA01 – Ex-post economic evaluation of competition policy

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Luxembourg: Publications Office of the European Union, 2024

Catalogue number: KD-09-24-494-EN-N
ISBN: 978-92-68-18107-2
DOI: 10.2763/089949

Acknowledgements

The present report is the result of a joint effort by the following staff members of DG Competition: Andreas Bovin, Thomas Deisenhofer and Vincent Verouden (eds.), Constantin Belu[1], Veerle Berghmans, Elena Crivellaro, Adriaan Dierx, Fabienne Ilzkovitz and Eike Radszuhn.

The authors of this report gratefully acknowledge the support and comments provided by Marceau Avena, Matteo Bulgarelli, Natacha Callens, Anaïs Couronné, Karin Hunin, Gabor Koltay, Szabolcs Lorincz, Beatrice Pataracchia[2], Pierre Régibeau, Yizhou Ren, Hristina Saparevska, Luis Sauri-Romero, Daniele Vidoni[3], as well as by the policy and support units COMP.A1, COMP.A2, COMP.A3, COMP.I2, COMP.I5 and COMP.01.

The authors also thank the contributors to the various research projects underlying this report. First, the OECD staff members that have worked on the research on the various indicators of competition used in the report: Sara Calligaris, Chiara Criscuolo, Christian Abele, Miguel Chaves, Josh De Lyon, Andrea Greppi and Oliviero Pallanch. Second, the consortium of researchers (academics and economic consultants) that has worked on the five specific research workstreams, led by Paolo Buccirossi, Salvatore Nava, Sean Ennis, Alexis Walckiers, Elena Argentesi and Claudio Colacurzio, and supervised by Tomaso Duso. Third, the team of Euromonitor International coordinated by Ruth Magaro.

Finally, the authors thank Jan De Loecker for performing a high-level review of the draft report.

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Abstract

Competition between firms takes place in an evolving economic and policy environment. The present report seeks to assess how the conditions of competition have changed in the EU over the past 25 years and what may have been the main drivers of those changes. It also seeks to assess how effective or weak competition impacts competitiveness and overall economic growth in the EU. It draws on contributions from the OECD, a consortium of researchers led by Lear and by DG Competition itself.

Research presented in the first part of the present report suggests that, on average and in a wide range of sectors in the EU over the past 25 years, (i) concentration at both industry and market level has increased, (ii) markups and profits in particular at the top of the distribution have increased, (iii) the gap between industry leaders and followers as regards markups, profits and productivity has increased, and (iv) business dynamism as measured by indicators such as market share volatility between leading firms or entry and exit rates has declined. A new study on the evolution of the profits of the world's 50 most profitable large firms suggests that the average profit rates of these so-called 'global superstars' almost doubled, growing from 11% in 1998 to 20% in 2022. The trends in the EU regarding concentration, markups and profits seem to have gone in the same direction as in other advanced economies, although they appear to be somewhat less pronounced than in the U.S.

An important driver of the developments observed over the past 25 years seems to be that, across many sectors, large first-mover firms can reap most of the benefits ('winner takes most' dynamics), largely due to long-term structural economic shifts: (i) rise of the share of investments in proprietary IT solutions and data or other intangibles (e.g. R&D, patents, brands), (ii) globalisation, and (iii) possibly to a more limited extent rising M&A activity. Regulatory barriers to entry and exit may also have contributed to these trends.

The observed 'winner takes most' dynamics appear to have had both 'benign' and 'adverse' effects on competition in the EU:

- *on the one hand, these dynamics have allowed large, globally active firms which have successfully invested in proprietary IT solutions and data or other intangibles to become more efficient than their competitors and to gain market shares at their expense which as such is the result of a 'benign' reallocation effect of competition and has likely been accompanied by benefits for consumers.*
- *at the same time or sequentially, these dynamics have raised both (1) industry and market concentration levels and (2) barriers to entry and expansion for*

smaller challengers and entrants, which now (i) have to incur higher fixed costs which are also sunk, (ii) face more limited diffusion of innovation and productivity gains than in the past and (iii) are confronted with increased opportunities for incumbents to engage in strategic exclusionary conduct; these developments have likely resulted in 'adverse' effects on the intensity of competition and on consumers.

Although the trends and the mix of contributing factors vary by sector, on average and on balance, the intensity of competition in the EU seems today to be weaker than in the past, while the market power of firms at the top of the markup and profit distribution appears to be more pronounced. This development may have contributed to adverse macro-economic trends in the EU such as (i) reduced business dynamism and (re-) allocation of resources, (ii) higher productivity dispersion and slower productivity growth, (iii) higher wage inequality and a lower labour share, and (iv) a reduced responsiveness to economic shocks and economic policy measures.

An analysis at sector level develops a scorecard of 127 industries ranking them according to their degree of competition on the basis of a composite indicator. The analysis is based on the same firm-level data and partly the same indicators as the analysis of the evolution of industry concentration, markups and entrenchment reported above. Relating the scorecard to data on EU competition interventions the analysis finds that EU competition interventions in the areas of merger control and antitrust have occurred most frequently in sectors with high competition risks.

Research presented in the second part of the present report confirms and supplements previous findings that weak (or strong) competition can have significant negative (or positive) effects not only on prices and thus on the purchasing power of consumers, but also on the competitiveness of EU firms and on overall economic growth.

A new study on price-concentration relationships in six sectors with notable price variations across EU Member States provides qualitative and, for mobile telecoms and airlines, empirical evidence that higher concentration levels appear to be associated with higher prices. Consistent with previous studies, it also finds that European customers benefit from significantly lower prices than U.S. customers in both telecoms and airlines. Furthermore, for mobile communications, a relationship of concentration levels with investment in networks relevant to user experience could not be reliably discerned from research for the period 2009 to 2019.

As regards the impact of competition on competitiveness, the report recalls the strong and consistent empirical evidence from the economic literature that industries experiencing greater competition show stronger productivity growth, while weak competition undermines productivity growth. Productivity growth in turn is the main driver of both the competitiveness of EU firms and long-term growth. A new survey of EU-based exporting firms suggests that effective domestic competition within the

Single Market (i) is an important driver of their global export competitiveness – in particular effective competition in upstream goods markets – and (ii) for a majority of respondents does not constrain their scale in a way that would hinder their success on global export markets.

A novel study on the macroeconomic effects of competition, relying on simulations in a general equilibrium macroeconomic model, estimates that the increase in markups observed in the EU since 2000 may have reduced EU GDP by up to 5-7% compared to the counterfactual. Closely related joint research by the Commission's Joint Research Centre and DG Competition estimates that without the EU's competition interventions taken over the last ten years, this impact might have been larger by almost one quarter. The study also suggests that strengthening competition in the EU could yield substantial macroeconomic benefits.

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SUMMARY

Competition between firms does not take place in a vacuum or a laboratory, but in a constantly evolving economic and policy environment. DG Competition has therefore conceived and launched several complementary research projects conducted respectively by a team of researchers from the OECD, a consortium of external academics and consultants led by Lear and by DG Competition itself.

The objectives of this report are to present the findings of the economic research described above and to assess on the basis of that research, combined with prior research reported in the wider economic literature, the following two broad questions:

(1) how and why the conditions of competition in the EU may have evolved during the last 20-25 years (focus of part I of the report),

(2) why competition matters for broader economic outcomes (part II of the present report)

Part I presents findings and assesses *how and why the nature and intensity of competition evolved in the EU during the past 25 years*.

Section I.1 discusses the *indicators of the evolution of competition* relied on in this report, notably measures of industry and market concentration, markups, profits and measures of business dynamism.

The strength or weakness of the competitive process cannot be measured directly, but only inferred from various indicators. The main indicators used in the literature and in this report reflect, respectively, structural (e.g. concentration), outcome related (e.g. markups, profits) and dynamic (e.g. indicators of business dynamism such as the level of entrenchment at the top of an industry or market, entry, exit rates, job reallocation rates) aspects of the competitive process.

In the short run, price competition takes place only within a narrowly defined market, as products from outside that market do not impose a relevant pricing constraint on products within it. What happens in narrowly-defined antitrust markets over time (and even the very existence of the antitrust market) is however itself at least in part a function of dynamic competition – based on innovation, product variety, product quality, efficiency, entry and exit – which often takes place at a broader industry level. Therefore, this report tries to bring together evidence of the evolution of competition indicators both at broader *industry level* using the analysis performed by the OECD team on production data from firm-level datasets (ORBIS and other), and at the *market level* using retail sales data from a novel dataset by Euromonitor International, a commercial data provider, on consumer facing (business-to-consumer or B2C) markets.

Competition also has an important geographic dimension. For the analysis of various indicators and going in this regard beyond prior research, industries are therefore assigned to one of three geographic categories ('buckets'), i.e. industries were competition is likely to take place mostly either at the domestic, European or global level. By contrast, for the

analysis of competition in consumer markets, in line with Commission practice, competition is assumed to take place at the national level.

Section I.2 presents and discusses new evidence on *the evolution of key indicators of competition in the EU during the last 20-25 years*. In particular, the Section

- presents new findings on the evolution of (i) concentration at industry and market level, (ii) business dynamism at industry and market level, (iii) markups at industry level;
- measures the evolution of competition indicators at *industry* level for 15-23 European countries at the level of 127-204 mostly 3-digit NACE industries based on firm-level production data covering the years 2000-2019 from the Orbis database;
- measures competition indicators at the *market* level for eight or more EU Member States, the U.S., Japan, South Korea, Canada and the UK for more than 300 consumer facing markets based on market sales data covering the years 2012-2019 from *Euromonitor International Passport Consumer Industries and Services, 2022 Edition*;
- presents and discusses, as a special topic, the evolution of the profits of so-called 'global superstar' firms, i.e. the most profitable large global firms; this research is based on Fortune Global 500 data for the years 1998 to 2022.

As regards the *evolution of concentration at industry level,* the report finds:

(1) Over the 2000-2019 period and across the 15 European countries and 127 industries considered, average industry concentration as measured by the CR4 concentration indicator (i.e. the combined industry or market share of the four leading firms) increased by about 5 percentage points.
(2) In particular, concentration levels appear to have increased in already more concentrated sectors (industry CR4 > 30%), although a reduction can be discerned in the most concentrated sectors (industry CR4 > 80%), which suggests that industries are overall converging to a more oligopolistic, but not monopolistic, state.
(3) The increase in average concentration was more pronounced in industries competing at the domestic level. The level of industry concentration is also highest in these industries over the length of the sample.
(4) As regards the level of industry concentration in the 27 industries competing at the domestic level, there seem to be significant differences between countries in Europe. As regards the trends, while industry concentration appears to rise in most countries, it was more stable in others.
(5) While the research reported here suggests that industry concentration increased in the EU, evidence from prior research suggests that average industry concentration in the EU has likely experienced a less pronounced increase and likely remains at lower absolute levels compared to North America.
(6) Research, both current and prior, suggests significant sectoral heterogeneity in the observed concentration levels and trends.

As regards the *evolution of market concentration in consumer facing markets,* the report finds:

(1) Across eight large EU countries representing around 72% of EU GDP ('EU-8'), the majority of consumer-facing markets covered by the study were - in 2019 - found to be concentrated with a CR4 greater than or equal to 60%.
(2) Average concentration levels in consumer facing markets in the EU-8 were lower compared to the U.S., Japan, Canada and South Korea.
(3) There are significant differences between Member States, even when controlling for country size. Average market concentration is relatively low in Germany and Italy and comparatively high in France, the Nordic countries, Ireland and Greece.
(4) During the relatively short period covered by the dataset (2012-2019), average market concentration increased in the EU by 0.25 percentage points annually, while it remained relatively stable in the U.S.
(5) In terms of sectors, concentration is particularly high in product markets that make up a relatively high share of poorer households' expenditure and which have contributed significantly to the recent surge in inflation, e.g. food, energy.

As regards the *relationship between measures of industry and market concentration,* the report finds that:

(1) The level and trends of product market concentration are strongly correlated with the level and trends of concentration in associated industries.
(2) Average concentration at the product market level is usually significantly higher compared to the associated industry level. Concentration levels measured at the industry level therefore seemingly tend to underestimate concentration at the product market level.

As regards the *evolution of measures of business dynamism,* the report finds:

(1) Research on entrenchment at industry level (measured as the change in composition of the top 4 firms within industries year-on-year) suggests that entrenchment at the top:
    - has been relatively high throughout the sample length (2000-2019), in particular in more concentrated sectors.
    - has increased between 2008 and 2019 in industries competing at the domestic and European level.
(2) Research on rank persistence and market share volatility regarding the leading four firms per industry (2000-2019) and per consumer facing market (2012-2019) suggests a reduction in business dynamism, in particular after the financial crisis, both at the industry and B2C market level.
(3) Research on entry-to-exit rates as well as prior findings on job reallocation rates between firms suggests a reduction in both indicators of business dynamism.

As regards the *evolution of markups,* the report finds:

(1) Average firm-level markups across 23 European countries and 204 3-digit NACE industries increased by 7% between 2000 and 2019.
(2) The increase of average markups was mainly driven by rising markups in the top decile of the markup distribution, while the markups of firms belonging to the

bottom of the markup distribution remained constant on average. This dynamic implies an increase in the dispersion of markups.
(3) Firms competing in the global market experienced - on average - the highest increase in markups (12%), followed by firms competing in European industries (7%), with the smallest increase in markups occurring in domestic markets (3%).
(4) There appears to be some heterogeneity as regards average trends within Europe. Whilst most countries saw an increase in average markups, a few countries did not seem to experience such a rise.
(5) Globally, prior evidence suggests that markups in Europe likely increased less compared to the U.S., but more compared to Japan and Korea.
(6) Consistent with economic theory and previous research, markups are found to be broadly uncorrelated with concentration.

As regards the *evolution of profits,* the report finds:

(1) In line with prior research, rising markups are found to be correlated with rising profits, suggesting that the rise of markups is at least in part a valid indicator of rising market power and not merely reflecting a rise in fixed costs.
(2) According to updated research by Koltay et al. (2023), net profits in 15 European countries (14 EU + UK) – as measured by the net profit share of GDP – increased from around 2% to more than 20% between 1986 and 2023. This significant rise of the net profit share does not seem very different from the almost parallel rise in the U.S. By contrast, average accounting profits of large EU firms are likely lower and have likely risen less than those of their U.S. peers, but are likely higher and have likely risen more than those of firms in Japan and South Korea.

As regards the *evolution of profits of* (so-called) *'Global superstars',* a new study is presented, which relies on a composite indicator combining absolute profits and profit rates to identify the world's most profitable large firms for five successive 5-year periods between 1998 and 2022, based on Fortune Global 500 data. With regard to those firms, the study finds:

(1) Both inflation-adjusted profits and profit rates of the top 50 global firms have increased significantly during the last 25 years. Average profit rates of those Global superstar firms almost doubled from 11% to 20% between 1998 and 2022.
(2) Profits did not increase to the same extent for other large global firms. There has therefore been growing inequality in terms of profits and profit rates between firms at the top of the profit distribution and other large firms.
(3) Profits at the top of the profit distribution rose significantly, not just for firms broadly belonging to the software and internet sector (in particular, the so-called GAFAMs), but also for firms active in the semiconductors, pharma, consumer goods, oil & gas or retail sectors.
(4) A qualitative analysis of the potential causes for the rise of profits of Global Superstars in three sectors (IT, pharma, consumer goods) suggests that the firms in those sectors benefit from high barriers to entry.
(5) Past merger and antitrust enforcement in cases involving global superstar firms sectors suggests that at least some firms in those sectors may have engaged in harmful mergers and strategic exclusionary conduct to protect or expand their profits. It also suggests that EU competition enforcement has sought to limit the occurrence or negative impact of such mergers or conduct.

Section I.3 presents and discusses evidence on *the likely main drivers of the observed evolution of the various indicators of competition in the EU*.

It (i) provides a taxonomy of the main candidate drivers and channels discussed in the economic literature, (ii) discusses the economic evidence in support of the different candidate drivers, (iii) discusses the evidence on whether overall and on balance competition in the EU increased or decreased.

The research on the evolution of competition discussed above shows that during the past 25 years the nature and intensity of competition changed across many sectors of the economy (not just in the digital sector), across many countries and over a long period of time. This suggests that these changes have likely been driven by *common and long-term changes* in how firms in today's economies create value and compete.

The main candidate drivers of those changes discussed in the economic literature are either structural or institutional or a combination of both.

- The main *structural* drivers discussed in the literature are (i) the rise of investments in proprietary IT solutions and data, (ii) the rise of other intangible investments, (iii) globalisation and (iv) changed business conduct (rise of M&A, oligopolistic pricing, use of patents for exclusionary strategies, common ownership). These four drivers are partially overlapping and intertwined.
- The main *institutional* drivers discussed are (i) changes of regulatory barriers to entry and expansion and (ii) weaker or stronger competition enforcement.

Proceeding with the discussion of the economic evidence in support of the different hypotheses, the report presents the results of a regression analysis conducted by the OECD team.

This analysis, taken together with other existing research, suggests that, like in other jurisdictions, important drivers of the observed trends in the EU economy have probably been *structural 'winner takes most'* dynamics mainly due to (i) digitalisation (primarily the rise of investments in proprietary IT solutions), (ii) the rise of other intangibles (patents, brands, human capital), (iii) globalisation through scale effects and (iv) possibly, to a more limited extent, rising M&A activity.

These structural 'winner takes most' dynamics have likely *both*

- allowed large globally active firms which have successfully invested in proprietary IT solutions or other intangibles (patents, brands, human capital) to become more efficient than their competitors and to gain market shares at their expense (reallocation effect of competition, as such a 'benign' outcome of the competitive process and likely associated with consumer benefits), and *at the same time*
- raised industry and market concentration as well as barriers to entry and expansion for smaller challengers and entrants, as they now must overcome (i) higher fixed costs which are also sunk, (ii) a more limited diffusion of innovation and productivity gains than in the past and (iii) increasing opportunities for incumbents to engage in legal or illegal strategic exclusionary conduct enabled by the more concentrated market structures and the rise of intangibles ('adverse' effects for the competitive process likely associated with harm to consumers).

As regards the potential *institutional* drivers, according to the regression analysis conducted by the OECD team *regulatory* barriers to entry and expansion may have also contributed to the observed 'winner takes most' dynamics, again favouring large globally active firms benefitting from global economies of scale.

As regards a potential *weakening of competition enforcement,* the regression analysis of the OECD team finds that in the EU, M&A by industry leading firms has likely contributed to the observed rise in markups and concentration. The regression however also finds that the magnitude of the contribution has likely been small. Moreover, the stability of EU competition enforcement over time as well as the nature of the observed changes were such that the latter likely cannot be explained mainly by a weakening of competition enforcement in the EU.

If anything, there is evidence that EU competition enforcement evolved in parallel with the changing economic environment during the last 20-25 years (see below) and may therefore, as suggested by some observers, have contributed to the observed (most likely largely structural) trends towards increased concentration, markups and profits being less pronounced in the EU compared to the U.S.

As to the question whether *overall competition in the EU increased or decreased during the last 20-25 years* or, in other words, which of the benign or the adverse effects of the structural drivers discussed above have *on balance* had more impact, it is useful to differentiate between (1) different *aspects of competition*, (2) different *categories of firms*, (3) different *sectors*, (4) different *countries*, (5) different *time periods* and (6) the *overall balance* between benign and adverse effects for the economy as a whole.

(1) As to different *aspects of the competitive process*, the evidence reported suggests that:

Digitalisation, globalisation and the related rise to the top of efficient firms in sectors such as general consumer retail, specialised consumer retail for apparel, furniture or sports equipment or low-cost airlines reflect likely in part the benign consequences of structural changes during the last 20-25 years and have likely brought, *at least initially,* benefits to consumers in terms of increased product variety and lower quality- adjusted prices.

At the same time, the adverse effects of the structural changes during the last 20-25 years (i.e. rising concentration and rising barriers to entry and expansion) have probably contributed to the emergence of an economy in which oligopolistic market power has increased and where dynamic competition appears to have weakened, possibly with worrying broader consequences.

(2) As to different *categories of firms,* the evidence reported here suggests:

On the one hand, competition as experienced by the majority of firms which are small or which do not belong to the top of the markup or profit distribution has likely not decreased or become less intense.

On the other hand, competition as experienced by *leading firms* has likely decreased as they experience less dynamic competition between themselves and less challenges from new or smaller firms.

(3) *Differences between sectors*:

There appears to be significant sector heterogeneity as regards the balance of benign and adverse factors affecting competition.

On the one hand, many unconcentrated sectors have likely continued to be subject to intense and mainly 'benign' effects of technological change and globalisation and experienced effective competition. Even some concentrated sectors may have continued to experience healthy levels of competition with continued leap-frogging and churn even at the top of the firm distribution.

On the other end of the spectrum, certain sectors have likely experienced a further widening of the gap between leading firms and followers, combined with no or limited churn at the top and with adverse effects on the competitive process and consumers.

Some sectors have possibly experienced both an increase in the benign consequences of structural change and the adverse aspects of weakened competitive pressure for market leaders.

(4) *Differences between countries*:

The observed trends regarding concentration, business dynamism, markups and profits (and the associated trends regarding productivity dispersion and the decline of the labour share) are directionally similar in many advanced economies, indicating that the dominant drivers are likely more structural than institutional.

On the other hand, the trends in the EU regarding concentration, markups and profits are on average more subdued than in the U.S. Moreover, within the EU the rise of concentration and markups is in some countries less pronounced than in others, with Germany as a notable example of such less pronounced trends.

One possible explanation is the different sector mix in different countries. In the U.S. economy sectors more strongly affected by the structural changes discussed in this report (e.g. IT, consumer goods, pharma) may have a comparatively greater weight than for example in Germany, where traditional manufacturing sectors may have a greater weight.

Another possible explanation are institutional differences, in the sense that more vigorous competition enforcement in the EU or in countries such as Germany may have contributed to ensure that the adverse effects of the structural changes discussed above have been less pronounced than in the U.S.

(5) *Differences between different time periods*:

The 'winner takes most' dynamics discussed in this section imply that the balance between benign pro-competitive effects of structural change and the adverse effects reducing competition may change over time and is possibly *sequential*.

During an initial phase, firms that make the best use of the new opportunities provided by digitalisation and globalisation may have outcompeted previous incumbents with better products and lower costs. During this first phase the balance of benign and adverse effects may have been positive for customers, consumers and the overall economy: more efficient and innovative challengers have displaced prior incumbents, important product innovation took place, quality adjusted prices decreased and productivity growth increased.

During a second phase the adverse effects of the 'winner takes most' dynamics (increased concentration at the top, higher fixed and endogenous sunk costs, reduced diffusion, increased opportunities for exclusionary conduct) are becoming on balance stronger than the benign effects: the 'winners' reap significant profits, while being subject to decreased

competitive constraints from peers (due to increased concentration) and from challengers and entrants (due to increased barriers to entry and expansion).

Several economic scholars have presented, mainly for the U.S. but partly also for Europe, economic evidence for such a sequential scenario. Their research seems to confirm that the benign effects of winner takes most dynamics may have dominated during the early years of the digital transformation and globalisation while the adverse effects seem to have dominated during more recent years, in particular after the financial crisis.

(6) Overall balance for the economy as a whole

Overall and on balance, the evidence presented in this report and from the literature suggests that on average competition in the EU seems be weaker than in the past, while the market power of firms at the top of the markup and profit distribution seems to be more pronounced. This development may have contributed to adverse macro-economic trends in the EU such as (i) reduced business dynamism, (ii) higher productivity dispersion combined with slower productivity growth, (iii) higher wage inequality and a lower labour share and (v) a reduced responsiveness to economic shocks and economic policy measures.

Section I.4. presents an analysis of competition at sector level. It develops a scorecard of 127 industries ranking them according to their degree of competition on the basis of a composite indicator.

The analysis underlying that composite indicator and ranking is based on the same firm-level data and partly the same indicators as the analysis of the evolution of industry concentration, markups and entrenchment reported above.

The composite indicator is further related to EU competition enforcement interventions in the areas of mergers and antitrust. The empirical analysis finds that EU competition interventions in the areas of merger control and antitrust have occurred most frequently in sectors with high competition risks based on the sectoral scorecard.

Part II of the present report explores the question *why competition matters*: how, in today's economic reality, the state of competition between firms affects broader economic outcomes in the EU.

Section II.1 discusses the *impact of competition on prices* based on a new price-concentration study performed by Lear et al. (2024) covering six emblematic sectors of the economy: mobile telecommunications, airlines, beer, cement, mortgages and retail. These sectors are characterised by similar input costs, but also surprisingly large price differences between Member States and between the EU and other jurisdictions.

For mobile telecommunications and airlines, the findings are based on quantitative empirical evidence from the pre-Covid era that allows for the inference of the (causal) effect of market concentration on prices and other outcomes, while for the other four sectors the findings are based on more qualitative, descriptive evidence.

- For mobile telecom services the study finds: Market structure has a strong impact on prices. EU countries with three Mobile Network Operators ('MNOs') have consistently higher average revenue per user (ARPU), a proxy for prices, than

countries with four MNOs; one additional MNO is associated with a 7-9% reduction in prices; the impact of Mobile Virtual Network Operators (MVNOs) on prices seems to be negligible. Furthermore, a relationship of concentration levels with investment in networks relevant to user experience could not be reliably discerned from research for the period 2009 to 2019.

- For air transport services, market structure also has a clear impact on prices: prices per mile for monopoly routes and duopoly routes are, respectively, 5.6% and 2.6% higher than for competitive routes, controlling for relevant other factors; exploring the natural experiment of the exit of Air Berlin from the market in 2017, the study finds that fares per mile increased on average by 19% in the first months after the exit and in the medium term by 5% in more concentrated markets and by 3% in less concentrated markets.

For both mobile telecommunication services and air transport the study finds that prices in the EU are considerably lower than in the U.S., which during the last 20 years appears to have experienced a more pronounced rise in concentration than the EU: ARPU in the EU is more than 50% lower and fare per mile more than 15% lower.

The four more descriptive studies find significant, and persistent, price differences between Member States in sectors which face cost structures that are likely relatively similar. The studies suggest that differences in concentration, regulation or consumer preferences may be important contributing drivers.

- For beer, the study finds that for instance, on average, prices in Belgium and France (high concentration countries at producer level) are more than 150% higher than in neighbouring Germany (a low concentration country). While country specific factors (e.g. the types of beer consumed, customer preferences and habits, volumes sold, differences in the retail channel) seem to be relevant, differences in concentration may also play a role.
- Likewise, for mortgages, more concentrated markets examined in the study tend to have higher mortgage rates. For instance, rates for fixed rate mortgages in the Netherlands (a high concentration country) are more than 50 basis points (0.5 percentage points) higher than in neighbouring Germany or France (low concentration countries).
- For cement, largely a B2B sector, domestic prices in Denmark and France (high concentration at national and/or regional level) appear to be more than 60% higher than in Poland, Slovakia or Spain (lower concentration).
- For modern retail (supermarkets) the study finds a comparatively weaker tendency to observe higher prices for basic consumer products in countries with higher concentration at national retail level.

Calculations of potential consumer harm, based on the significant unexplained price differences between countries in sectors with comparable input costs, show that customers and consumers stand to gain (or lose) significant benefits from effective competition in these sectors (or a lack of it).

Section II.2 discusses and explores the *impact of competition on competitiveness* illustrating this impact based on a novel survey study of EU-based firms exporting to markets outside of the EU.

There is strong and consistent empirical evidence that industries which experience greater competition experience stronger productivity growth, and that weak competition undermines productivity growth. This fundamental point has been confirmed in a wide variety of empirical studies, on an industry-by-industry, or even firm-by-firm, basis. Since productivity growth is the most important driver of overall competitiveness and overall growth, effective competition across an economy is also an essential driver of overall competitiveness and long-term economic growth.

The main channels through which effective competition boosts (and weak competition reduces) productivity and growth are:

(1) Competition reallocates market share to more efficient firms and forces inefficient firms to shrink or even exit ('between firms' or 'reallocation and selection' effects).
(2) Competition forces managers to run their business more efficiently ('within firms' effects).
(3) Competition forces firms to invest and innovate ('dynamic' effects).

According to past research, effective competition 'at home' in a firm's domestic market is not just a driver of that firm's competitiveness within that market, but also an important driver of its global export competitiveness. This issue is explored in more depth in a new survey study.

While prior studies have looked into the factors driving the export success of so-called 'hidden champions' in Germany from a national perspective, this study is to our knowledge the first to specifically explore the link between domestic competition and competitiveness and to do this for firms from across the EU.

The survey of EU-based exporting firms covers responses from 398 firms from 11 Member States belonging to the most successful export sectors. It investigates the relationship between domestic competition – i.e. competition within the EU Single Market – and the export performance and competitiveness of EU-based firms on global markets. More specifically, it assesses the role and relevance for the export performance of EU-based firms of effective competition in respectively (i) domestic upstream markets for input goods, (ii) domestic upstream markets for input services and (iii) domestic markets for the EU-based firms' own products. Respondents were also asked whether domestic competition constrained their scale in a way which would prevent them from being successful on global export markets.

A large majority of respondents (80%) confirms – in line with consistent prior economic research on the importance of competitive sourcing of manufacturing inputs – that effective competition in domestic (i.e. EU) upstream markets for physical input goods is important for their success on export markets. A large majority of respondents (84%) sources their main physical input product in the EU. Most respondents regard the quality of inputs as even more important for their export success than price.

Similarly, a majority (67%) of respondents confirms that competition on upstream input markets for services matters for their competitiveness. The most important input services for export success are considered to be (i) transport and logistics, (ii) energy and (iii) IT and communications. While respondents were in general satisfied with the level of competition in upstream services markets, some respondents highlighted low competition in upstream (i) IT and communications and (ii) energy markets.

Perhaps most interestingly:

- a majority of 67% of respondents state that competition in the domestic markets for the firm's own products is important for its export success: large majorities of respondent firms agree or tend to agree that domestic competition has incentivised them to increase their product quality (85% of respondents), efficiency (84% of respondents) and innovation performance (78% of respondents);
- at the same time, a majority of respondent firms (66% of respondents) disagrees or totally disagrees with a statement that domestic competition curbed the size of their domestic operations, thereby preventing them from being successful on export markets.

Overall, the survey study confirms the importance of competition 'at home' for the export competitiveness of EU firms. Effective competition in domestic upstream goods and services markets as well as in the exporting firm's own domestic market appears to be an important driver of success on global export markets.

Section II.3. explores the *impact of changes in the conditions of competition on economic growth and performance* in the EU. This section presents the analysis performed by Lear et al. (2024) which aims to quantify the potential magnitude of both the historical costs of the weakening of competitive pressures (as proxied by the increase in markups observed in the EU since 2000) and the potential gains for the EU economy from a strengthening of competition going forward.

This part of the report relies on two well-established general equilibrium models (the MATER and the QUEST models) to perform simulations based on the following counterfactual scenarios.

First, a *backward-looking*, historical scenario explores how the EU economy would have evolved if markups in the EU had not experienced the observed significant increase since 2000. This scenario is based on the simplifying assumption used in the macro-economic literature that the increase in markups can be fully attributed to a weakening of competition and is fully translated into an increase in price levels. However, in reality, observed changes in markup can also be due to a combination of other factors working in different directions, such as changes in the cost structure (increases in fixed costs), efficiency gains or the impact of various measures taken to promote healthy competition in the EU, such as the enforcement of EU competition policy.

Based on three reliable pieces of research, the simulations of the backward-looking, historical scenario assume a 7.54% increase in EU markups since 2000. The simulations suggest that a corresponding weakening of competition may have led to a significant negative impact on EU GDP (up to minus 5-7%), price level (plus 4-5%) and labour productivity (minus 1-3%). However, closely related research by the Commission's Joint Research Centre and DG Competition estimates that without the EU's competition interventions taken over the last ten years, this this impact would have been larger by almost one quarter.

Second, the report explores two *forward looking* scenarios exploring the benefits of measures improving the conditions of competition in the EU, without prejudging the precise policy measures to be taken. The first, a *trimming* scenario, simulates how the EU economy

would evolve if the market power of the firms at the very top of the markup distribution would be limited. The second, a *convergence* scenario, investigates how the EU economy would evolve if the country-level markups of Member States with markups higher than the EU average were to be reduced and were to converge towards the EU average.

According to the forward-looking simulations, measures limiting the market power of the most powerful firms or pro-competitive regulatory reforms across the EU might each increase GDP by up to 2%-4%, depending on the time horizon.

These results have to be considered with caution because (i) competition is a complex and multi-faceted process that cannot be fully approximated by the evolution of markups and (ii) simulations based on macroeconomic models such as the ones used in the present simulations do have limitations and are based on a number of simplifying assumptions. In particular, the simulations do not assume or point towards any specific initiative in the field of competition policy as such, as opposed to sectoral or other possible reforms. Without prejudice to the feasibility and proportionality of designing any policy initiative that could pursue the simulated outcomes, the results of the simulations illustrate, however, that more effective competition, as proxied by lower markups, could offer substantial benefits in terms of a reduction in price levels, increased household consumption and private investment, a strengthening of productivity and overall economic growth.

INTRODUCTION

1. COMPETITION AND ITS ECONOMIC BENEFITS

Competition between firms is a process of rivalry in which firms strive to win customers by making offers intended to be more attractive than those of their competitors.

If this process of interaction between firms is effective, it obliges firms to lower their prices, improve the quality and variety of their products, lower their costs, to become more productive, and come up with more innovative products. Over time, effective competition will also (i) reward better performing firms with higher market or industry shares (until they are replaced by even better performing firms) and (ii) force inefficient firms to shrink or even exit the market. The latter two effects are often referred to as the 'reallocation' or 'selection' effect of competition[1].

If the competitive process works well across an entire economy, it is a fundamental driver of overall investments, innovation, productivity growth, business dynamism and employment. Competition is therefore not just beneficial to customers, but one of the essential drivers of long-term growth and the improvement of living-standards of citizens[2].

Conversely, weak competition harms (i) customer firms in industries downstream[3] from those with weak competition, (ii) final consumers and (iii) if it is weak across sectors, the overall competitiveness of an economy and the long-term living standards of citizens.

Together with other policies, well-functioning competition can not only improve an economy's potential to grow, but also contribute to its resilience to shocks which is important in a world exposed to crisis moments. By contrast, less competition risks making an economy 'brittle' and thus less resilient to external shocks[4].

Given this essential role of effective competition, the EU is committed to establish an internal market disposing of a 'system ensuring that competition is not distorted'[5] and to

[1] In dynamic contexts with product or process innovation, these effects have been described as a process of 'creative destruction'.
[2] OECD (2014), CNMC (2022).
[3] A similarly important competitive process takes place on the demand side of markets where firms compete for the acquisition of inputs or the hiring of employees. If competition is weak on the demand side of markets (monopsony or oligopsony) it harms upstream suppliers and employees supplying their labour as well as total welfare.
[4] See e.g. Draghi (2015), Ciapanna and Roma (2020). CNMC (2022), section 8, provides a review of the relevant economic literature. In particular, well-functioning competition makes an economy less rigid and more adaptable as more supply options are available to firms, thereby allowing them to diversify. In addition, competition may ensure a high rate of price transmission, suggesting a faster response to changing economic conditions and, in turn, a shorter recovery. Conversely, less competitive and more rigid market structures will inhibit a swift response to crises. See also OECD (2021).
[5] Treaty on European Union, Protocol (No 27) on the internal market and competition.

work towards a 'highly competitive social market economy'[6]. In the same spirit, the Commission recently reiterated that a robust competition policy must remain at the heart of its efforts to promote the long-term competitiveness of the EU[7].

2. REASONS FOR CONDUCTING RESEARCH ON THE EVOLUTION OF COMPETITION IN THE EU

Competition between firms does not take place in a vacuum or a laboratory, but in a constantly evolving economic and policy environment. Competition between firms today is likely driven and impacted by different factors than it was 25 or 50 years ago. The main factors affecting the nature and intensity of competition in the past have been long-term changes in technology, trade patterns, business practices, customer preferences and public policies.

Historically, successive waves of technological innovation were among the strongest drivers of changes in the nature and intensity of competition[8]. These include the introduction of new primary movers (e.g. the steam engine, the combustion engine), modes of production (e.g. mass production, automation), means of transport (e.g. air transport, container shipping) or information and communication technologies (e.g. telephony, digitalisation of businesses as a result of the ongoing ICT revolution).

Another important driver has been the changing dynamics and patterns of trade, exemplified by the recent process of China's (re-)integration into global trade. This integration has led to substantial transformations in global supply chains.

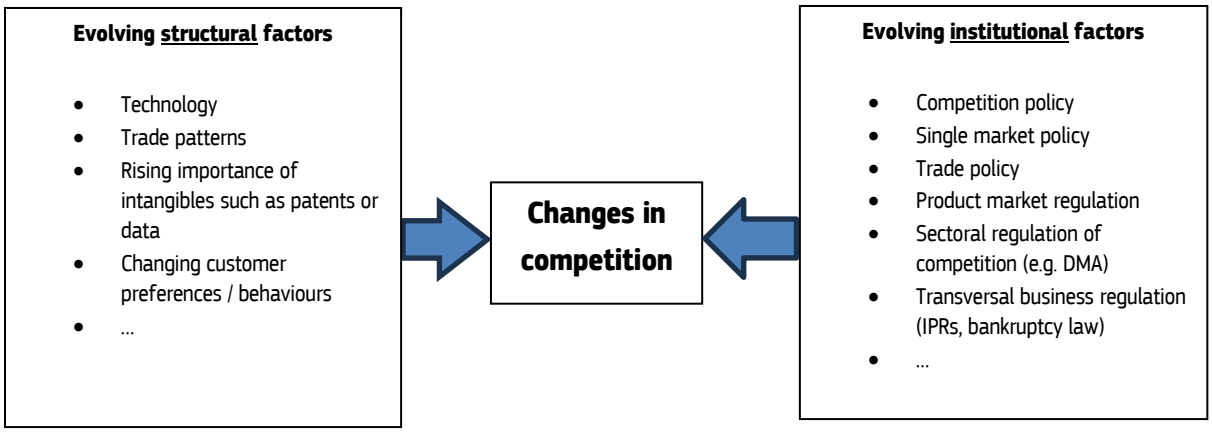
With regards to public policies affecting the nature and intensity of competition, it is important to bear in mind that competition policy is not the only driver of change. Other institutional drivers include (i) market integration policies such as the Single Market policies in the EU, (ii) trade policy, (iii) product market regulations (for example on licensing, shop opening hours, health and safety or data protection), (iv) sectoral pro-competitive regulations such as the Digital Markets Act, or (v) transversal legislation for example on intellectual property rights or bankruptcies which all contribute to shape and transform the conditions of competition between firms.

[6] See Article 3(3) of the Treaty on European Union: '*The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance*'.

[7] Communication from the Commission: *Long-term competitiveness of the EU: looking beyond 2030*, 16.3.2023 COM(2023) 168 final.

[8] See for example, Acemoglu, D., and Johnson, S., (2023).

Figure 1: Factors driving changes in competition



While competition enforcement in individual cases must, by its nature, focus on the specific features of each relevant market and industry at a given moment in time, it can be useful to take a step back and explore how (i) over a longer time horizon and (ii) at the level of broader sectors or of the whole economy the basic determinants of competition and – as a result – the nature and intensity of competition itself in the economy may have evolved.

Moreover,

- recent economic research has detected in many advanced economies indications of significant changes in the nature and intensity of competition during the last 20 to 40 years, i.e. (i) rising industry concentration[9], (ii) rising markups[10] and profits[11], (iii) a growing gap between leading firms and followers as regards markups, profits and productivity[12] and (iv) decreasing business dynamism[13], i.e. a weakening of the dynamic process of reallocation of market shares between firms as well as of firm entry and exit;
- related strands of recent economic research have been exploring whether the observed evolution of competition may have contributed to worrying long-term trends at the macro-economic level such as lower productivity growth[14], growing wage inequality[15], lower investments[16] or overall lower economic growth[17];

[9] See Autor et al. (2020), Bajgar et al. (2023), Koltay et al. (2023).
[10] Markups are often defined as the ratio between price and cost (p/c), see De Loecker et al. (2020). An alternative way to present markups is via the Lernex index ((p-c)/p).
[11] See Philippon (2019).
[12] See Andrews et al. (2016).
[13] Calvino et al. (2020).
[14] See for example De Ridder (2024), Akcigit and Ates (2021).
[15] See for example Autor et al. (2020), IMF (2019), Deb et al. (2022).
[16] Covarrubias et al. (2020).
[17] See for example De Loecker, Eeckhout and Mongey (2021); Pellegrino (2023).

- the recent significant shocks to the EU economy[18] raise the question whether the EU economy and the competitive process in the EU are sufficiently flexible and resilient to adapt to similar shocks going forward;
- public authorities in other advanced economies have conducted their own research on the evolution of competition in their respective jurisdictions[19].

DG Competition has therefore conceived and launched several complementary research projects to gather evidence on how and why the nature and intensity of competition during the last 20-25 years may have changed in the wider EU economy, and on how and why competition, as well as competition policy, in today's economic reality may affect broader economic outcomes e.g. GDP, investment, productivity or the income distribution.

As part of a first research project two foundational research workstreams on the evolution of various indicators of competition have been conducted by a team of economists at the OECD led by C. Criscuolo and S. Calligaris[20]. As part of a second research project, five workstreams have been conducted by a consortium of researchers (academics and economic consultants) led by the economic consultancy Lear and advised by T. Duso[21]. Two

[18] The Covid-19 pandemic and related supply chain disruptions, Russia's war of aggression in Ukraine and related economic effects in particular in the energy field, the ensuing rise of inflation, the monetary policy response leading to higher borrowing costs.

[19] Research on the long-term evolution of competition in their respective countries has been conducted by the German Monopolkommission, the UK Competition and Markets Authority, the Norwegian Competition Authority, the U.S. White House Council of Economic Advisers, the Canadian Competition Bureau, the New Zealand Productivity Commission and the Australian Treasury. A worsening of several indicators of competition has been reported in the UK, the U.S., Canada and Australian reports. By contrast for Germany and Norway the respective reports found relatively stable overall conditions of competition. The report for New Zealand does not conduct an across-the-economy assessment but assesses trends at sectoral level with heterogeneous outcomes.

[20] The two workstreams co-financed by the OECD and the European Commission investigate (i) the evolution of concentration, business dynamism amongst market leading firms, and markups in Europe as well as the drivers of that evolution; (ii) the identification of sectors presenting antitrust risks at industry level. The authors of the first report entitled 'Exploring the state of competition in the EU' are Calligaris, Chaves, Criscuolo, De Lyon, Greppi and Pallanch. The authors of the second report entitled 'A taxonomy of industry competition' are Abele, Calligaris, Criscuolo and Greppi. For the sake of simplicity, the two reports will be referred to throughout this report respectively as OECD (Calligaris et al., 2024) and OECD (Abele et al., 2024). The team of researchers from the OECD led by C. Criscuolo and S. Calligaris will be referred to as 'the OECD team'.

[21] The five workstreams consist of (i) a review of the economic literature on how competition affects the economy, indicators of competition and trends in competition in Europe led by S. Nava; (ii) a price-concentration study led by S. Ennis; (iii) a study of the evolution of profits of the most profitable large firms worldwide during the last 25 years led by A. Walckiers; (iv) a survey study on the importance of competition 'at home' in the single market for the global export competitiveness of EU firms led by E. Argentesi; (v) a macro-economic modelling study of the potential costs of weakened competition in the past and the potential benefits of strengthening competition going forward led by C. Colacurzio. The research conducted under those five workstream is reported in detail in a report published on the same day as the present report which will be referred to hereinafter as Lear et al. (2024).

further workstreams have been conducted respectively inhouse in DG Competition and with the assistance of the Commission's Joint Research Centre[22].

3. OBJECTIVES OF THE PRESENT REPORT AND LIMITATIONS

The objectives of the present report are to present and discuss findings of the economic research described above and to assess on the basis of that research (combined with prior research reported in the wider economic literature) the following two broad questions:

(1) how and why the conditions of competition in the EU may have evolved during the last 20-25 years (focus of part I of the report),
(2) why competition matters for broader economic outcomes (part II of the present report)

The research presented and discussed in the present report has been designed for different teams of researchers to investigate similar and partially overlapping issues based on different, but complementary methods and data-sources. For instance, various indicators of competition (such as concentration and business dynamism) are not only analysed at broad industry/sector level, but also at market level where possible. Likewise, the research employs statistical analysis, simulation models as well as survey tools to assess the impact of competition. This multipronged approach helps to come to nuanced conclusions and strengthens our confidence in the overall findings.

Moreover, the research has been designed to (i) innovate in several important respects from a methodological point of view[23] (ii) mainly focus on Europe, (iii) be based at least in part on novel data sources, (iv) provide a comprehensive view of the likely drivers of the observed trends, and (v) explore links between the observed trends and the Commission's competition enforcement efforts.

Overall, the research reported aims to provide a comprehensive, robust and nuanced picture of the importance and the overall evolution of competition in the EU during the last 20-25 years.

The first and likely most important limitation of the research presented here is that due to more limited data availability in the EU as compared to the U.S., most of the research reported cannot go back further than 20-25 years. Similar research for the U.S. shows however that some of the trends reported in the present document (e.g. rising industry concentration, rising markups) started in the U.S. already during the 1980s. It is therefore

[22] The two workstreams consisted respectively in (i) research on the evolution of market concentration in consumer facing markets in European countries, the U.S., Canada, South Korea and Japan based on a novel dataset acquired from Euromonitor; (ii) research on the effectiveness of Covid-19 State aid.

[23] The most important methodological innovations are probably to (1) explore the evolution of industry concentration, business dynamism and markup at a granular NACE 3-digit industry level, (2) distinguish for the analysis for the first time between industries competing at domestic, European and global level and (3) analyse for the first time the evolution of market and industry concentration jointly.

well possible – or even likely based on for example the longer time series for the profit share of GDP reported in Figure 35 below – that similar trends started also in Europe around that time already, but that they cannot be solidly documented in the present report on the basis of the available data.

A second similar limitation is that for the research conducted by the OECD team on the evolution of concentration, markups and business dynamism as well as for the DG Competition inhouse research on market shares the most recent data is from 2019. Likewise, the data used for the quantitative price concentration analyses presented in section II.1 are also related to pre-Covid era. The research on the profits of so-called superstar firms reported in Figure 38 as well on the profit share of GDP reported in Figure 35 below are based however on more recent data and do not suggest that the trends observed before 2019 at least as regards profits fundamentally changed thereafter.

Thirdly, the research reported here seeks mainly to explore aggregate trends at the level of the EU economy. As will become apparent below, behind those broad trends there are however heterogeneous sectoral trends which, depending on the specific conditions in the sector concerned, can have different drivers or magnitudes than the aggregate trends or even go in opposite directions altogether. There can also be significant differences between countries within the EU. It is therefore important that the kind of broad-based research presented in the present report is complemented by, and read together with, micro-economic sectoral studies[24] as well as country studies[25].

Fourthly, the type of economic research described in this report can help to better understand what some of the underlying larger technological and economic trends in Europe may be. It can therefore complement and inform competition policy and enforcement efforts. It can however not in any way substitute for the Commission's detailed assessments in its specific cases or sector inquiries. It can also not substitute for the necessary economic ex-post evaluation of enforcement decisions in individual competition cases or in specific sectors or of other competition policy measures.

[24] Miller (2024).
[25] E.g. CMA (2022) and De Loecker et al. (2022) on UK; Monopolkommission (2022) on Germany.

PART I: EVOLUTION OF COMPETITION IN THE EU DURING THE PAST 25 YEARS

In recent years, a number of contributions to the economic literature have provided evidence which suggests that competition may be declining, and market power may be on the rise[26]. Among other trends, research reports an increase in concentration, markups, and profit rates, accompanied by reduced job reallocation and startup rates, lower productivity growth, and increased polarization between larger and smaller companies. For a good overview of these and other trends, see Akcigit and Ates (2021).

While there is evidence for a weakening of competition in most advanced economies, including the EU, research has remained largely focused on the U.S. A notable example is the influential paper produced in 2016 by the U.S. White House Economic Policy Advisors, which found (a) an increase in U.S. industry concentration as well as (b) a significant rise of returns on invested capital ('ROIC') for the top 10% of U.S. firms over the past 20 years[27]. While during the 1980s those firms earned a ROIC of around 30%, the 2015 average ROIC reached a level above 90%.

De Loecker et al. (2020), using a novel estimation technique[28], found that average markups of listed firms in the U.S. increased from around 21% above marginal cost in 1980 to 61% in 2016. They further argued that this increasing trend was driven by the rise of markups at the top of the firm distribution and accompanied by a rise in the profit rate for these firms.

In Philippon's (2019) book 'The great reversal', both industry concentration and profits are reported to have risen in the U.S., but not in the EU. Nonetheless, several contributions suggest that concentration, markups and profits have – on average – increased in Europe, whereas business dynamism decreased[29]. This section therefore adds to the literature by investigating different indicators of competition in Europe and documenting their trends.

As mentioned, competition between firms takes place in a constantly evolving environment and is therefore governed by factors different from those which prevailed 25 or 50 years ago. As a result, it is important to not only document various trends, but to also use the collected evidence to assess what are the likely drivers of those trends.

Section I is therefore structured as follows: Section I.1 briefly discusses the various indicators of competition, after which Section I.2 reports observed trends across Europe during the past 20 years. Section I.3 employs the prior findings to consider what are the

[26] In the economic literature, market power is usually defined as the ability of a firm to, profitably, keep prices above competitive levels over a given period of time (or to keep output, product quality, product variety or innovation below competitive levels) without being constrained by competitors competing away market share.
[27] Council of Economic Advisors (2016).
[28] See De Loecker and Warzynski (2012).
[29] For profits and concentration, see for instance Bajgar et al. (2023), Koltay et al. (2023), whereas evidence on markups is provided by Díez et al. (2018). Lastly, for business dynamism see for instance Biondi et al. (2023).

most likely drivers of the observed trends. Lastly, Section I.4 reports research providing evidence on how competition enforcement adapted to the evolving conditions of competition.

I.1. INDICATORS OF COMPETITION

Competition is an 'invisible', complex and multifaceted process. The strength or weakness of the competitive process can therefore not be measured directly, but only approximated based on various indicators.

The economic literature employs a wide array of indicators, which serve as tools to assess the degree of competition characterizing markets and industries. In this Section, a selection of indicators is investigated across European industries and markets, which are often employed to measure market power and the degree of competition.

The reasons for considering a selection, rather than any individual indicator, are twofold. First, each of the employed indicators is – on its own – considered insufficient to capture the multi-faceted nature of competition[30]. As a result, various contributions have made the case for a multi-pronged approach, which examines several indicators of competition in conjunction[31]. Secondly, while each suffers from its individual shortcomings, it could be argued that if all evidence points in the same direction, this provides a much stronger signal; or, as Philippon (2019) writes, '[n]one is perfect, but together they can form a convincing picture'[32].

It should be noted that the empirical contributions contained in this Section mainly provide an aggregate picture of various indicators over a wide array of industries and countries, and while instructive on broad economic trends, are therefore liable to hide significant variations, both at the sectoral and geographic level. It cannot be excluded that any trends which are found are *not* present at the micro-level for individual industries or countries, or that the causes behind observed trends differ from one sector to another.

The different indicators of competition relied upon belong to one of three categories, distinguishing between (i) structural, (ii) performance and (iii) dynamic indicators:

(i) **Structural measures** of competition focus on the underlying structure of markets, which influences the competitive landscape and the intensity of competition. In practice,

[30] See OECD (2021).

[31] Recently, a similar approach has been employed by – among others – the CMA (2022, The State of UK Competition) and the Competition Bureau Canada (2023, Competition in Canada from 2000 to 2020: An Economy at a Crossroads). See also Berry et al. (2019), Bajgar et al. (2023) or Koltay et al. (2023).

[32] For instance, Koltay et al. (2023) state that: 'To avoid the pitfall of overinterpreting evidence on industry level concentration, several reports suggest that one should assess concentration in conjunction with other measures of market trends and market power. These other measures might include data on profitability, markups, firm dynamics of entry and exit, various market and technology characteristics (fixed and sunk costs, network effects, monopsony power, international trade, etc.), as well as indicators of competition policy intervention (p. 4.).'

market structure is often analysed by considering its level of **concentration**[33]. Market concentration can be measured in several ways: for example, as the number of (significant) firms operating in the market, as the CR4 concentration ratio (which sums the market shares of the top 4 players), or through the Hirschman-Herfindahl index (HHI)[34].

Concentration has since long been used as a structural gauge of competition. According to the well-known Structure-Conduct-Performance (S-C-P) paradigm, market structure (S) is an important determinant of the way firms compete (C) and, ultimately, of market performance (P), such as the level of output, prices, investment and so on[35]. While it is clear that the chain of causation stipulated by the S-C-P paradigm is neither mechanistic nor one-directional (see further below), it is also clear that market structure is a vital element in describing how competition works in any given market.

As the number of competitors in a market decreases, so does the number of competing products available to the customer. In oligopolistic markets the risk and magnitude of oligopoly effects (both unilateral and coordinated effects) increases. In the extreme scenario of a monopoly, where a single firm operates in the market, that firm is able raise prices without fear of losing customers to competing brands. Concentration has therefore been associated with consumers facing fewer choices, paying higher prices, and receiving lower quality products. Higher concentration could therefore signal increased market power and reduced competition.

The above basic insight is not confined to the number of firms in the market, but extends to other, more comprehensive measures of market concentration such as the CR4 concentration ratio or the HHI. Various models of market competition suggest that the more concentrated the market in terms of CR4 or HHI, the less competitive pressure firms face, which in turn leads to higher markups, prices and profits[36].

Nonetheless, concentration only sheds light on part of the story. Concentration may be the result of intense competition. Moreover, markets may be highly concentrated but at the same time allow for intense competition among the market leaders and remain contestable to new entrants. Performance measures and dynamic measures of

[33] See Bishop and Walker. (2010).
[34] The HHI is equal to the sum of the squared market shares of all firms active on a given market multiplied by 10 000. In contrast to the CR4, it not only looks at the market shares of the largest firms but considers how market shares are distributed as it attaches a higher weight to larger firms.
[35] See e.g. Clark (1940).
[36] This relationship holds in most models used by economists to describe and analyse competition: Cournot models (where companies compete for volume), Bertrand models (price competition with differentiated products), as well as bidding markets. Furthermore, more concentrated markets are widely understood to foster collusion. See also Ivaldi et al. (2003).

competition therefore are a complementary tool to examine the intensity of competition.

(ii) **Performance measures** examine market outcomes in order to gauge changes in market power and the intensity of competition more directly. As the textbook definition of market power is a firm's ability to influence prices, a natural candidate is the **markup**, which is defined as the ratio of the price at which a firm sells its output over the marginal cost of production, the latter denoting the cost of producing an additional unit of output.

A markup exceeding one implies that the price a firm receives for selling an additional unit of output exceeds the cost of production, suggesting excess profits. Consequently, if these profits are not competed away and firms are able to maintain markups at elevated levels, this is indicative of the presence of market power. Should a market or industry be characterized by higher markups over time, this could signal a softening of competition.

(iii) **Dynamic measures** aim to provide insights on the dynamic aspects of competition, such as firm entry and exit, innovation, growth, and technological change. These measures are complementary to structural and performance indicators as, on their own, high concentration and high markups are not necessarily a cause of concern (because they may reflect e.g., a higher degree of efficiency on the part of the firms in question and just be temporary). However, if high concentration and high markups are accompanied by an 'ossification' of markets and industries, with the most efficient firms solidifying their position vis-à-vis the rest of the market, this should be considered a concern, regardless of the underlying causes, as business dynamism is considered of vital importance to *sustained* competitive pressure, *sustained* innovation and *sustained* economic growth.

A number of indicators are therefore examined, which attempt to quantify dynamism within European markets and industries and largely focus on the rate of **entry/exit**, the change in relative market shares at the top, referred to as **market share instability**, and the composition of the top, referred to as **rank persistence**. For an overview of all the employed indicators, as well as their advantages and limitations, see Annex 1.

As a final caveat, it should be mentioned that even though multiple indicators are considered, the list is still far from exhaustive and there remain many aspects which are not taken into consideration. For instance, Tirole (2023) points out that even without abnormal profits or a sharp rise in markups, firms might exhibit other types of anti-competitive behaviour, such as killer acquisitions or political lobbying. Furthermore, while attention is largely restricted to seller power, increasing evidence highlights the presence of

buyer (or monopsony) power on input and labour markets[37]. Indeed, while the presence of seller power is assumed to result in reduced welfare, the same potentially holds for buyer power through misallocation of resources and the stifling of upstream innovation.

I.2. EVOLUTION OF KEY INDICATORS OF COMPETITION IN THE EU

I.2.1 CONCENTRATION

Several recent contributions to the economic literature have examined concentration trends. In the U.S., studies have documented an increase in average industry concentration over the past few decades[38]. A similar finding was reported in the case of Canadian industries, where the largest increase was situated in sectors that exhibited higher levels of concentration to start[39]. In contrast, evidence on European concentration is somewhat more ambiguous. While some studies find stable or decreasing concentration levels, other contributions suggest the opposite[40].

However, while many studies have attempted to establish a causal link from concentration (structure) to market power (outcome), as measured for instance by higher profits or markups, results have been somewhat ambiguous[41]. While high concentration can stifle competition, increased concentration can also be the very result (outcome) of intense competition, in which the most efficient firms capture the market[42].

Consequently, this has led to the more nuanced view that the relation between concentration and competition depends on the environment in which firms compete, which differs from one market to another. While high concentration can be an indicator of market power, this need not always be the case. However, everything else being equal, concentrated markets are likely to be characterised by less competition compared to unconcentrated markets[43]. Overall, higher concentration can lead to:

[37] For a literature review, see Ashenfelter et al. (2010); or, for more recent contributions, Morlacco (2019) or Rubens (2023).
[38] Examples include Barkai (2020), Crouzet and Eberly (2019), Autor et al. (2020, 2023), Covarrubias et al. (2020), Furman and Orszag (2015, 2018), Grullon et al. (2019).
[39] Competition Bureau Canada (2023).
[40] For stable or decreasing trends, see Philippon (2019), Covarrubias et al. (2020), Cavalleri et al. (2019) and Gutiérrez et al. (2018). In contrast, De Ridder (2024) documents an increase in industry concentration in France based on administrative data, with De Loecker et al. (2022) finding a similar pattern in the UK. Koltay et al. (2023) and Bajgar et al. (2023) also find that European industry concentration increased over time, whereas Bighelli et al. (2023) paint a mixed picture, with concentration increasing in some countries and decreasing in others.
[41] See Domowitz et al. (1986a, b; 1987) or Schmalensee (1989).
[42] The workhorse model in which this dynamic holds, is discussed by Melitz and Ottaviano (2008). See also Miller et al. (2022).
[43] See Lear et al. (2024).

- Customers facing fewer alternative suppliers to turn to if a firm raises prices, meaning that the demand facing any of the leading suppliers becomes more inelastic.
- Firms with higher individual market shares enjoying higher single firm market power.
- An increased risk of coordinated effects as the number of firms in an industry decreases, facilitating collusion.
- A reduction in both the number of potential innovators and the incentive to innovate.
- Reduced competition between firms in the labour market and lower wages.

The metric employed in this analysis is the four-firm concentration ratio or CR4, which equals the joint market or industry share of the four largest firms. A higher CR4 typically suggests a more oligopolistic market structure. However, data on actual market shares is often unavailable. To circumvent this issue, most studies employ firm-level revenue shares (derived from accounting data) within industry categories as a proxy of market shares, which could introduce measurement error, especially when the industries do not match the relevant product and geographic markets in which the companies compete. As will be discussed in the next subsection, this report employs novel data, both at the industry and market level, which attempts to accommodate these concerns and therefore provides an important contribution to the literature on concentration.

I.2.1.1 DATA AND METHODOLOGICAL INNOVATIONS

The analysis on concentration presented in this Section relies on two different types of data: data at industry/sector level and data at market level.

Data at industry level

The **first** dataset employed in this empirical analysis is compiled by the OECD team and allows for both the measurement of concentration and entrenchment measures within NACE[44] industry categories and the calculation of markups at the firm level, which are further discussed in in section I.2.2. For a more in-depth discussion of the dataset, see OECD (Calligaris et al., 2024). In total, the dataset used for the concentration analysis covers firms belonging to 127 industries/sectors, which in turn are part of the broader mining, utilities, non-financial market services and manufacturing categories. These industries are tracked from 2000 until 2019 across a total of 15 European countries[45], as well as Japan, the U.S., and South Korea.

[44] The NACE classification system (Nomenclature générale des activités économiques dans les Communautés européennes) is a hierarchical categorization of firms by economic activities, henceforth industries, which is employed in the EU for various purposes including economic analysis.

[45] The 15 countries are: Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Norway, Poland, Portugal, Slovenia, Spain, Sweden and the United Kingdom. Due to data restrictions, the following European

Importantly, there is an inherent difficulty when studying concentration (and, to a lesser degree, business dynamism) at the industry/sector level. The fundamental relationship between concentration and competition derives from the notion that higher concentration entails fewer competing firms. The key variable of interest is therefore concentration in the marketplace (or the 'relevant market' in antitrust terms), where firms offer competing products.

Consequently, the definition of relevant markets requires both a clearly delineated product dimension, as goods offered in the market should be substitutes, as well as a geographic dimension. The latter is motivated by differing competitive conditions and consumer preferences across territorial boundaries and jurisdictions, as well as the fact that transportation is often costly, making it sensible to set up both plants and stores near customers.

While *industry* concentration might be considered useful as an initial screen, it also introduces a risk of measurement error if the intended goal is to provide insights on concentration at the *market* level[46]. First, industry classifications typically exist at a more aggregated level than actual markets, which are defined quite narrowly. Firms operating in one industry category often sell their output in multiple product markets. As an example, the most granular NACE subcategory of 'prepared animal feed' (C10.9) groups all pet food producers together, making a distinction between pets (C10.9.2) and farm animals (C10.9.1). However, from a consumer's perspective dog food, cat foot, bird food or fish food cannot be considered substitutes.

Second and closely related, industry classifications are often based on similarities at the production level, not the consumption level. For instance, producers of metal cans are grouped together in the same industry classification (NACE C25.92, manufacture of light metal packaging), regardless of how their output enters the market[47]. Again, from a consumer's perspective, soda cans, aerosol cans and paint cans are not substitutes. Moreover, actual substitutes can be excluded from the industry, such as plastic and glass bottles for soda cans.

Likewise, industry sales are often reported in terms of revenues from *production*, not as revenue from market sales. Industry sales hence typically relate to a geographic level (e.g. the country where production takes place), which is different from that of the actual market (the country where sales take place). Not accounting for firm-level imports and exports tends to give a distorted image of market shares, especially when the goods or services are heavily traded[48]. Should a producer possess a plant in a certain country yet only sell half of

countries were excluded from the concentration analysis: Austria, Bulgaria, Czechia, Estonia, Ireland, Latvia, Luxembourg, the Netherlands, Romania and Slovakia.

[46] See Bajgar et al. (2023).

[47] See Benkard et al. (2021).

[48] To be precise, direct firm-level import activity is not observed unless done via national subsidiaries.

its total output on the domestic market, with the rest destined for exports, its industry revenue – if reported at the national level – would be double its market revenue[49].

Lastly, in the best-case scenario where an industry is simply an aggregate of multiple product markets, changes in industry concentration are not necessarily informative about concentration in its constituent markets[50].

While these points of criticism are valid, it should again be mentioned that they might overlook the fact that increased concentration is often linked to reduced innovation, which can play out primarily at the broader industry level. While the pharmaceutical industry consists of firms serving various (of often very narrow) product markets, research tends to take place at the corporate or division level. Furthermore, increased industry concentration might facilitate coordination via multi-market contact[51]. In addition, it should be noted that while the relation between concentration and market power is not clear-cut, low concentration is likely to imply low market power.

Nonetheless, in comparison with previous work and to accommodate the aforementioned concerns, OECD (Calligaris et al., 2024) introduces two main innovations. First, concentration is calculated at the most disaggregated industry classifications for which data are available. As these consist of more narrowly defined industries, they are presumed to correspond more closely to actual markets. Industry concentration is measured at the 3-digit NACE level, although for a restricted number of food and beverage industries data was employed at the 4-digit level. This stands in contrast to prior studies examining concentration across multiple countries, which employ the less granular 2-digit level.

Second, a geographic taxonomy is introduced by assigning each industry to a geographic scope at which competition is assumed to take place[52]. This is not a trivial exercise, as some firms compete at the national level, whereas other producers compete against one another on the EU Single Market or even at a global scale. Consequently, using the correct geographic dimension (and hence taking into account relevant imports and exports) is of key importance when calculating firm-level industry shares. The NACE industry categories have accordingly been assigned to one of three 'geographical buckets': domestic (national), European or global[53]. This assignment is based on industry trade flows, which are considered a measure of openness to trade (OTT) and therefore an important indicator of

[49] By way of illustration: plain industry/production shares as an indicator of concentration on the Italian car market might suggest that a large proportion of the Italian population drives a Ferrari or Lamborghini. However, this obscures the fact that a sizable fraction of luxury cars produced in Italy are not destined for the domestic market, but rather for export.

[50] See Werden and Froeb (2018). See also Shapiro (2018) for a further discussion on this issue.

[51] See Bernheim and Whinston (1990) or Ciliberto and Williams (2014).

[52] A less refined was employed by Bajgar et al. (2023), who perform a dual analysis by computing concentration both at the national and EU level for a selection of industries.

[53] Finally, it is worth mentioning that inter-firm linkages are taken into account, as the individual industry shares of firms belonging to the same business group are considered jointly. Incorporating these linkages both avoids introducing a downward bias on concentration estimates and accounts for the role of M&A activity in steering concentration trends.

the geographic level at which competition takes place[54]. For a more elaborate discussion, see OECD (Calligaris et al., 2024).

Data at market level

In order to cater more directly for the criticism that industry shares might - despite the above-described innovations - not capture market shares well, a **second** data source is employed to investigate concentration and entrenchment in Europe at *market* level.

Specifically, it uses the data on a large number of consumer-facing markets from the Passport Consumer Goods and Services (CG&S) dataset obtained from *Euromonitor International Passport Consumer Industries and Services, 2022 Edition* (hereafter: Euromonitor)[55]. This dataset consists of sales revenue to end consumers at the level of narrow product categories, which one can typically think of as antitrust markets (and which, for simplicity, will henceforth be referred to as 'markets'[56]). The dataset covers a large number of business-to-consumer markets (B2C), which represents a sizable fraction of total household expenditure in the EU and includes diverse products such as packaged food, soda drinks, personal care products (e.g. shampoo, tooth paste, ...), smartphones and passenger cars[57].

The market level data provided by Euromonitor is more granular in comparison to industry/sector data. For instance, in the NACE classification, pet food is a 4-digit category with no further subcategories, even though producers of pet food sell their output in various product markets. The Euromonitor dataset goes one step further, distinguishing between markets for bird food, dry dog food, dry cat food, etc.

Moreover, the Euromonitor dataset contains *sales* data at retail level (of sales to end users in the geography concerned), instead of *production* data (which is the starting point of the dataset used in OECD (Calligaris et al., 2024)).

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[54] See Lyons et al. (2001).

[55] For more background on this dataset and the applied methodology, see https://www.euromonitor.com/our-methodologies. Euromonitor International disclaimer: 'All such source material is © Euromonitor International Ltd [2022] and provided without any warranties or representations about accuracy or completeness. Further sharing, disclosure, publication or making available of all or part of the material contained in this document (or any data or other material derived from it) will require Euromonitor's prior written consent. Euromonitor International Ltd cannot be held liable for analysis or findings within this report and cannot be held liable for any reliance on such materials in any capacity and any reliance is done at the users' risk'

[56] The term 'market' does not describe or prejudge how relevant antitrust markets are defined in EU competition law enforcement.

[57] A back-of-the-envelope calculation shows that household expenditure in the EU in 2020 totalled EUR 3.4 tn. Importantly, this includes expenditure on non-manufactured goods markets which are largely excluded from the dataset, such as education and recreation/culture. Nonetheless, in 2019, the total revenue on the observed markets within the EU countries amounted to EUR 1.9 tn, which equals 55% of total household expenditure. Eurostat reports figures on 'Mean expenditure per household' and 'The number of households'. This figure (3.4 tn.) excludes markets in which market shares were reported in volumetric data such as consumer retail, where market shares were measured by square meters of selling space. Furthermore, credit and debit cards, which accounted for 1.5 tn. In transactions, were excluded to avoid double counting.

In the analysis presented, market concentration is mainly investigated for a selection of 300+ product markets across eight European countries, henceforth EU-8 (Germany, Italy, France, Spain, Poland, Romania, the Netherlands and Sweden), as well as Canada, the U.S., the UK and South Korea. Data on market shares are available at an annual frequency between 2012 and 2019[58].

Lastly, to address the question of whether industry trends are informative about market trends in terms of concentration, a comparison is made between the empirical results obtained using both datasets. While it is found that industry concentration underestimates market concentration (as might be expected), both datasets exhibit similar trends over time, suggesting that (i) markets are becoming increasingly oligopolistic and (ii) that trends in industry concentration can be informative on the direction of market trends.

I.2.1.2 FINDINGS ON INDUSTRY CONCENTRATION

The dataset compiled by OECD (Calligaris et al., 2024) allows for the calculation of concentration indices at industry level for 127 NACE categories at the 2- and 3-digit level for 15 European countries[59]. Concentration is calculated at the geographic level assigned to each industry/sector and then averaged[60]. Figure 2 below reports the average CR4 across all industries for each year. This figure shows a steady increasing trend over time, with an average CR4 which hovers around 26% in 2000, ending well above 30% in 2018. This increasing trend is further highlighted in Figure 3, which shows the cumulative change in CR4 and demonstrates that average CR4 increased by approximately 5 percentage points (p.p.)[61].

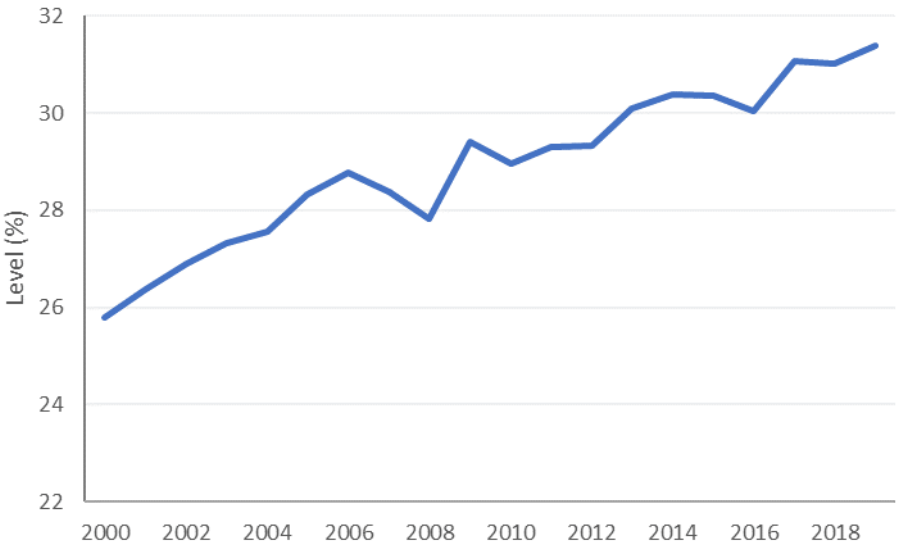
[58] In the Euromonitor dataset, markets are tracked across 29 countries in total. In Europe, the sample consists of the UK and the EU-27 countries except for Cyprus, Luxembourg, and Malta. Non-European countries include Canada, the USA, Japan and South Korea. The main limitation of the dataset is the lack of uniform market coverage across countries and over time. While some countries exhibit almost perfect market coverage (distinguishing between 330 different non-overlapping markets), others only provide data on approximately a third of all consumer markets. The unbalanced nature of the dataset thus presents a trade-off between markets and countries. As a result, the analysis presented in this report mainly focusses on the subset of countries (eight EU countries and the United Kingdom, U.S., Canada, South Korea and Japan) which provide the best coverage in the market dimension.

[59] The 15 countries are: Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Norway, Poland, Portugal, Slovenia, Spain, Sweden and the United Kingdom.

[60] For the present analysis, the global bucket contains 20 industries, the European one 80 industries and the domestic one 27 industries (for 15 European countries). As industries defined as national yield annual CR4's for each individual country, the aggregate was obtained by giving industries defined as European or global an equal weight of 15 in calculating the average. This was done to avoid attaching too large of a weight to industries in which competition takes place domestically.

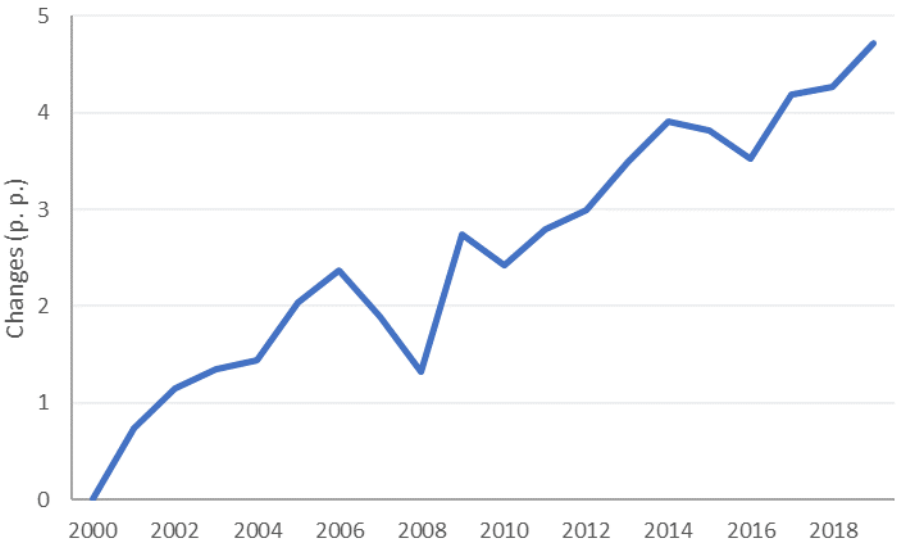
[61] The figures presented in this section are liable to hide variations across industries and countries. To account for this, several robustness checks were performed for each figure, which consisted of the exclusion of industries and countries from the aggregate analysis. Overall, results were robust to the alternative specifications, suggesting that the observed trends were not driven by a subset of countries or industries, but rather a general phenomenon.

Figure 2: Industry concentration (CR4, aggregating across geographical buckets, 2000-2019)



Source: OECD (Calligaris et al., 2024).

Figure 3: Industry concentration, cumulative change (p.p., 2000-2019)

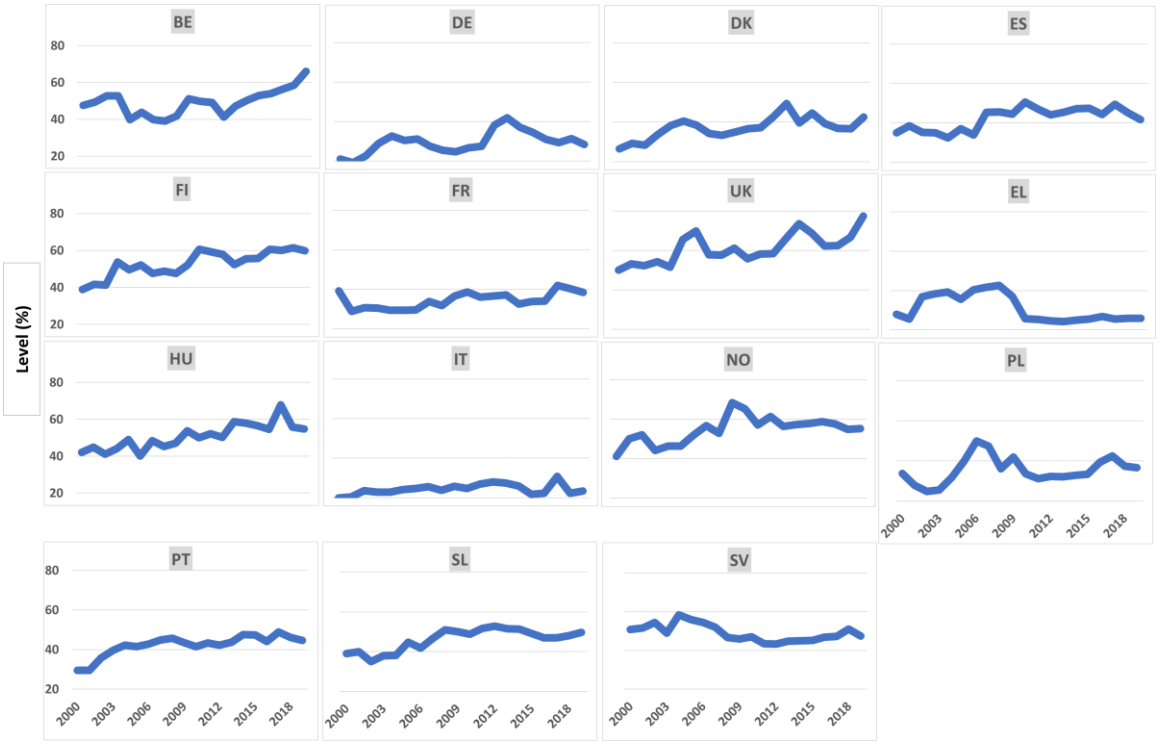


Source: OECD (Calligaris et al., 2024)

While the previous figures present averages across all industries and countries, trends at the level of domestic industries can be considered at the country level. For the fifteen countries included in this section of the analysis, Figure 4 depicts the average change in CR4 across 27 domestic industries. As can be seen, there is heterogeneity present, with some countries (e.g. the UK, Norway, Finland) appearing more concentrated than others (e.g. Italy, Germany). Overall, most countries exhibit an increasing trend over time. This

finding is consistent with similar work by Bajgar et al. (2023) based on 2-digit NACE industries.

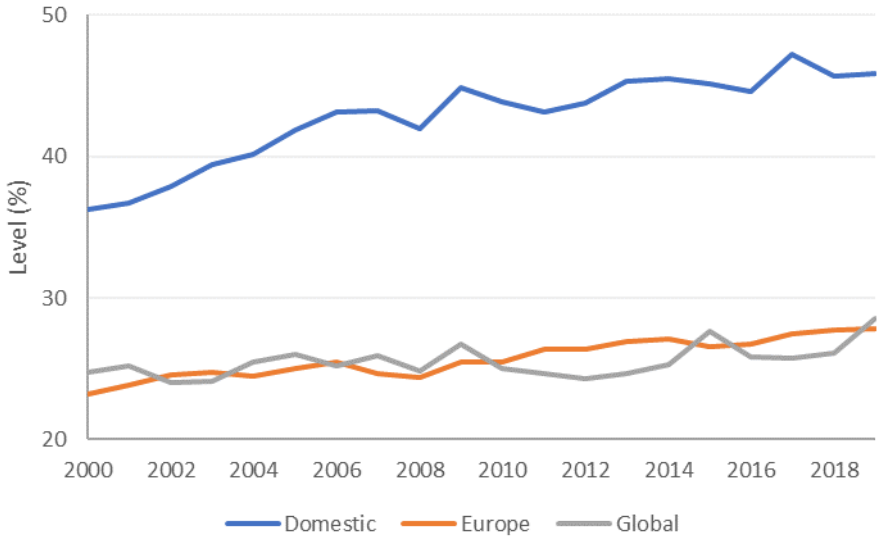
Figure 4: Average CR4 in industries competing at the domestic level across countries (2000-2019)



Source: OECD (Calligaris et al., 2024). Note: the chart shows average level of CR4 across the countries of the concentration sample when considering only domestic industries.

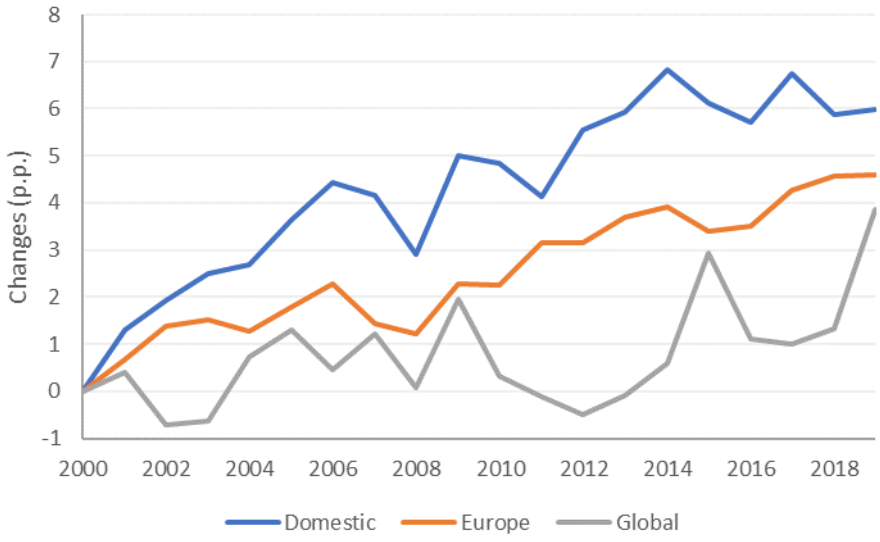
To further examine potential geographical disparities in concentration trends, Figure 5 and Figure 6 document the evolution of average CR4, disaggregated by geographical bucket. Concentration is higher in industries competing at the national level, with an average CR4 of 43% over the sample period, compared to around 26% in the other buckets. As Figure 6 shows, concentration did increase at all geographic levels, although the increase in domestic industries is more pronounced. This finding is not necessarily surprising. Sutton (2001) notes that – in general – as the number of potential customers on a market grows, so does the number of firms a market can sustain. Analogously, it therefore seems logical that industries which are defined as competing domestically are more concentrated compared to their European and global counterparts.

Figure 5: Industry concentration across geographical buckets, levels (2000-2019)



Source: OECD (Calligaris et al., 2024).

Figure 6: Industry concentration across geographical buckets, cumulative change (p.p., 2000-2019)

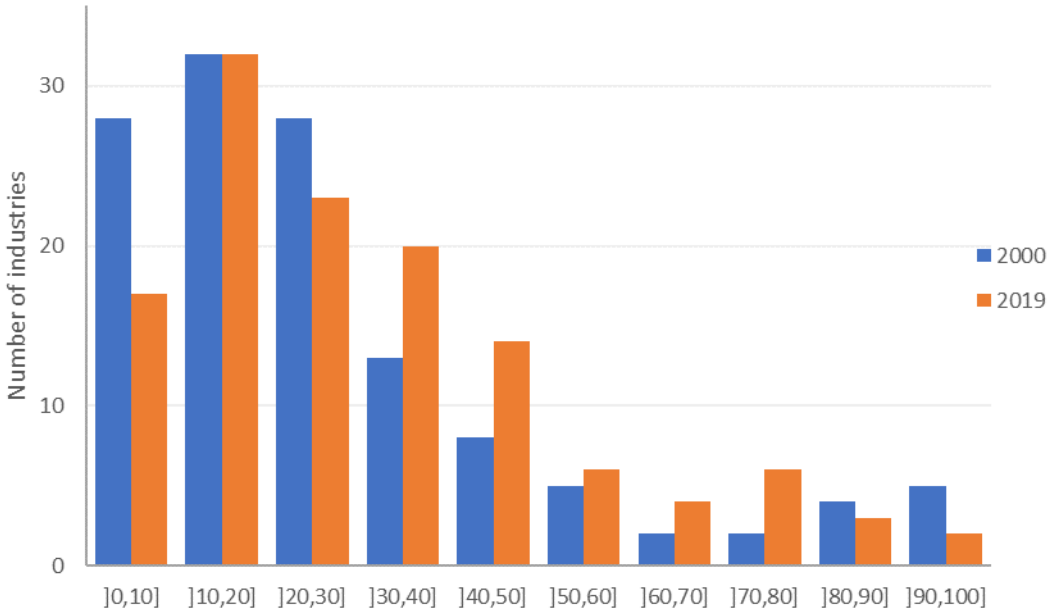


Source: OECD (Calligaris et al., 2024)

As a further illustration of the change in concentration, Figure 7 shows a histogram of all industries by CR4 interval at the beginning (2000) and end (2019) of the sample period. Overall, a higher CR4 suggests a more oligopolistic market structure. This figure therefore implies two things. First, the distribution of industries in the low-to-medium CR4 categories has shifted to the right. While less industries are characterized by a low CR4 (0-30) in 2019 compared to 2000, there is a clear increase in the more concentrated categories. Second, at

the top end of highly concentrated industries – with a CR4 over 80 – the number of industries categorized as such decreased.

Figure 7: Industry concentration – change in CR4 distribution, 2000 vs 2019

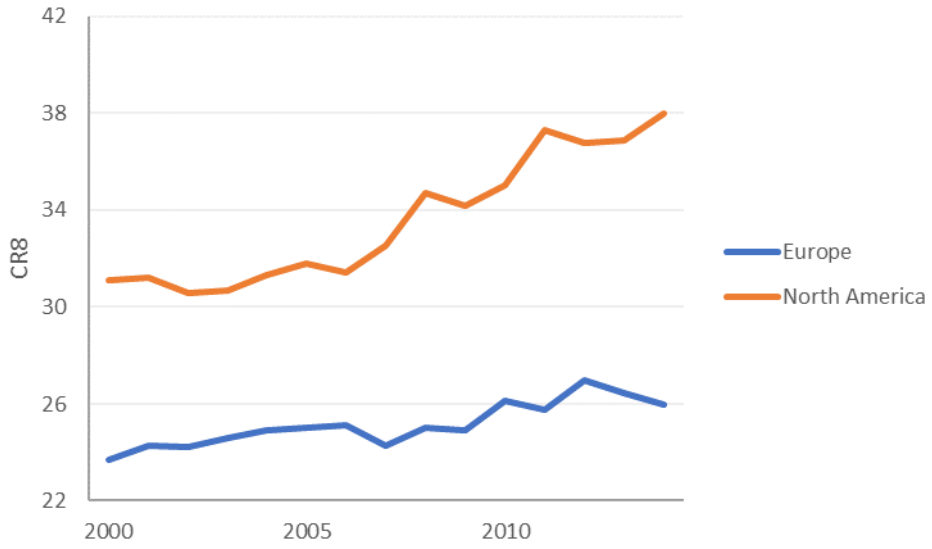


Source: OECD (Calligaris et al., 2024)

These findings therefore suggest a tendency toward oligopolies rather than monopolization, the latter being the limiting outcome in the presence of ever-increasing industrial concentration. A similar finding is reported by Koltay et al. (2023) on industry concentration within the five largest EU economies, who find that there is a convergence in the long run towards a CR4 close to 60.

As a final point, while concentration appears to be increasing across all geographical buckets, it is not clear whether there are any large differences between different economic zones, as the focus is largely restricted to European aggregates, global industries being the exception. The most closely related contribution which compares industry concentration between economic zones is provided by Bajgar et al. (2023), who look at manufacturing and non-financial services in Europe and North America (Canada and the U.S.). Although less granular as industry concentration is calculated at the 2-digit level, this study tries to accommodate business group ownership, as well as the geographical market dimension. Their results are depicted in Figure 8 below, which shows that while industry concentration (as measured by the CR8) increased in both Europe and North America, European trends seem more muted by comparison.

Figure 8: Change in CR8 at the industry level (2000-2014)



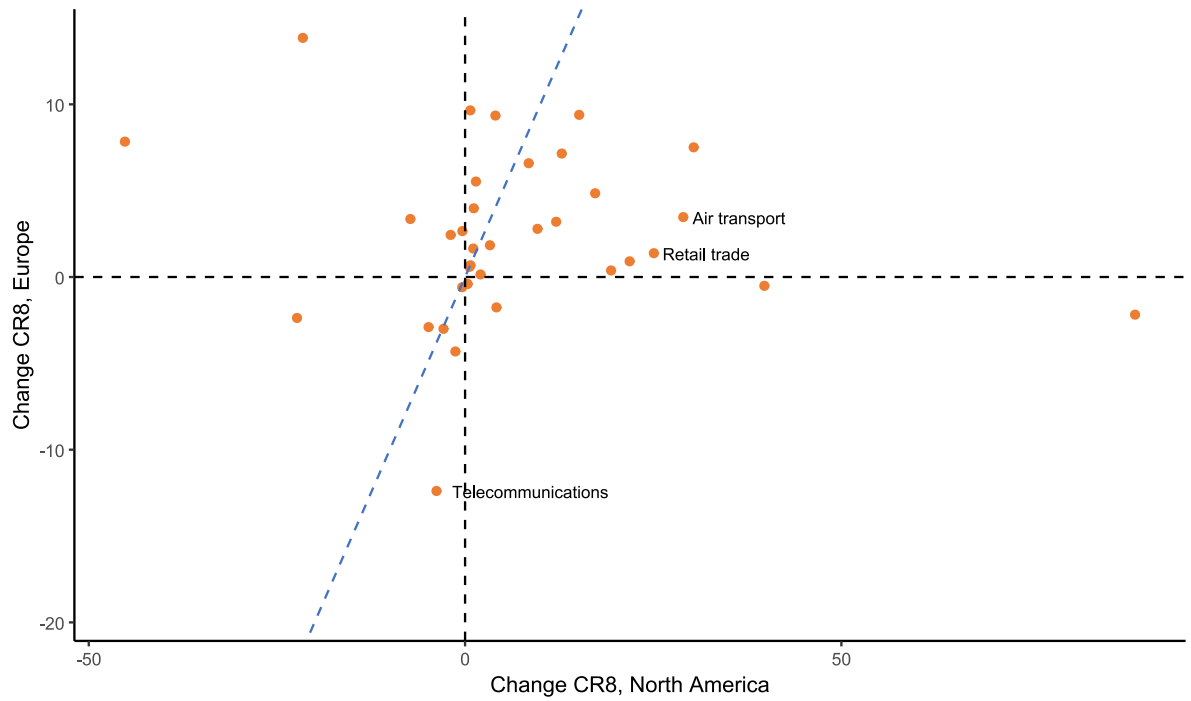
Source: Bajgar et al. (2023), online appendix, Figure B.7, p. 19[62].

A further comparison can be made at the sectoral level, examining changes in cumulative CR8 between 2000 and 2014 for European and North American industries. While some sectors exhibit similar trends[63], the averages reported in Figure 8 hide a lot of heterogeneity. This is visualized in Figure 9 below, where each scatter point represents an industry, depicting the cumulative change in CR8 for that industry in North America (x-axis) relative to the change in Europe (y-axis).

[62] Note: the countries and periods covered are as follows: Belgium (2000–2014), Denmark (2000–2012), Finland (2000–2012), France (2000–2014), Germany (2003–2013), Hungary (2000–2012), Ireland (2006–2014), Italy (2001–2014), the Netherlands (2001–2014), Norway (2000–2012), Portugal (2004–2012) and Sweden (2002–2012).

[63] E.g., textiles, machinery equipment, wholesale trade.

Figure 9: Change in cumulative CR8 at the industry level, by economic zone (2000-2014)



Source: Figure based on data provided by Bajgar et al. (2023), online appendix, Table B.1, p. 20.

The red 45-degree line divides the figure into sectors where concentration either increased more or decreased less in Europe compared to North America (left of the blue line), or vice versa (right of the blue line). The figure is further divided into four quadrants. Most sectors are situated in the upper right quadrant, meaning CR8 increased both in Europe and North America. Most sectors also lie to the right of the blue line (25 out of 38), meaning concentration either increased more or decreased less in North America compared to Europe. In reference to prior work by Philippon (2019), this figure also shows that concentration in air transport and retail increased at a faster rate in North America compared to Europe, and while cumulative CR8 decreased in both the North American and European telecommunications sector, this decrease is much more pronounced in Europe (-12.39) compared to North America (-3.8).

In conclusion, the findings in this section can be summarized as follows:

(1) Over the 2000-2019 period and across the 15 European countries and 127 industries considered, average industry concentration as measured by CR4 increased by about 5 percentage points.
(2) The increase in average concentration was more pronounced in industries competing at the domestic level. The level of industry concentration was also highest in these industries.

(3) In particular, the observed trends present an oligopolistic pattern, with the most concentrated industries exhibiting decreasing trends in CR4, while less concentrated industries experienced the opposite.
(4) As regards the level of industry concentration in the 27 industries competing at domestic level, there seem to be significant differences between countries in Europe. As regards the trends, while industry concentration appears to rise in most countries, it was rather stable in some.
(5) While the research reported here suggests that industry concentration increased in the EU, prior research suggests that average industry concentration in the EU remains at a lower level and has experienced a less pronounced increase compared to its North American counterpart.
(6) Prior research further suggests significant sectoral heterogeneity.

I.2.1.3 FINDINGS ON MARKET CONCENTRATION

In this section, the results on *industry* concentration presented in the previous section are supplemented by a presentation of *market* concentration ratios, using Euromonitor data on 330+ consumer facing (B2C) markets in a range of EU and non-EU countries.

While almost all studies on concentration trends employ industry-level data (mostly due to data availability), there are two notable exceptions: for Europe, Affeldt et al. (2021) study concentration on antitrust markets using market share information from merger review cases. In the U.S., Benkard et al. (2021) measure concentration using market share estimates based on survey data, which provided information on what brands were purchased by consumers. Both arrive at a similar conclusion, as they find concentration levels which far exceed what prior research using industry shares would suggest. However, while Affeldt et al. (2021) find increasing concentration trends for Europe, Benkard et al. (2021) document a decrease in U.S. concentration.

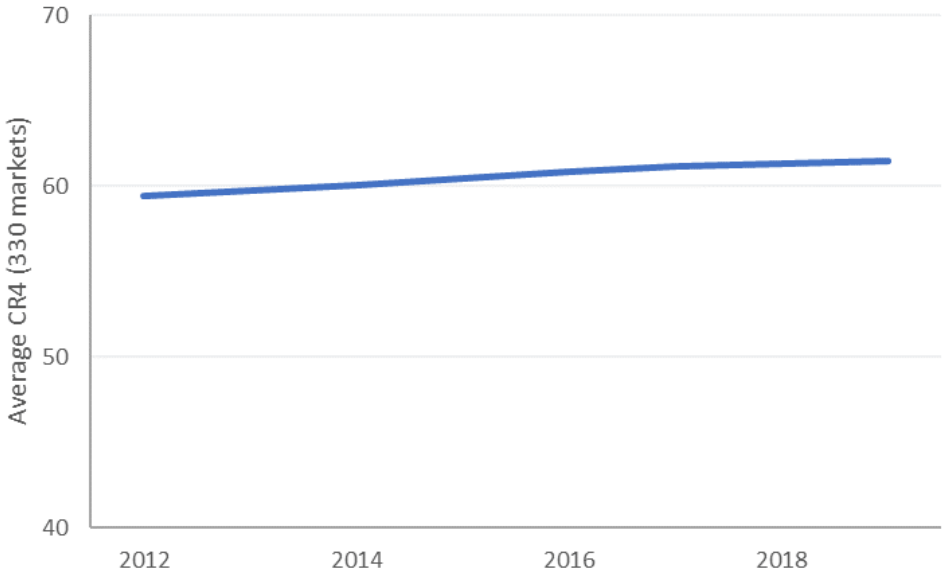
While clearly valuable, there are some limits to the methodologies employed in both contributions. In the case of Affeldt et al. (2021), problematic merger cases (in concentrated markets) are likely overrepresented in the sample, introducing selection bias. Benkard et al. (2021) measure concentration in the U.S. using market share estimates based on survey data on what brands are purchased by consumers in a range of categories. However, as these surveys are somewhat limited in scope, it cannot be ruled out that there exist discrepancies between the estimates and actual market shares[64].

The Euromonitor dataset employed in this part of the analysis circumvents these issues, as it provides direct information on retail level sales revenue shares for a large number of consumer-facing (B2C) markets, thereby allowing for the calculation of concentration

[64] For instance, while survey data provide info on *which* brands a consumer purchased, it does not provide information on the *quantity* purchased by each individual consumer. Hence, the assumption is made that all consumers purchase an identical amount of each brand which may be a serious limitation.

indices at market level. In parallel to the work on industry concentration, the main metric employed here is the CR4. As a starting point, Figure 10 provides a market-level counterpart to the broader industry concentration depicted in Figure 2 at the beginning of the previous subsection. As shown by the picture below, average EU market concentration (measured as the unweighted average[65] CR4 in eight EU Member States where data on all 330 consumer markets is available) appears to be around 60%. It also appears to have increased slowly over the period (with CR4 increasing on average about 0.25 percentage points annually).

Figure 10: Average CR4 at market level, EU-8 (unweighted, 2012-2019)



Source: Euromonitor. Unweighted average CR4 in the EU-8 countries (France, Germany, Spain, Italy, Sweden, Poland, Romania and the Netherlands) across 330 markets; own calculations.

The above figure provides for an EU average. It is interesting to zoom in and consider the actual level of market concentration across the eight different EU members states, and to compare these to other jurisdictions such as the UK, U.S., Canada, Japan and South Korea. Figure 11 below provides a between-country comparison of market concentration, presenting the distribution of 325 product markets over three different concentration categories.

A distinction is made between:

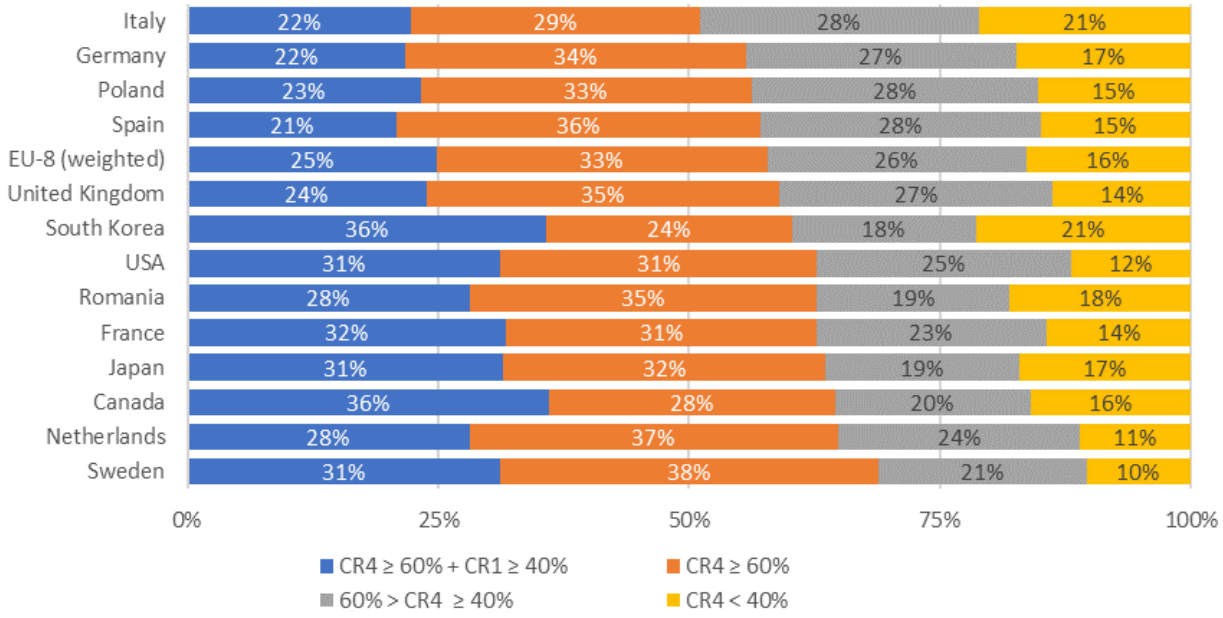
(1) markets in which the CR4 is below 40%, which are, throughout this section, considered as unconcentrated.

[65] The unweighted average refers here to the average CR4 of the eight EU Member States being unweighted (i.e. with country CR4s non-weighted by population size). Later in this subsection also the weighted average CR4 (with country CR4s weighted by population size) will be presented.

(2) markets with a CR4 between 40% and 60%.
(3) markets in which the CR4 is above 60%, which are considered as concentrated[66].

Within this latter category, a further distinction is made between markets with and without a potentially dominant firm. In EU competition practice, if a single firm possesses a market share below 40, it is unlikely to be dominant in the sense of Article 102 TFEU, whereas above that market share, dominance starts to become a real possibility. Consequently, a specific subcategory consists of concentrated markets (with CR4 over 60%) and, in addition, a CR1 over 40%. One can consider this subcategory as concentrated markets with one (or more) potential dominant firm(s).

Figure 11: Distribution of 325 markets by concentration category, per jurisdiction (2019)



Source: Euromonitor, own calculations

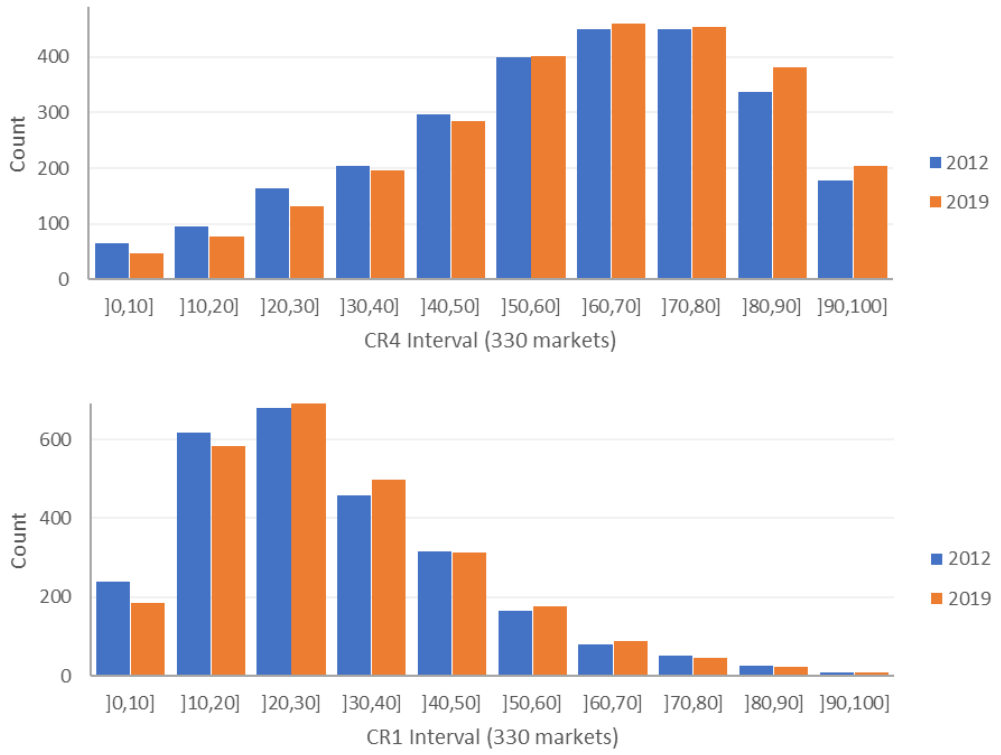
The main takeaways from this figure are twofold: (i) over half of all studied markets can be categorized as concentrated, with concentration levels therefore far exceeding corresponding estimates at industry/sector level[67], and (ii) there are large differences between the various countries included in the analysis. This figure also includes the market

[66] Further examples of competition authorities which maintain similar criteria in their reports on competition are the South African Competition Authority in their 2021 report on industry concentration (see Competition Commission South Africa (2021), pp. 6-7), as well as German competition law, which contains a presumption of joint dominance if three or fewer companies have a combined market share of 50% or more or if five or fewer companies have a combined market share of two-thirds (i.e. 66.6%) of the relevant market. This classification is further comparable to the one adopted in the 2023 U.S. merger guidelines, which consider markets to be highly concentrated when the Hirschman-Herfindahl index (HHI) exceeds 1 800. When comparing HHIs and CR4s for the various markets in the Euromonitor dataset, a CR4 over 60% roughly appears to correspond to a HHI of around 1 600-1 800.
[67] In line with Affeldt et al. (2021) and Benkard et al. (2021).

distribution for the EU-8 as a whole, which depicts the average fraction of markets assigned to each category, weighted by population size. The majority (58%) are considered concentrated, although it should be noted that the non-European countries included in the analysis, as well as the UK, are characterized by a higher degree of concentration.

Figure 12 depicts the change in concentration over time by comparing the distribution of the EU-8 markets by CR4 and CR1 in 2012 with 2019. This histogram shows that concentration seems to have increased somewhat along the entire length of the distribution, as there is a shift to the right in both CR4 and CR1. In turn, this suggests a (weak) tendency towards more oligopolistic/monopolistic markets and an increased risk of dominance over the eight-year period considered.

Figure 12: Distribution of EU-8 markets by concentration ratios (CR4, CR1) – 2012 versus 2019



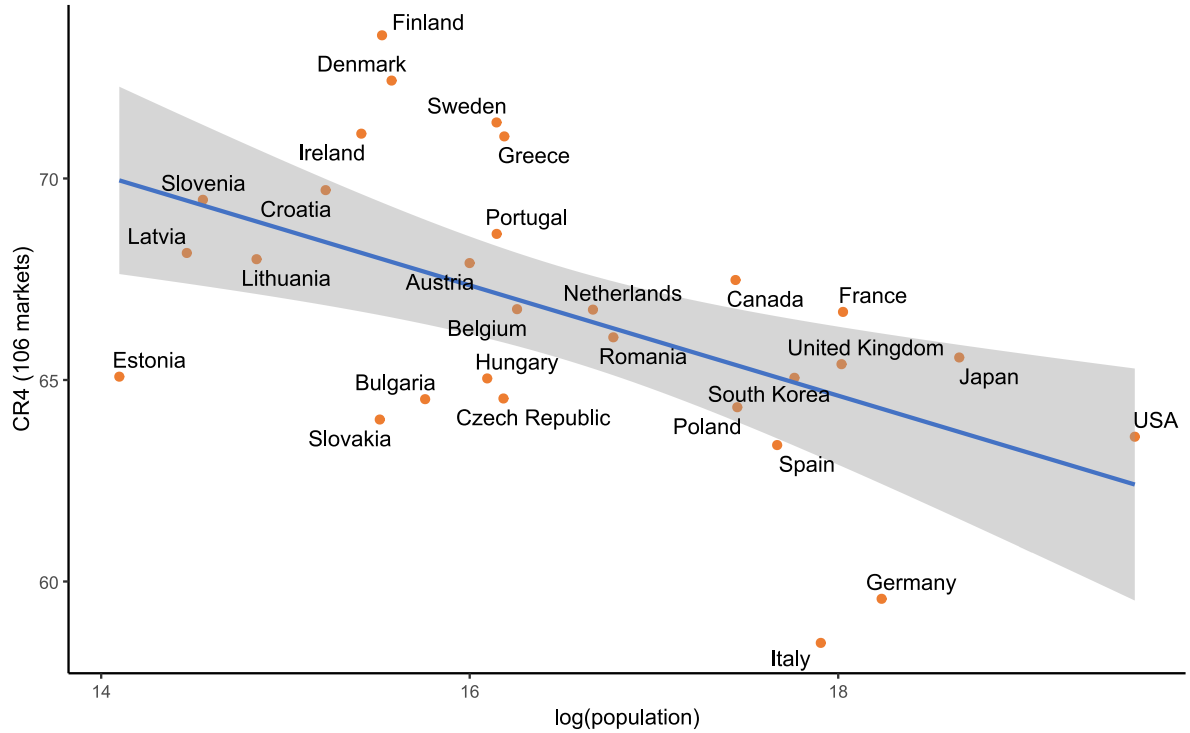
Source: Euromonitor; own calculations.
Note: as the market coverage changes over time, markets which were not consistently covered in both 2012 and 2019 were dropped, reducing the market count to 330.

Importantly, the between-country comparison in Figure 11 also shows that while high concentration is quite ubiquitous within the observed markets, some countries exhibit a lower degree of overall concentration compared to others. However, caution should be exercised when comparing concentration at the country-level for at least two reasons.

First, smaller markets in terms of sales revenue tend to allow for less competing firms and substitutes, which in turn suggests higher concentration levels. Consequently, an inverse relation between concentration and market size exists[68]. Second, a positive relationship between country size, as measured by the number of potential consumers (population) and revenue on each individual market exists.

Combined, this suggests that smaller countries in terms of population size will – on average – exhibit a tendency towards higher concentration. It is therefore important to consider how this scale effect plays out when comparing concentration indices between different countries. Figure 13 below elaborates on this point, as it depicts the relation between average concentration at country-level, as measured by average CR4 across all markets, against the logarithm of population size[69].

Figure 13: The relation between country population (logarithmic transformation) and CR4, all countries, 2019



Source: Euromonitor; own calculations. Note: as this figure includes all countries in the dataset for expositional purposes, the number of markets is reduced to 106. A similar result is obtained using the EU-8 sample of 325 markets in 2019.

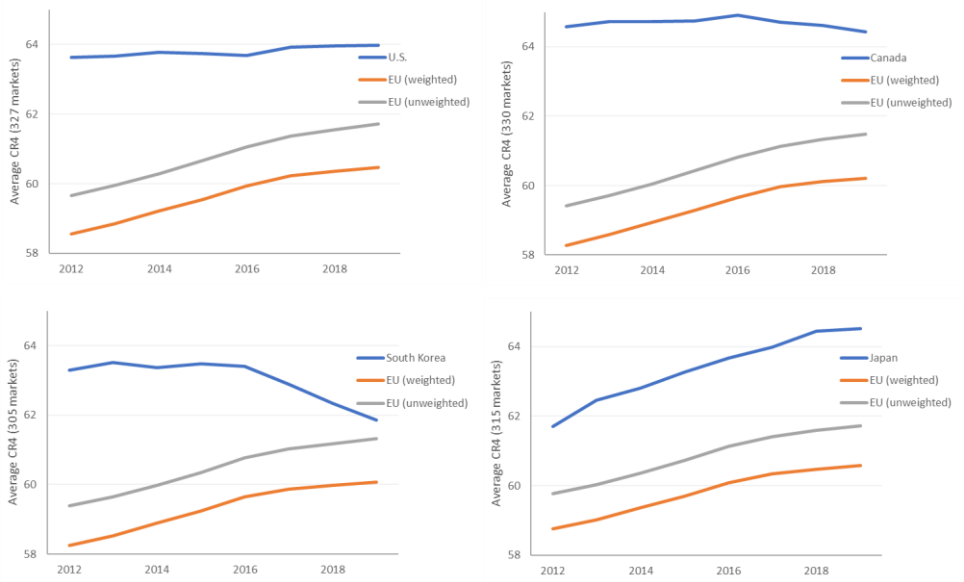
[68] For empirical studies which support this statement, see Schmalensee (1989). Regressing market size in terms of revenue on CR4 (including market and time fixed effects) as it emerges from the Euromonitor dataset yields a statistically significant and negative relation between both.

[69] It might be argued that population is not the proper metric for market size, as the number of potential customers is not purely related to demographics, but rather disposable income and purchasing power. As a robustness check, the analysis was therefore repeated using GDP (or the logarithm thereof) as a measure of market size, yielding an almost identical figure. Lastly, expanding the sample size in the market dimension by dropping countries which provided lower market coverage and solely including the EU-8 did not confound the relationship.

Based on this figure, some countries appear quite unconcentrated given their size, and vice versa. In the case of Europe there are two noteworthy outliers, with Italy and Germany appearing less concentrated given their size. This is however not the case for France, which is situated well above the trend line. This finding reflects Koltay et al.'s (2023) work on industry concentration, whose results show that France and the UK exhibit higher concentration compared to Spain, Italy and Germany, suggesting that data on industry shares is able to capture these differences. Another interesting aspect to point out is that while some EU member states seem to be more concentrated than average given their size, this is also the case for the included non-EU states, all of which are located above the red line (even if some remain within the confidence bound).

One way to take country size into account is to consider a weighted average of concentration, in which a higher weight is given to larger countries, thereby attenuating any scale effects due to differences in relative market size within countries. Figure 14 compares both the weighted and unweighted average CR4 for the EU-8 with average CR4's in the four non-European economies included in the dataset: U.S., Canada, Japan and South Korea[70]. As can be seen, while the CR4 in the EU-8 is overall lower in comparison, this gap is both negligible, as well as decreasing over time in case of all but Japan. Furthermore, in contrast to Benkard et al. (2021), concentration in U.S. consumer markets does not seem to decrease, but rather stays flat over the studied period.

Figure 14: Average CR4 trends, a comparison between the EU-8 average, population weighted and unweighted, and other economic zones (2012-2019)



Source: Euromonitor; own calculations. Note: As market coverage changes depending on the comparison, so does the average CR4 at the European level.

[70] This weighted average was obtained by first calculating average CR4 at the country-level. Next, a weighted sum was taken, in which the weight assigned to each CR4 was dictated by that country's fraction of total population size.

The previous results suggest that EU-8 markets are both quite concentrated and that concentration is increasing somewhat over time, although there are large discrepancies within Europe and, comparatively speaking, concentration levels are still below those in other jurisdictions.

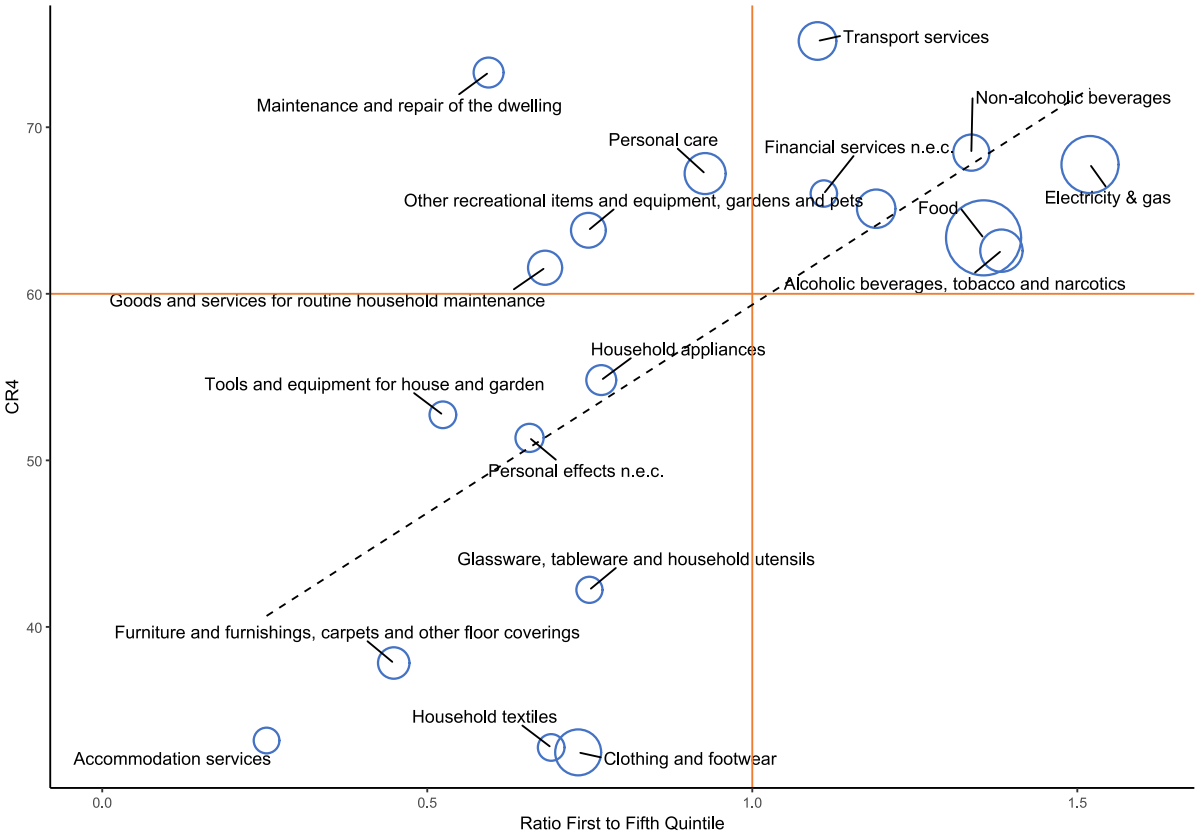
Using data on consumption expenditure patterns by income decile, Davies and Mariuzzo (2022) show that – in the UK – poorer households tend to be relatively more exposed to concentration compared to richer households, as they spend a larger fraction of their budget in concentrated markets. While merely a descriptive fact, it could suggest that poorer households are drawing the short end of the stick if concentration negatively impacts competition. In a comparable exercise, Eurostat data on household expenditure by income quintile was used to see if European markets exhibited a similar tendency[71]. For each quintile it reports the percentage of total expenditure on various categories, based on the classification of individual consumption by purpose (COICOP).

Although there is no perfect overlap between the markets and industries within the Euromonitor dataset and the various COICOP categories, there was sufficient overlap to assign a CR4 to seventeen categories, which together made up on average 44% of total expenditure by the poorest households[72]. Figure 15 below reports the corresponding CR4 for these categories on the y-axis, based on Euromonitor data. On the x-axis, it depicts the ratio of expenditure between the first (poorest) and fifth (richest) quintile. This gives an indication of the relative importance of the product categories for the households in question. A ratio above one implies that poorer households spend a larger fraction of their budget on a given category compared to the richest households. A ratio below one means the opposite. Consequently, all categories to the right of the vertical line are of higher relative importance to the poorest households.

[71] See Eurostat's household budget survey database.

[72] The COICOP reports expenditure shares on 12 categories at the 1-digit level, which are further divided into subcategories at the 2- and 3-digit level. However, while household expenditure by quintile was reported at the EU-27 level for the 1-digit categories, this was not the case for the subcategories. In this case, data was provided for France, Germany, the Netherlands, Spain, Poland, Romania and Sweden, but not Italy. As a result, expenditure shares on the various categories are an average of the expenditure shares of the individual countries, weighted by population. For concentration, the reported CR4 starts from the revenue weighted average CR4 for each included category at the country level, as these can consist of multiple markets. The displayed CR4 was obtained by taking a population weighted average of the country-level CR4s. Lastly, it should be noted that Euromonitor does not research the gas and electricity markets. As a result, concentration data was obtained from the Council of European Energy Regulators (CEER), which provides information on CR3s for the household segment in 2018. While for confidentiality reasons the exact figures cannot be obtained for each individual country, CEER reports that in 2018 fifteen countries had a CR3 above 70 in the case of electricity and twelve in the case of gas, which therefore provides a reasonable lower bound. It can further be seen that in the case of HHIs, the majority of countries exceeded (by far) the high concentration threshold of 2 500 (CEER (2019), pp. 20-21).

Figure 15: Concentration and relative exposure, richest versus poorest European households, 2019



Source: Euromonitor; own calculations based on Eurostat's household budget survey database.

The horizontal line indicates when the CR4 exceeds 60%, suggesting concentrated markets. As can be seen on this graph, most categories belong to either the bottom left quadrant or the top right quadrant. In turn, this figure suggests that categories which are of high relative importance to poorer households tend to be more concentrated, and vice versa, as the categories tend to be clustered in the bottom left and top right quadrants. To further illustrate this, a linear trend line was added, which is upward sloping, indicating a positive correlation between concentration and relative importance to poorest households.

In conclusion, the findings in this section can be summarized as follows:

(1) In the EU-8, the majority of the consumer facing (B2C) markets covered by the Euromonitor dataset are considered concentrated (a CR4 over 60%).
(2) Average concentration levels in consumer facing markets in the EU-8 markets are lower compared to the U.S., Japan, Canada and South Korea.
(3) There are significant differences between Member States, even when controlling for country size. Average concentration is remarkably low in Germany and Italy and comparatively high in France, the Nordic countries, Ireland and Greece.

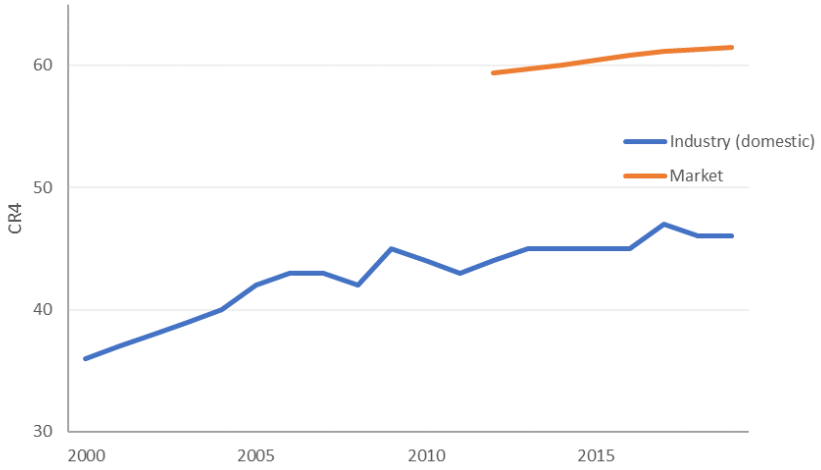
(4) During the relatively short period covered by the dataset (2012-2019), average market concentration slowly increased in the EU while it remained relatively stable in the U.S.
(5) In terms of sectors, concentration is particularly high in product markets which matter most for poorer households, e.g. food, energy.

I.2.1.4 RELATION BETWEEN INDUSTRY AND MARKET CONCENTRATION

The imperfect overlap between markets and industries has led some to question how informative studies on industry concentration are with respect to actual market concentration[73]. In this section, the results obtained using both industry- and market-level data are compared in an attempt to shed some light on this issue.

It is found that – in terms of magnitude – market concentration is far higher compared to industry concentration, although both datasets exhibited increasing average trends. This is visualized in both Figure 16 and Figure 17 below, which depict, respectively, the average CR4 at EU level and the distribution of CR4s, each time for both industries and markets. Many industries are characterized by a CR4 below 30, whereas only a small fraction of markets belongs to this category.

Figure 16: Comparison of concentration trends in the EU using both industry and market level data



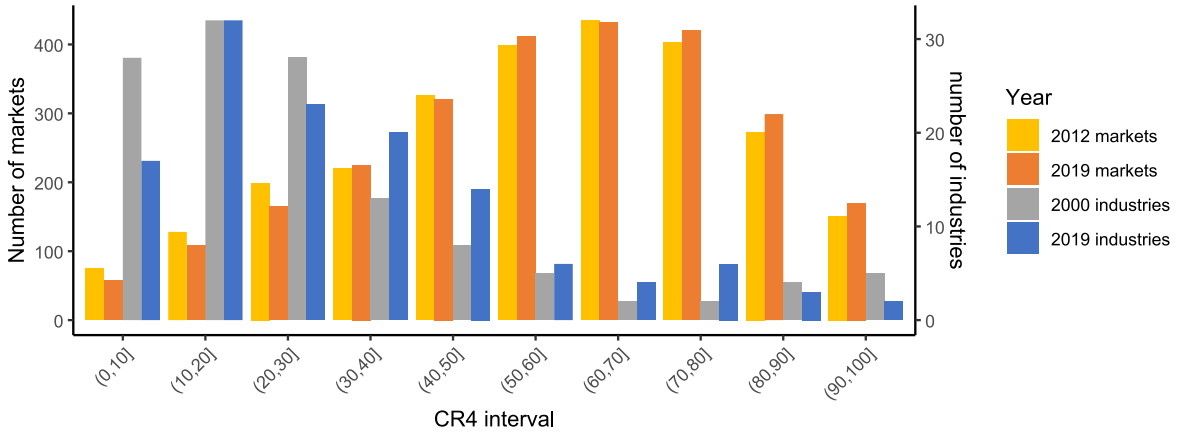
Source: Euromonitor; OECD (Calligaris et al., 2024); own calculations. Note: as the Euromonitor markets were assumed to be national in nature, the comparison is made between average concentration in these markets in the EU-8, and the industries in which competition was assumed to take place at the domestic level.

There is little doubt that the explanation for these findings is to be found in industry classifications tending to be broader compared to narrowly defined product markets. This aggregation tends to 'blend' or 'wash out' high market shares held by firms in individual

[73] See Shapiro (2018) and Werden and Froeb (2018). See also Berry et al. (2019).

markets[74]. Overall, the distribution of markets by CR4 is slightly left skewed, meaning most observations are clustered around higher levels of concentration. The opposite holds in the case of industries, the distribution of which is right skewed.

Figure 17: Histogram of industry and market concentration in the EU – a comparison



Source: Euromonitor; OECD (Calligaris et al., 2024); own calculations

One finding which is present in both datasets is that concentration did increase over time (even if it should be noted that market share concentration could only be calculated over a shorter time span). However, while market concentration appears to have increased (somewhat) along the entire length of the distribution, industry concentration trends suggest a tendency towards oligopoly and a convergence to high, but not monopolistic, concentration levels (taking into account the averaging effect of industry shares).

Importantly, there is no perfect overlap between the industries and markets in both datasets. To make both samples more directly comparable, work by OECD (Calligaris et al., 2024) maps 371 markets from the Euromonitor database to 46 NACE industries. The idea behind this exercise is to investigate whether more concentrated markets are part of the more concentrated industries for the period and geographies for which both datasets overlap[75].

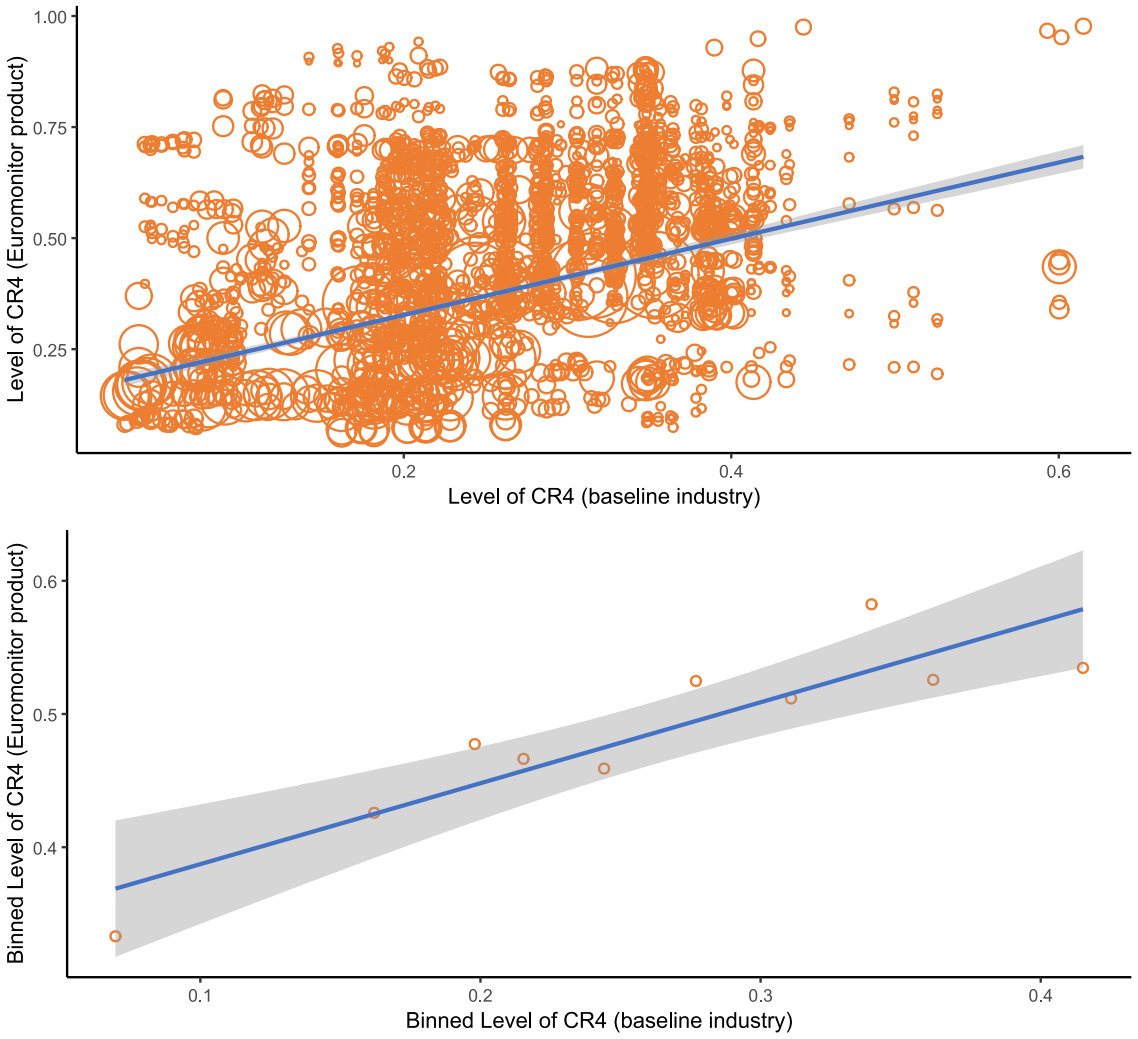
The upper panel of Figure 18 below depicts the relation between industry CR4 on the x-axis and the CR4 for the corresponding markets on the y-axis. The size of the circle indicates the value of the product market in total sales revenue. The blue line is the average relation between industry and market CR4, with a higher weight attached to more important

[74] Even at the level of industry concentration across different levels of aggregation, the data shows that concentration levels for industries measured at the 4-digit level were higher compared to their 3-digit counterparts.

[75] The countries included in the sample are Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Norway, Poland, Portugal, Slovenia, Spain, Sweden and the UK; the period considered is 2012-2019.

markets, as measured by sales value. This figure therefore shows that there is a positive correlation between industry and market concentration[76]. The lower panel further clarifies this relation, as it depicts a binscatter plot. For each decile of data, this plot depicts the average CR4 at the industry level, as well as the corresponding weighted average CR4 at the market level. In doing so, a positive correlation between both can be discerned[77].

Figure 18: The relation between market and industry CR4, weighted by market size (top), binned weighted average by decile of data (bottom)



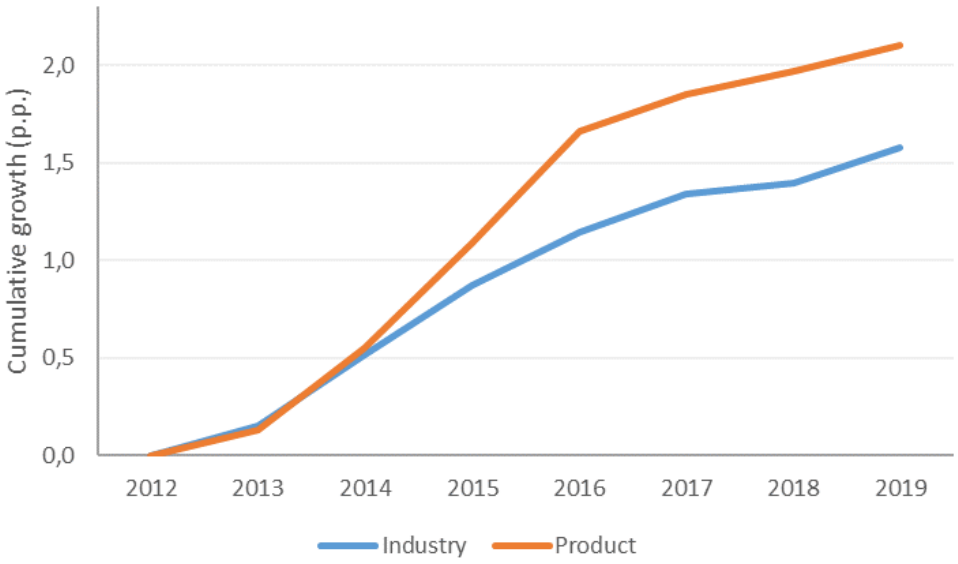
Source: OECD (Calligaris et al., 2024). Note: The slope of the unweighted regression line in the non-binned regression is 0.55; the slope of the weighted regression line is equal to 0.858.

As an additional exercise, trends in both industry concentration and concentration in the corresponding markets are compared. In Figure 19, the average of industry concentration at country level (weighted by size) is compared to the average (weighted) market

[76] The slope of the unweighted regression line is 0.55 and statistically significant, whereas the slope of the weighted line is equal to 0.858.
[77] See also Cattaneo et al. (2024).

concentration across product markets and countries for the markets which correspond to the included industries. As can be seen, market concentration and industry concentration exhibit similar trends, although market concentration appears to have increased faster compared to industry concentration. While far from perfect, these comparisons demonstrate that there is a strong positive correlation between industry and market concentration, suggesting that studies on the evolution of industry concentration are able to shed light on the evolution of market concentration.

Figure 19: Concentration trends in industries and product markets, weighted (2012-2019)



Source: OECD (Calligaris et al., 2024). Note: In this analysis, all industry concentration were calculated at the domestic level, to allow for comparability between the datasets. Each line depicts the unweighted average of CR4 cumulative growth.

In conclusion, the findings in this section can be summarized as follows:

(1) Average concentration at the product market level is higher than at the associated industry level. In other words, concentration measured at industry level tends to underestimate concentration observed at the product market level.
(2) Product market concentration is strongly correlated with industry concentration; suggesting studies on the evolution of industry concentration are able to shed light on the evolution of market concentration.

I.2.2 BUSINESS DYNAMISM

Although the findings on industry and market concentration both suggest that aggregate concentration is increasing over time, they neither shed light on the underlying drivers behind these trends, nor the resulting implications for market power and competition.

Most notably, several contributions to the literature suggest that the observed concentration trends are most likely attributable to a reallocation or selection effect, with efficient firms adopting practices and innovations which allow them to capture the market (referred to as a 'winner takes most' dynamic). These include intangible investments, successful business models and logistical networks, which all might, in principle, benefit the consumer[78]. Yet this does not rule out the possibility of these firms entrenching their newfound position at the top, resulting in increased inertia and reduced dynamism[79].

A decrease in business dynamism can be considered a worrying evolution regardless of the underlying cause, be it technological innovations or lax merger enforcement, as entry and exit are key drivers of innovation. Creative destruction, which occurs when innovative firms employ new technologies and business models to disrupt the existing market – leading to the decline of outdated practices and firms – plays an important role in driving economic growth, productivity, and development (Aghion and Howitt, 1992). In the U.S., Decker et al. (2016) argue that in the 80s and 90s, successful startups grew 31 percent faster than the median firm, but the share of these high growth young firms started to decline around 2000. Disney et al. (2003) find – using UK data on manufacturing firms – that exit, entry and changes in market shares account for 80-90% of productivity growth.

Recent contributions have hypothesized the existence of a link between observed trends in concentration and business dynamism. For instance, the same efficiency-enhancing innovations which are singled out as one of the key driving forces behind increased concentration might now be serving as effective barriers to entry and competition.

De Ridder (2024) proposes a theoretical model in the style of Sutton (1991), in which intangible investment reduced variable production costs at the expense of higher fixed costs, allowing the most efficient adopters to undercut their rivals and capture the market, after which sunk fixed costs and intangibles serve as an efficient barrier to entry[80]. In turn, this results in decreased business dynamism as industries and markets become increasingly characterized by the same select group of entrenched firms. Evidence of increased entrenchment is provided by Bessen et al. (2020), Calvino et al. (2020) and Bajgar et al. (2023).

Even highly concentrated markets can be considered contestable if there is sufficient threat by entrants. However, Covarrubias et al. (2020) provide evidence for a sequential scenario, in which so-called 'good' concentration through selection paved the way for 'bad' concentration, with firms using their dominant positions to stifle competition and increase

[78] See, for example, Bessen (2020), Crouzet and Eberly (2019), and Autor et al. (2020).

[79] See for instance Aghion and Howitt (2022) or Akcigit and Ates (2023). Indeed, Autor et al. (2020) conclude that '[N]othing in our analysis rules out this mechanism, and we regard it as an important area for subsequent research and policy'.

[80] At the micro-level, several studies document a similar mechanism. For instance, Collard-Wexler and De Loecker (2015) find that innovation resulting in lower fixed costs in the steel industry both increased entry and reduced markups. The opposite holds for Ganapati (2021) and Miller et al. (2022), where innovations which reduced marginal costs are accompanied by higher concentration.

rents. They further argue that there is evidence for this type of dynamic on U.S. markets, but less so in Europe[81]. This section adds to the literature by examining business dynamism and entrenchment within European industries and markets.

The economic literature proposes several methods to quantify entrenchment. Bessen et al. (2020) examine the rate of leapfrogging and displacement in the U.S., which is the year-on-year likelihood of an outsider firm entering the top 4 of a market or industry, or an incumbent dropping out, respectively. They document a decline in both rates from 2000 onward, which is found to be inversely related to rising investment in intangibles and proprietary software. Bajgar et al. (2023) arrive at a similar conclusion using variation within the top 8 at the industry-level in the U.S., Japan and Europe.

The next section attempts to measure dynamism at the top of industries by providing a measure of entry/exit and the likelihood that whoever is at the top retains its position. It does so by documenting the number of firms which were part of the top 4 for two consecutive years, referred to simply as **entrenchment**. Consequently, entrenchment can range from four (more entrenched) to zero (more dynamic) for any given year.

One issue with entrenchment, leapfrogging and displacement is that these metrics might hide a lot of variation at the top. Although the top 4 or 8 might stay unchanged in name, a great deal of reshuffling could still suggest intense competition between the market leaders. A number of alternative metrics which take this consideration into account are therefore employed, namely **rank persistence** and **market share instability**.

The former assesses relative changes within the top 4 and 8 by assigning firms a rank based on their market share. This allows for the calculation of the probability that ranks change year-on-year. A lower probability means higher rank persistence, indicating a more stable ranking and reduced dynamism among the top firms.

The latter examines the stability of market shares within the top ranks by calculating the average relative change in market shares held by the top firms each year. This metric provides insights into how consistent market shares are within the top, documenting overall stability or volatility. High volatility suggests that there was a significant change in importance among the market leaders. Conversely, a reduction in market share instability indicates less movement at the top, suggesting lower business dynamism.

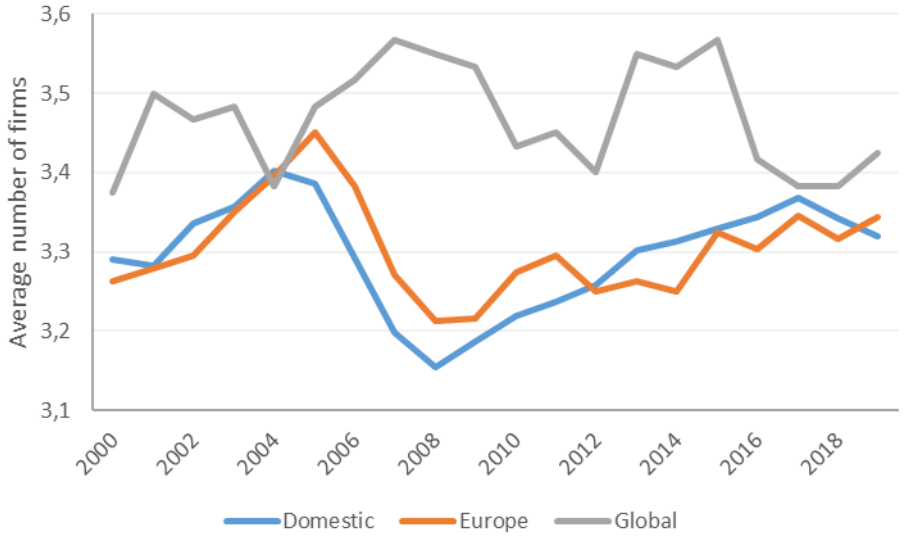
I.2.2.1 ENTRENCHMENT AT THE TOP – INDUSTRY LEVEL

Figure 20 plots the yearly unweighted average of entrenchment across industries in each geographical bucket, i.e. the average number of firms in an industry top 4 for a given year

[81] Nonetheless, Biondi et al. (2023) provide evidence of a structural aging of economic activity in Europe, whereas Bijnens and Konings (2020) show that from 2000 onward, start-up rates in Belgium declined and small firms experienced lower growth. Other examples include Calvino et al. (2020) and Citino et al. (2023).

that were present in the top four the preceding year[82]. On average, more than three firms that were in the top 4 for any given year remain there the next. Overall, there is a relatively high level of persistence in the entrenchment rate in all the geographical buckets. Industries competing at the global level have higher persistence on average compared to industries competing at the domestic and European level. In addition, for industries competing at the domestic and at the European level, the entrenchment measure slightly decreased between 2005 and 2008, to restart increasing after 2008 to the pre-2005 levels, while for global industries the measure remained fairly stable across the sample period.

Figure 20: Entrenchment across geographical buckets (2000-2019)



Source: OECD (Calligaris et al., 2024). Note: The y-axis depicts the average number of number of firms that were in the top 4 in year t-1 and remain in the top 4 in year t. As such, it is bounded between 0 and 4.

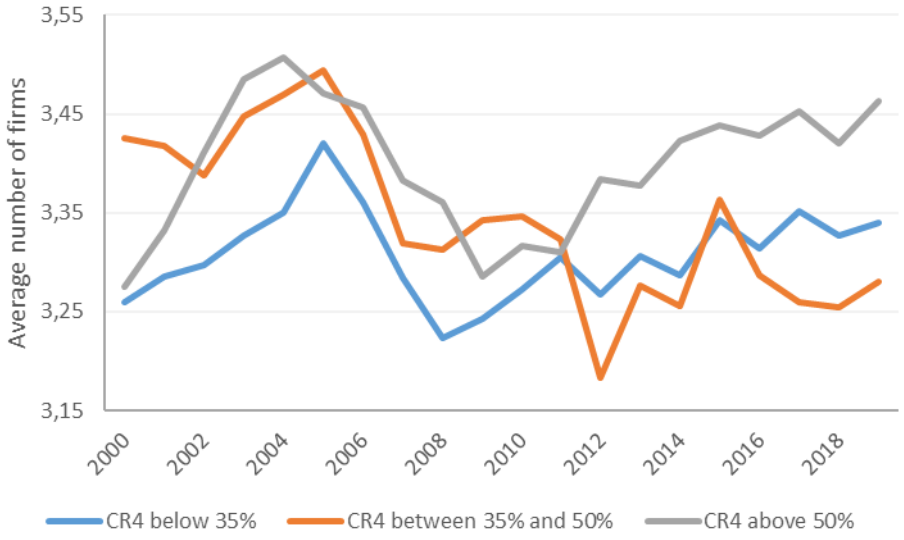
Another interesting (although perhaps straightforward) characteristic of trends in entrenchment becomes apparent when it is considered jointly with concentration. Figure 21 reports the entrenchment measure across different intervals of concentration. Two main features emerge: (i) average entrenchment is slightly higher in more concentrated industries[83], (ii) while average entrenchment declines in markets with levels of concentration between 35% and 50%. It shows a mildly increasing trend in weakly concentrated industries, and a more pronounced increase in strongly concentrated industries starting around 2009. Higher entrenchment in more concentrated industries

[82] Note: the chart shows the unweighted average across industries (and countries, for the domestic bucket) of entrenchment in the top 4 firms between 2000 and 2019. Industries included in the analysis are a mix of 2- and 3-digit industries belonging to mining, manufacturing, utilities, and non-financial market services and are classified as either domestic, European, or global, depending on the taxonomy. The countries included in the sample are Belgium, Denmark, Germany, Finland, France, Greece, Hungary, Spain and the UK.

[83] As industry concentration levels are overall smaller compared to market concentration levels, the introduced cut-off differs, differentiating between industries with a CR4 below 35%, between 35-50% and above 50%, compared to 40% and 60% in the case of markets.

implies that churning occurs more rarely at the top in these industries, and thus that it may be easier for leader firms to create barriers to competition.

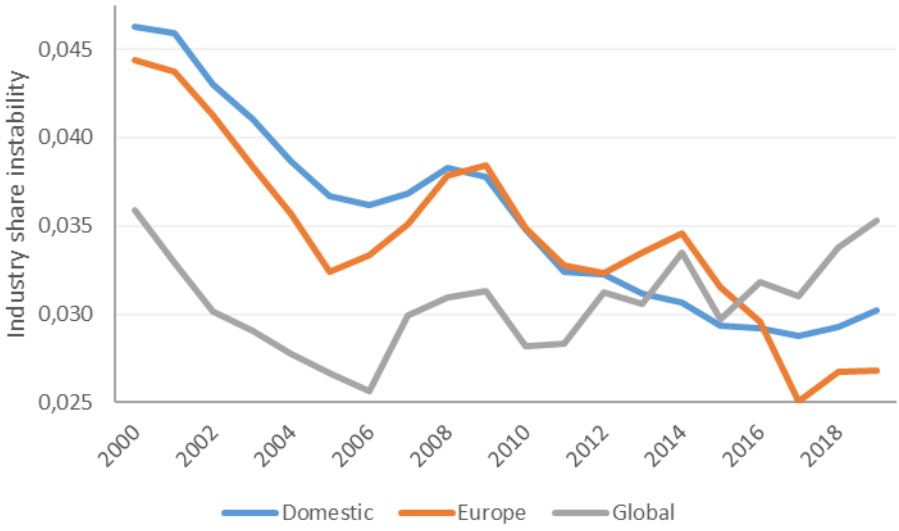
Figure 21: Entrenchment by concentration level (2000-2019)



Source: OECD (Calligaris et al., 2024). Note : The y-axis depicts the average number of number of firms that were in the top 4 in year t-1 and remain in the top 4 in year t. As such, it is bounded between 0 and 4.

Figure 22 below explores market share stability within the industry top 4. This chart depicts the unweighted average market share stability, differentiating between the different geographic buckets. In contrast to the more nuanced trends in entrenchment, market shares within the top 4 seem to have become more stable over time across all industries except for those competing on a global scale, although market share instability is lower within this segment.

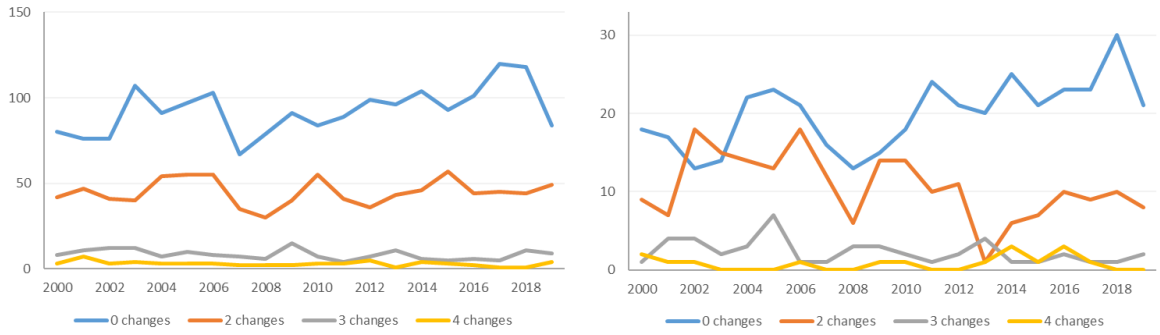
Figure 22: Industry share instability across geographical buckets (2000-2019)



Source: OECD (Calligaris et al., 2024)

Even if there are few changes among the firms that are in the top 4, a market could be highly contestable if there is high competition within the top and these firms constantly challenge each other. Evidence on this is reported in Figure 23 below. In these figures, the focus is on industries competing at the domestic level with zero entry in the top 4 and on industries competing at the European level with no new firms in the top 4, respectively. The figures report the number of rank changes within the top 4 of industries, with the market leader being assigned rank one, the second largest firm rank two, and so on. Zero changes implies that there have been no rank changes at the top.

Figure 23: Number of changes in the top 4 ranking in markets with no entry into the top 4, domestic (left) and European (right), (2000-2019)



Source: OECD (Calligaris et al., 2024)

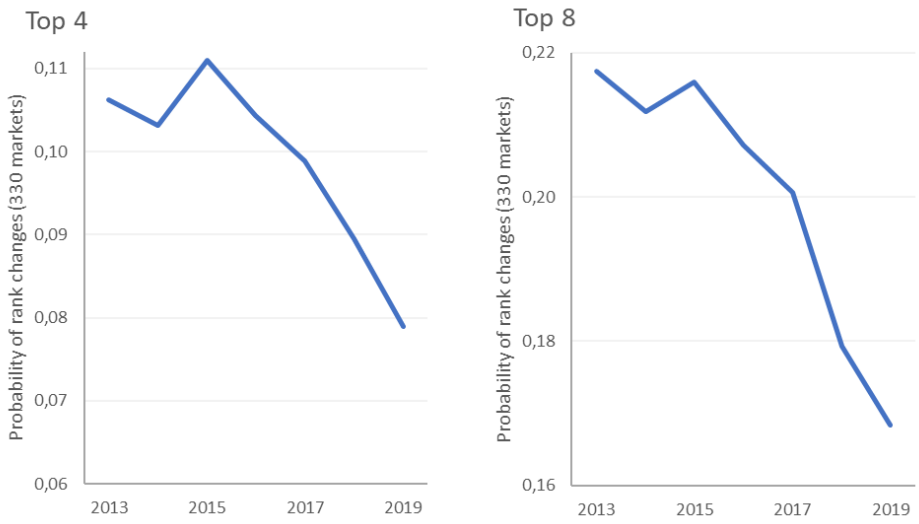
Taken together, the increasing trend of zero changes within the top 4 compared to the others reported in the same figures suggests that, increasingly often, not only is there no

change in the top 4 group composition, but the ranking of the firms remains constant (suggesting low ranking contestability). Overall, the evidence reported so far on entrenchment and rank persistence suggest some lack of dynamism at the top, both with few firms contending the top 4 positions and low levels of contestability among the market leaders.

I.2.2.2 ENTRENCHMENT AT THE TOP – MARKET LEVEL

At the B2C market level, based on the Euromonitor dataset, an increasing trend in entrenchment can be discerned as well, although the sample length considered is more limited in comparison to the industry level data employed by OECD (Calligaris et al., 2024). Figure 24 reports the change in rank persistence across the EU-8 markets, which is the probability that a firm in the top 4 or eight of a market changes its position year-on-year. As mentioned, relative rank changes within the top of a market suggest the presence of competition between the top firms as well as firms dropping in and out of the top 4/8, with a high probability suggesting a more contestable market.

Figure 24: Rank volatility within top 4/8, EU-8 (2013-2019)

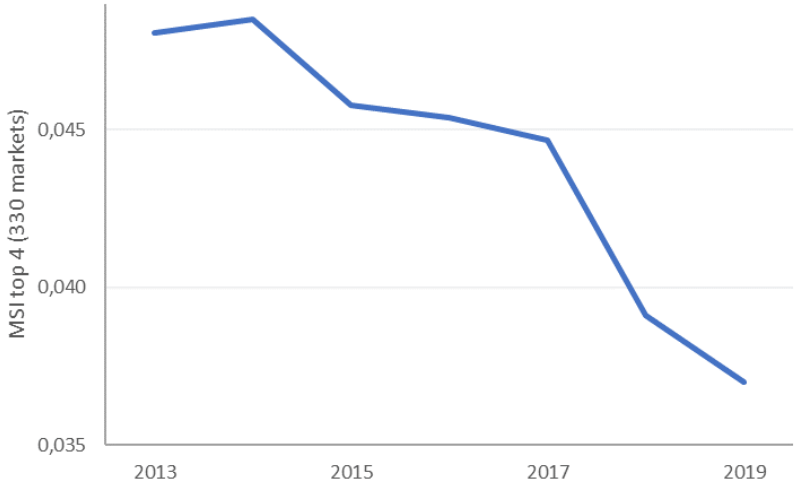


Source: Euromonitor; own calculations

This figure shows that this probability exhibited a downward trend, decreasing quite steadily over time, both within the top 4 and top 8 of markets. In turn, this suggests a less dynamic environment. Furthermore, in line with the analysis at industry level, market share instability was examined as presented in Figure 25. A low degree of instability suggests reduced dynamism, meaning this downward trend is consistent with a decrease in dynamism. Taken together, the downward trends presented in Figure 24 and Figure 25 are therefore consistent with an increase in entrenchment over time within the observed

markets. For a more in-depth discussion on how both indicators are constructed, see Annex 2.

Figure 25: Market share instability within top 4, EU-8 (2013-2019)



Source: Euromonitor; own calculations

I.2.2.3 ENTRY AND JOB REALLOCATION

Two more aspects can be considered when examining dynamism. Job reallocation rates are often thought of as an indicator of business dynamism as they reflect economic flexibility, as well as an increased rate of job creation and destruction (which is typically associated with more dynamic economies characterized by high rates of entry and exit). Similarly, high job reallocation suggests a smooth transfer of inputs (labour) from more to less efficient firms and are suggestive of limited labour market power.

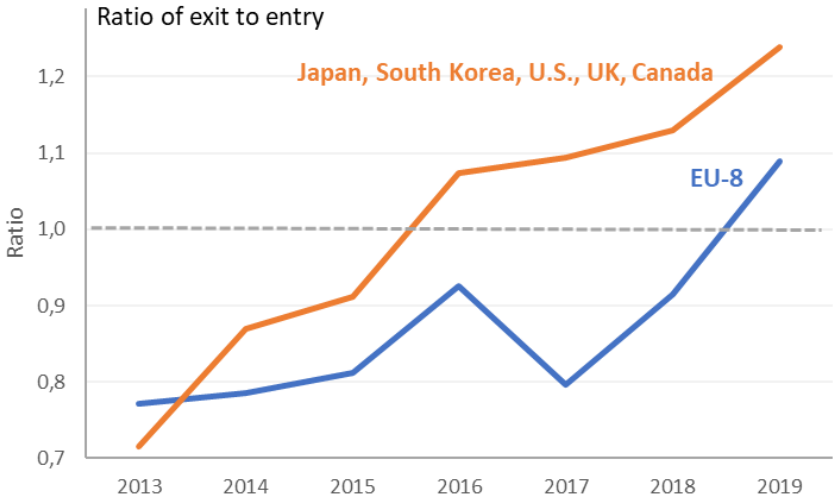
Biondi et al. (2023) examine job reallocation as a measure of business dynamism. They document a decline in the European job reallocation rate, which is especially driven by larger firms, accompanied by a structural aging of economic activity, as the share of young firms is decreasing.

Lastly, but closely related, the ratio of entry to exit and aging of economic activity can be considered an important indicator of dynamism. Several contributions document a decrease in firm entry[84]. As a final indicator, Figure 26 below therefore considers the ratio of exit to entry within the B2C markets studied using the Euromonitor dataset. Once the ratio of exit to entry exceeds one, this suggests an ageing of economic activity if persistent. Indeed, in the EU-8 this ratio is increasing, although at a slower rate compared to the non-European markets included in the dataset. A similar finding was reported by the White House

[84] Examples include Furman and Orszag (2015, 2018), Bijnens and Konings (2020), Decker et al. (2016).

economic advisors, as they documented a steady decrease in entry rates, combined with stable exit rates, from 1977 to 2012 based on U.S. census data[85].

Figure 26: Ratio of firm exit to entry, a comparison (2013-2019)



Source: Euromonitor; own calculations

As mentioned, an important hypothesis put forward in the literature is that the observed slowdown in business dynamism – be it decreased startup rates, reduced job reallocation or a lower probability of displacing incumbents – can be (at least in part) attributed to a 'winner takes most' dynamic. It seems straightforward that concentration and entrenchment at the top are closely linked. If market shares are highly dispersed across active firms, even small changes might result in an overhaul of the top 4. If the top firms control a vast share of the market, displacement becomes difficult by construction.

Indeed, Bajgar et al. (2021) focuses on three variables to explore the churning of the top firms: the share of firms that are in the top 8 but were not in the top 8 in the previous year, the rank correlation between the market shares of top 8 firms over two years, and the market share instability. Using data for a sample of OECD countries, they show that increased concentration is associated with reduced churning among the top firms, namely with less entry of new firms at the top and more rank persistence of the leading firms.

An often-heard argument is that concentration is not an issue as long as markets remain contestable, which exerts a disciplining effect on incumbents. However, in Canada, there is increasing stability among firms' industry rank and less entry accompanied by increased concentration (Competition Bureau Canada, 2023). Similarly, using Euromonitor data, higher concentration in the EU-8 was accompanied by an increase in the ratio of exit to entry. As a final point, while movements in and out of the top 4 or 8 of a market will tend to decrease

[85] Council of Economic Advisors (2016).

by construction as the CR4 or CR8 increases, this is not necessarily the case for movements within the top. Based on Euromonitor data, it was found that the probability of rank changes within the top of EU-8 markets decreased as markets became more concentrated[86].

In conclusion, the findings in this section can be summarized as follows:

(1) Research on entrenchment at the level of the leading four firms per industry suggests that entrenchment at the top:
   a. is relatively high, in particular in more concentrated sectors.
   b. has further increased between 2008 and 2019 in industries competing at the domestic and European level.
(2) Research on rank persistence and market share volatility within the top of industries and markets suggests a reduction in dynamism, both at the industry and B2C market level.
(3) Research on entry and exit rates as well as on job reallocation rates suggests both a decrease in labour market dynamism, as well as reduced entry relative to exit.

I.2.3 MARKUPS AND PROFITS

Various contributions to the economic literature have suggested that markups are increasing across industries and economic zones. As can be seen in the overview table below, however, there exist large discrepancies among the various reported estimates in the literature, which are partly related to the studies in question relying on diverse datasets and employing various estimation methodologies:

Table 1: Summary of markup changes identified in the literature, by geographical area and other relevant dimensions

Paper	Geographical area	Markup change range	Time horizon	Aggregation level
Bighelli et al., 2023	15 European countries	Increased from 1.18 to 1.19 (+1 p.p.)	2009-2016	Firm-level
Cavalleri et al., 2019	Germany, France, Italy and Spain	Fairly stable around 1.13-1.14 (+1 p.p.)	1980-2015 (macro estimates) 2006-2015 (micro estimates)	Sectoral and aggregate
Ciapanna et al., 2022	Italy	Up to 2.7 p.p. reduction after liberalization reforms	2008-2013	Aggregate
Weche and Wambach, 2021	EU28	Around 2.31 but unstable around economic crisis years	2007-2016	Firm-level
Forni et al., 2010	European countries	Reduced from 1.61 to 1.35 (-26 p.p.)	1996–2006	Service sector
Eggertsson et al., 2021	USA	Increased from 1.12 to 1.22 (+10 p.p.)	1970-2018	Aggregate
Gutierrez, 2018	USA	Increased from 1.15 to 1.21 (+6 p.p.)	1980-2014	Sectoral
Hall, 2018	USA	Increased from 1.12 to 1.27 (+15 p.p.)	1988-2015	Sectoral
De Loecker et al., 2020	USA	Increased from 1.18 to 1.67 (+49 p.p.)	1960-2014	Firm-level
Konczal and Lusiani, 2022	USA	Increased from 1.26 to 1.72 (+46 p.p.)	1955-2021	Aggregate and Industry
Nekarda and Ramey, 2020	USA	Increased from 0.97 to 1.07 (+10 p.p.)	1980-2013	Sectoral

[86] This was done using a logit regression of the probability of rank changes on concentration as measured by CR4, controlling for time, country and market fixed effects. The correlation was statistically significant at the 0.01 level.

Traina, 2018	USA	Increased from 1.10 to 1.15 (+5 p.p.)	1950-2016	Firm-level
Akgicit et al., 2021	Advanced economies, emerging markets	Increased by 35 p.p.	1980-2016	Aggregate
IMF, 2019	27 Advanced and Emerging economies	Increased from 1.28 to 1.36 (+8 p.p.). Advanced economies increased by 7.7%, emerging economies by 1.8%	2000-2015	Aggregate
Díez et al., 2021	20 countries (USA, Russia, Japan, Korea and an heterogenous selection of EU countries)	Increased from 1.22 to 1.29 (+7 p.p.)	2000-2015	Aggregate
Díez et al., 2018	74 countries	Increased from 1.11 to 1.58 in the U.S. (+47 p.p.). Fairly stable in emerging economies around 1.38	2000-2015	Firm-level
De Loecker and Eeckhout, 2018	Global, Europe	Increased from 1.1 to 1.6 globally (+50 p.p.) and from 0.98 to 1.63 in Europe (+65 p.p.)	1980-2016	Firm-level
Christopoulou and Vermeulen, 2008	8 European countries and USA	No significant change in markup (with exception of Austria and a few sectors)	1981-2004	Sectoral
Calligaris et al., 2018	25 high-income countries (EU, U.S. and others)	Increased from a log-markup of 0 to a log-markup of 0.8	2001-2014	Firm-level

Source: Lear et al. (2024)

As indicated, the large discrepancies are due in part to these studies relying on diverse datasets and employing various estimation methodologies. In addition, and similar to the earlier discussion comparing market and industry concentration, differences can arise when data is aggregated. For instance, Hall (2018) finds an increase of 15% based on sectoral data, compared to the 49% increase for De Loecker et al. (2020) at the firm-level. However, the latter demonstrate that when they aggregate their firm-level data at the industry level, a similar figure compared to Hall (2018) is obtained for the average increase in markups over a comparable period[87]. Lastly, the studies presented here span different time horizons. As will be discussed in the section on what might be driving these changes, patterns differ when comparing the period from 1980-1999 compared to 2000 onwards, when globalization and digitization begin to take off. Hence certain discrepancies are to be expected.

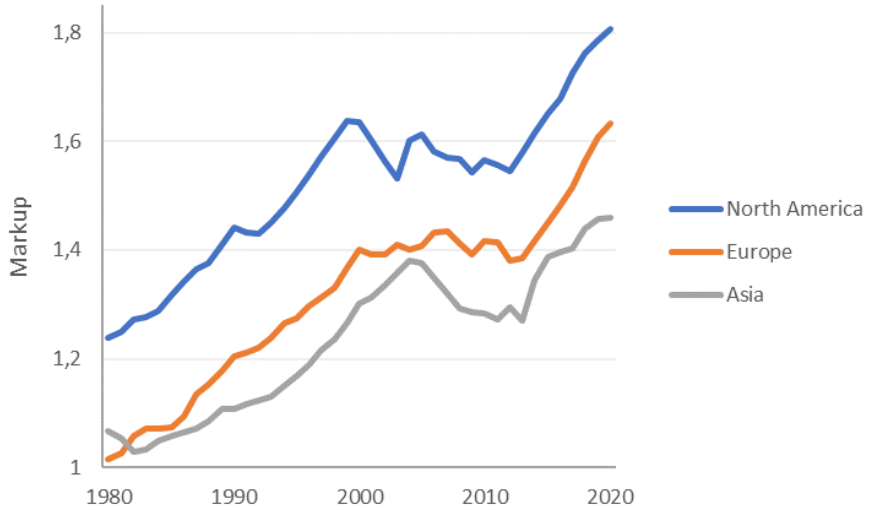
Nonetheless, it seems that – in line with the literature on concentration – evidence on rising markups in the U.S. is more consistent compared to Europe[88]. Moreover, in the limited number of papers performing *direct* comparisons among jurisdictions, it appears that while markups are increasing in Europe, they are still below their U.S. counterparts[89]. For instance, De Loecker et al. (2020) provide a comparison between the markup trends across economic zones, as presented in Figure 27.

[87] As will be discussed more in detail in this subsection, markup growth primarily seems to take place at the top of the markup distribution resulting in increased skewness. It follows from Jensen's inequality that aggregating a nonlinear function can yield different results, with these differences becoming more pronounced the more skewed the underlying distribution. For a more elaborate discussion, see De Loecker et al. (2020).

[88] Further papers not included in Lear et al.'s (2024) review include De Ridder (2024), who finds increasing trends in France, while evidence from the Netherlands reveals a flat trend (Van Heuvelen et al., 2021). Research on Spanish markups found an increase (2004-2009) followed by a decrease (2009-2017) over time, see García-Pereas et al. (2021).

[89] See for instance Díez et al. (2018) or De Loecker et al. (2020).

Figure 27: Aggregate markup by global region



Source : De Loecker and Eeckhout (2021)

However, while the relationship between markups and market power is more clear-cut in economic theory compared to concentration, there are some drawbacks. First, marginal costs are unobserved and therefore need to be estimated, which is a data-intensive process[90].

Second, it has been argued that rather than suggesting malfunctioning competition, higher markups might be the result of a change in the primitives underlying competition[91]. De Loecker et al. (2020) document a rise in markups across a panel of U.S. firms, but importantly note that higher markups only shed light on part of the story. For a nuanced discussion on the potential causes of rising markups, see Berry et al. (2019). Most importantly, a decrease in marginal cost due to technological innovations which are accompanied by an increase in investment, R&D expenditures and other fixed costs could result in higher markups, lower prices and increased consumer welfare[92].

Investigating markups in isolation therefore introduces the risk that (i) whatever increasing trends are observed are not the result of higher market power and (ii) might even benefit the consumer if they are accompanied by lower (quality adjusted) prices. Recent work by Conlon et al. (2023) suggests that while markups may have increased, this increase seems not to have been caused by higher prices. De Loecker et al. (2021) show that if the rise in markups is driven by reallocation of activity towards the most efficient firms as suggested by Autor et al. (2017), there is a welfare trade-off between reduced prices due to efficiencies on the one hand, and these efficient firms establishing a position of market

[90] See Ackerberg et al. (2015) or Berry et al. (1995).
[91] See Berry et al. (2019).
[92] See De Loecker et al. (2021). For instance, De Ridder (2024) finds that in the case of French firms, there is evidence to suggest that the fixed cost share of total costs has grown over time.

power, allowing them to extract higher markups which are not competed away, causing a loss of consumer welfare.

Within such a framework, it can also be noted that a gap in markups between the EU and the U.S. does not have to be necessarily be interpreted in a positive light, as it could reflect either merely a different mix of industries in either jurisdiction with the U.S. economy having relatively more industries in which markups increased more (e.g. Software, Internet services) or suggest that there is a widening gap in the development of technology and firms, with U.S. companies capitalising and innovating faster[93].

One important question is therefore the following: if higher markups are the result of lower variable production costs at the expense of higher fixed costs, has this change in cost structure offset any gains firms might experience? Should this be the case, a divergence might have occurred in profit trends relative to changes in the markup. In addition to evidence on markup trends (Section I.2.3.1), this section therefore further presents evidence on the relation between markups and profits (Section I.2.3.2).

I.2.3.1 MARKUPS

Based on OECD (Calligaris et al., 2024), this section presents evidence on the change in average markups in 204 sectors across 23 European countries from 2000 to 2019[94].

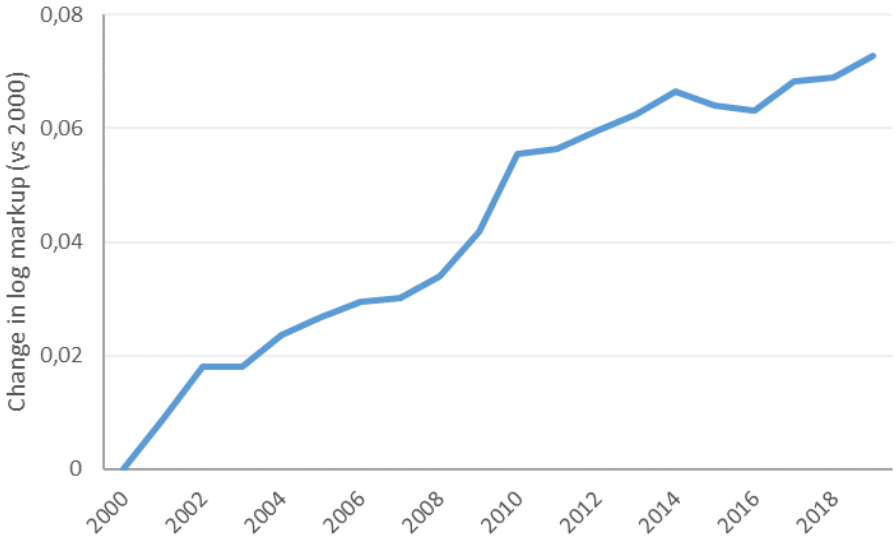
As mentioned, marginal costs are typically unobserved and therefore require estimation. The markups presented in this section are estimated in OECD (Calligaris et al., 2024) using the De Loecker and Warzynski (2012) production-side approach, which yields an estimate of the markup at the individual firm level[95,96]. Throughout this section, trends in the markups are depicted as the change in the logarithm (log) of the markup over time relative to the start of the sample, which is approximately the percentage growth rate since 2000. Consequently, a change (difference) in the log markup over time of +0.01 is approximately equal to a 1% increase in the markup over time.

As a starting point, Figure 28 presents the average (unweighted) change in EU firm-level log markups over time as found in OECD (Calligaris et al., 2024). Markups grew on average

[93] For instance, a report by the European Policy Analysis Group refers to Europe being stuck in a middle-technology trap, necessitating a boost in innovation spending.
[94] Countries included: Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the UK. The number of sectors studied (240) is larger than the number of sectors studied for the concentration analysis (127) due to stricter data limitations for the latter.
[95] The functional form for the production function employed in the estimation procedure is a Cobb-Douglas production function with three inputs (capital, materials and labour). Raw materials are assumed to be the flexible input. For more information on the estimation procedure, see OECD (Calligaris et al., 2024).
[96] It should be mentioned that other approaches towards estimating markups, notably the demand approach, have also been pursued in the literature (on specific sectors), leading to other and sometimes lower estimates.

about 7% from 2000 to 2019, a finding which is in line with work by Calligaris et al. (2018) and Díez et al. (2021)[97].

Figure 28: Growth of average firm level markup (2000-2019, unweighted)



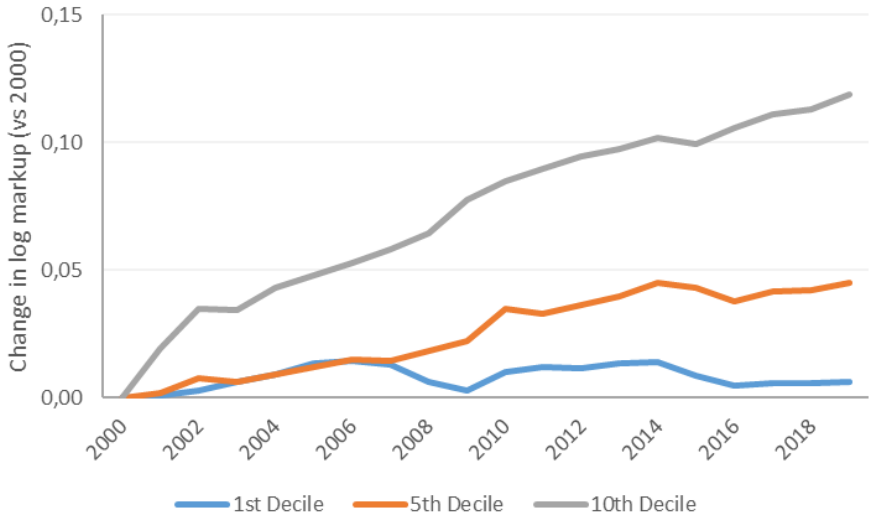
Source: OECD (Calligaris et al., 2024); Note: This figure shows log changes of unweighted average markup across firms in the sample. It plots log markups and indexes the 2000 level to 0. Hence the vertical axis represents log-differences from the starting year and approximates percentage growth rates.

Prior work has suggested that the increase in the average markups is largely driven by firms at the top of the markup distribution, i.e. those firms that charge the highest markups overall[98]. Figure 29 therefore breaks down the changes in the average unweighted markup along the markup distribution, distinguishing between the top (10th) decile, the 5th decile and the firms with the lowest markup (1st decile). In line with previous findings, the increasing trend is largely situated in the top decile (±12% increase compared to 2000). In the bottom decile, by contrast, trends are flat.

[97] While not displayed here, the average markup (at firm level) over the timeframe considered was 1.22 for the 204 sectors and 23 European countries considered, with a median of 1.07 (OECD (Calligaris et al., 2024), Table A A.10). At the level of the 127 sectors for which concentration data are available (and which are used for the assessment of the scorecard), the average markup over the timeframe considered was 1.23, ranging between 1.02 and 2.09, and a median of 1.18 (see OECD (Abele et al., 2024), Table 3.2). For illustrative purposes, a 7% relative increase in the markup (price-to-marginal cost ratio) is suggestive of an increase in net terms (i.e. deducting for marginal cost) in the order of 40-50%, assuming the average markup went from ca. 1.18 (in 2000) to 1.26 (in 2019).

[98] See for instance De Loecker et al. (2020) and Calligaris et al. (2018) or Autor et al. (2020).

Figure 29: Growth of average firm level markup in different parts of the distribution (2000-2019)

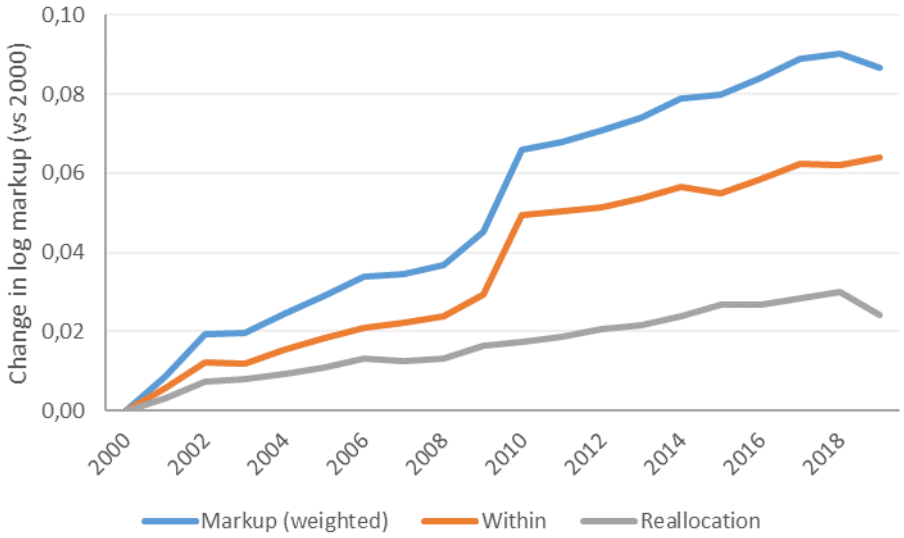


Source: OECD (Calligaris et al., 2024) Note: This figure shows log changes of unweighted average markup in the chosen part of the distribution of markups. It plots log markups and indexes the 2000 level to 0. Hence the vertical axis represents log-differences from the starting year and approximates percentage growth rates.

While the average change in unweighted markups across all industries seems consistent with other findings in the literature, it should be considered that any negative impact on consumer welfare will also depend on which industries exhibit increasing markups. If markup growth is primarily situated in industries with a relatively small share of GDP, an average across all industries might present an overly pessimistic view, especially as this average growth could coincide with lower markups in more economically significant sectors.

In order to account for industry size, the change in weighted average markups can be considered, where industry averages are weighted by their respective gross output to obtain a weighted average across industries. This change is depicted in Figure 30 (blue line), which reveals that accounting for 'industry importance' results in an 8.6% increase in the average markup since 2000, which is bigger than the increase in the average unweighted markup.

Figure 30: Growth of average firm markup (weighted) and its decomposition (2000-2019)



Source: OECD (Calligaris et al., 2024); Note: the figure plots log markups and changes in their components and indexes the 2000 level to 0. Hence the vertical axis represents log-differences from the starting year and approximates percentage growth rates.

The fact that accounting for industry size leads to a more substantial rise in the average markup suggests two potential mechanisms: (i) either industries with a greater gross output experienced a pronounced markup surge, or (ii) industries that charged higher markups to begin with saw an increase in their gross output relative to low markup industries.

In order to see which of the two mechanisms dominates, the change in markups is decomposed into a 'within' component – which is the fraction of change in the average markup due to markup changes within industries while keeping output unchanged – and a 'reallocation' component, which is the change due to variations in relative output, keeping markups constant over time[99]. It is found that changes in the weighted markup are largely due to an increase in markups within industries, rather than reallocation of business from low to high markup industries. Taken together, Figure 29 and Figure 30 are consistent with findings by De Loecker et al. (2020), the latter figure suggesting that the increase in markups is not driven by one specific industry, e.g. technology, but rather a more general phenomenon.

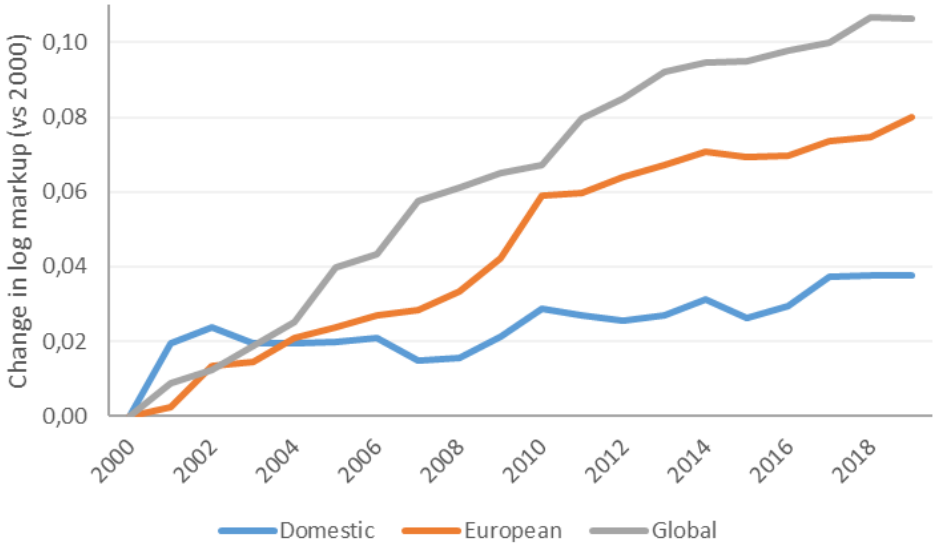
Given the geographical taxonomy assigned to various industries, it is possible to calculate the change in markups within different geographical buckets[100]. Doing so shines a light on whether changes in markups were situated in more globalised industries, as globalization and economic integration have been considered possible drivers of increased market power.

[99] The methodology employed to perform this decomposition is the same as the one employed by Haltiwanger (1997) and De Loecker et al. (2020).

[100] This is done by calculating the average firm-level markup at the industry level across the 23 geographies included. Importantly, this means that Korean, Canadian and U.S. firms are not included in the analysis.

Indeed, Figure 31 below does indicate that the largest increase (±11% since 2000) was situated in those industries where competition was found to take place at a global scale. The industries which were assigned to the domestic category (and therefore assumed the least open to trade) saw the most limited increase in the average markup.

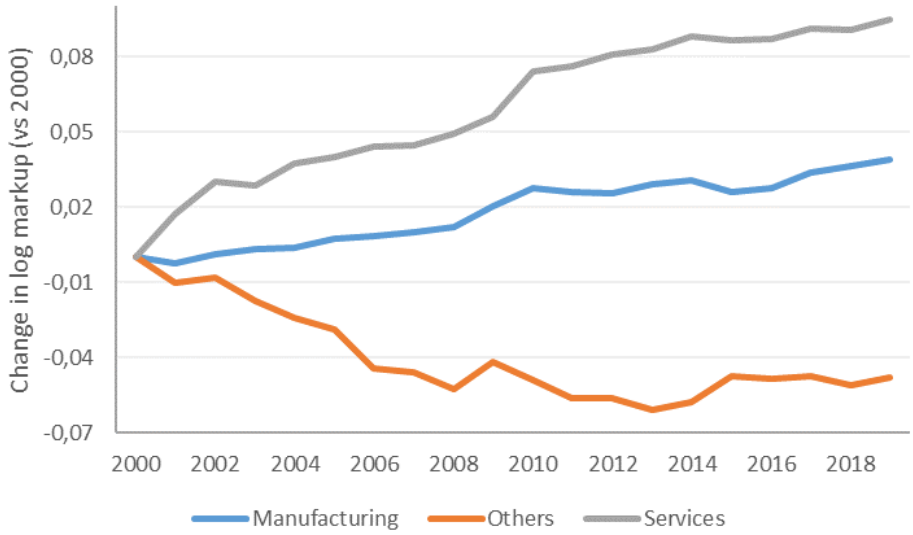
Figure 31: Markup growth across geographical buckets (2000-2019)



Source: OECD (Calligaris et al., 2024); Note: the figure plots log markups and changes in their components and indexes the 2000 level to 0. Hence the vertical axis represents log-differences from the starting year and approximates percentage growth rates.

As a final consideration, OECD (Calligaris et al., 2024) performs an exercise similar to the one undertaken by Calligaris et al. (2018), who examine whether or not markup growth at the industry level varies conditional on digital intensity. First, markup changes are considered by industry type, distinguishing between manufacturing, services, and other industries (which are mainly comprised of mining and utilities). As service industries are overall more digitized, seeing a higher increase in service markups relative to the other categories, as evidenced by Figure 32 below, suggests this to be the case.

Figure 32: Markup growth across sectors (2000-2019)

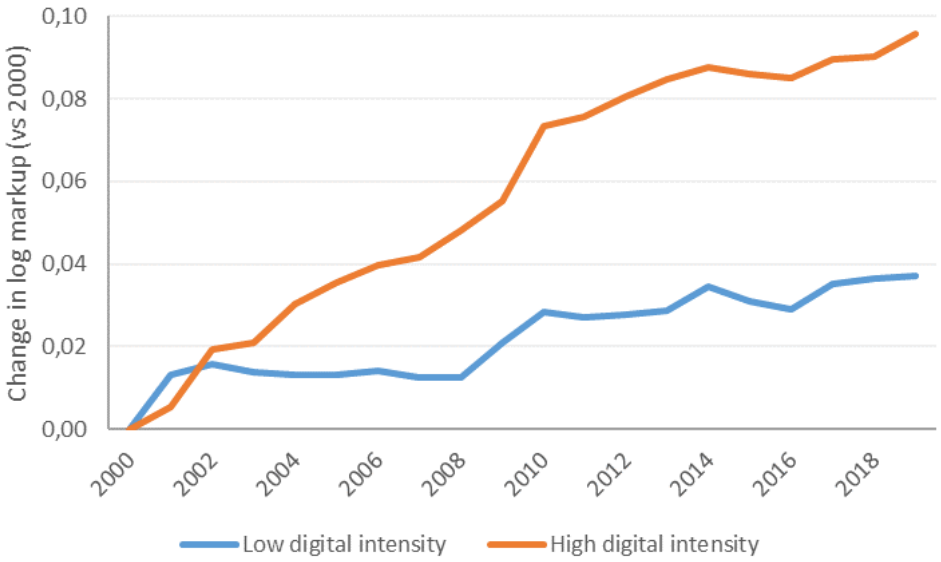


Source: OECD (Calligaris et al., 2024); Note: the figure plots log markups and changes in their components and indexes the 2000 level to 0. Hence the vertical axis represents log-differences from the starting year and approximates percentage growth rates.

A second and more direct approach is to categorize individual industries by digital intensity, differentiating between 'low' and 'high' digital intensity. This categorization is based on prior work by Calvino et al. (2018), who developed a taxonomy of digitally intensive sectors.

Both the preceding figure and Figure 33 below present results which are consistent with the hypothesis that digitization and investment in intangibles are key driving factors behind the observed increase in markups over time. The increase in service sectors is higher compared to manufacturing, whereas this difference is also more pronounced when separately controlling for digital intensity. On average, firms belonging to digitally intensive industries saw their markups increase by almost 10% over time, whereas over the same period the increase for low digitally intensive sectors, while apparent, hovers below 4%.

Figure 33: Markup growth by digital intensity of sector (2000-2019)

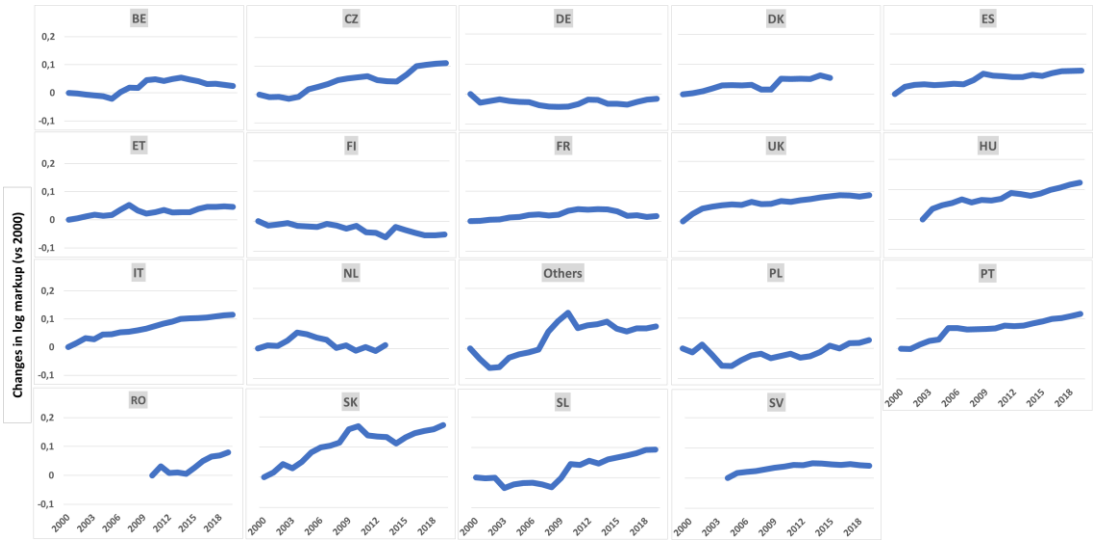


Source: OECD (Calligaris et al., 2024); Note: the figure plots log markups and changes in their components and indexes the 2000 level to 0. Hence the vertical axis represents log-differences from the starting year and approximates percentage growth rates.

As a final consideration Figure 34 examines whether there is any heterogeneity in markup trends at the country level[101]. While markups seem to have increased in most countries, they seem to have remained stable or even declined in Germany and Finland. Díez (2021) presents similar trends with slight differences for the same countries. The same holds for Lear et al. (2024).

[101] An important question in this regard is to what extent national average mark-ups or profitability levels could be affected by tax optimization strategies on mark-ups of multinational firms. The OECD Corporate Tax Statistics reports (4th edition) provide evidence of misalignment between the location where profits are reported and the location where economic activities occur. EU Member States with low effective tax rates or with tax systems geared towards attracting foreign investment may report higher mark-up or profitability levels, because of the tax optimization strategies of multinational enterprises (MNEs), e.g., via internal transfer prices (which affect marginal/variable costs). Assuming that MNEs are able and willing to shift their profits to optimize their tax burden, the size of this wedge will therefore be largest in those Member States where the tax burden is lowest. These complications apply notably to the country level but can extend to assessments at wider geographic level.

Figure 34: Markup growth by country (2000-2019)



Source: OECD (Calligaris et al., 2024); Note: The figure shows average log changes of markup across countries belonging to the markups sample. The figure plots log markups and changes in their components and indexes the 2000 level to 0. Hence the vertical axes represent log-differences from the starting year and approximates percentage growth rates. Industries included cover all 3-digit industries belonging to mining, manufacturing, utilities and non-financial market services sectors. The trend of 'Others' aggregates together Austria, Bulgaria, Ireland, Latvia and Luxembourg.

The link between concentration on the one hand, and other indicators of market power such as markups and profits, has long been studied in the industrial organization literature. As mentioned, theory suggests that concentration and markups could have positive, negative, or no correlations at all[102]. In less competitive markets, markups may still be low due to bad management practices[103], or rent-seeking activities[104]. Low markups do not necessarily imply low market power, while low concentration is likely to imply low market power. At the other extreme, high and persistent markups can only be sustained under a lack of competition, while high concentration may be a competitive outcome, for example in dynamic oligopolistic markets.

Indeed, work by OECD (Calligaris et al., 2024) finds that there is no statistically significant correlation between markups and concentration in the studied industries. Schmalensee (1989) does state that there is tentative evidence that, while there is no average relation between markups and concentration in industries, there does exist one at the top of industries[105]. This could be considered the manifestation of a reallocation effect as discussed by De Loecker et al. (2020), who document that - at the firm level - markup growth is largely driven by a reallocation of market shares towards firms at the high end of the markup distribution, which were the firms that saw the largest markup increase as well.

[102] See Syverson (2019).
[103] See Bloom et al. (2015).
[104] See Zhou (1995).
[105] Schmalensee (1989), at p. 983, stylized fact 4.10.

Indeed, OECD (Calligaris et al., 2024) does find a positive and statistically significant relationship between CR4 in the non-domestic industries when only looking at average markups in the top decile. However, in the domestic industries, while significant, this relationship turns negative, suggesting other factors than concentration may be at play.

I.2.3.2 PROFITS

One stylized fact observed in the literature is that the labour remuneration share of gross value added, which was remarkably constant up to the 1980s and makes up a large fraction of variable production costs, exhibited a more pronounced decrease starting around 2000[106]. If the cost structure hypothesis holds, suggesting a reallocation of expenditure from labour to capital (fixed costs), an increase in markups would not necessarily be reflected in a higher pure profit share[107]. Pure profits are what a firm earns deducting all production costs, including variable costs such as materials and labour, as well as capital costs.

Furthermore, the distributive implications of such a dynamic need to be considered. If reduced costs are (partly) passed on to the customer in the form of lower prices, this could entail a welfare gain[108]. However, if profits remain high and grow over time, this could raise the question as to why they are not competed away.

While a cost structure effect might have taken place[109], perhaps the most compelling piece of evidence is provided by Barkai (2020), who documents a decline in both the labour and capital share which is jointly offset by an increase in pure profits. In a similar fashion, the CMA (2022) documents an increase in UK markups, concluding that there was tentative evidence that this increase was accompanied by an increase in economic profits.

Novel research by Lear et al. (2024) finds that markup estimates obtained using the De Loecker and Warzynski (2012) methodology for EU firms between 2012 and 2019 exhibited a growing trend, with an average annual growth of around 0.8%. In an extension, a correlation analysis was performed between the estimated markups and corresponding EBIT margins, a commonly used measure of profitability[110]. They find a positive and statistically significant relationship between both, suggesting higher markups and profits go hand-in-hand. This exercise is not trivial, as an increase in markups due to lower costs – as opposed to higher prices – accompanied by a flat or decreasing profit trend would imply that cost savings are entirely passed on to the consumer.

[106] See Karabarbounis and Neiman (2014), Gollin (2002), and Autor et al. (2020).
[107] It should be noted that considering labour as a variable cost is not uncontroversial. For instance, costs associated with hiring, firing, training, etc., are often assumed to result in firms retaining workers during economic downturn, anticipating when the cycle turns up again, which is inconsistent with variable input usage. This is referred to sometimes as labour hoarding (Cahuc et al., 2006).
[108] Indeed, Ganapati (2021) and Conlon et al. (2023) suggest that concentration and higher markups are not related to higher prices, respectively.
[109] See De Ridder (2024).
[110] Earnings before interests and taxes.

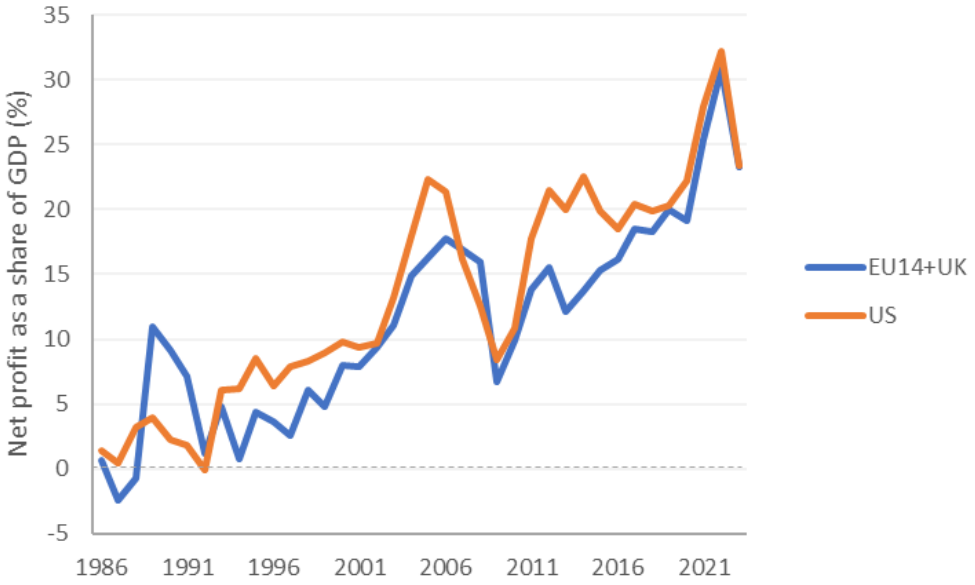
In a similar argument, Traina (2018) suggests that the increasing trend exhibited by the markup of price over production costs is the result of firms devoting a larger share of total expenditure towards non-production activities, such as marketing and management costs, also referred to as selling, administrative and general expenses (SG&A). Once these costs are accounted for, the argument goes, the increase in markups is far more muted. Indeed, De Loecker et al. (2020) find that firms with higher markups allocate a larger share of their expenditure towards SG&A. However, they also find that the 'excess markup', which is the difference between the markup required to break even (zero profits) when accounting for SG&A and the observed markup, was also highest for firms with the highest SG&A expenditure share.

Research by Barkai (2020) suggests the presence of cost savings due to decreased marginal costs, which are largely retained by firms in the form of a higher profit share. As an example of a similar dynamic, De Loecker et al. (2016) examine trade liberalizations in India, which resulted in lower input costs due to decreased tariffs, finding that the decline in the price of output was relatively small compared to the decline in marginal costs (inputs). In turn, this suggests that whatever gains were made due to liberalization were largely not passed on to the consumer. This type of 'incomplete pass-through' suggests the presence of at least some degree of market power, as excess markups are not competed away.

Further compelling evidence is provided by Koltay et al. (2023), who document the evolution of net profits (or pure profits, i.e. the profits that remain after deducting capital costs) as a share of GDP for 15 European countries, as well as the U.S., as depicted in Figure 35 below. As can be seen, the aggregate net profit share has been increasing since the 1980s, which coincides with a decline in the labour share. While EU net profitability was below the U.S. in the 1990s, this gap seemingly closed, with both showing a similar trajectory since[111].

[111] Net profits refer to net operating surplus minus capital costs (EBIT).

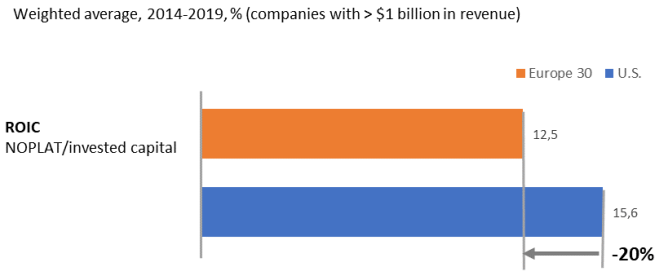
Figure 35: Net profit as a share of GDP, EU14+UK and U.S. (1986-2023)



Source: Koltay et al. (2023)

Additional comparisons are provided by McKinsey Global Institute (2015), who find operating profits minus taxes relative to revenue (referred to as the NOPLAT[112] margin) increased in both North America and Western Europe, although this increase is less pronounced in case of the latter (3% versus 1.5% between 2000 and 2013, respectively). It is important to note that this margin does not include capital expenditure costs[113]. Between 2014 and 2019, the ratio between NOPLAT and invested capital was 20% higher in the U.S. compared to the European average of firms with over one billion EUR in revenue[114].

Figure 36: Corporate Europe lags behind U.S. counterparts in aggregate on profitability, growth, investment and R&D



Source: McKinsey Global Institute (2022)

[112] Net operating profits less adjusted taxes.
[113] McKinsey Global Institute (2015).
[114] McKinsey and Co. (2022).

Analogous to markup growth, which seems mainly driven by the firms in the top decile of the markup distribution, there is further evidence of increased profit dispersion over time. For instance, Furman and Orszag (2015) find that in case of publicly traded non-financial firms in the U.S., returns on capital have become increasingly skewed. In line with such findings, the next section on Global Superstars further discusses certain aspects associated with a more skewed and polarized economy.

I.2.3.3 EVOLUTION OF PROFITS OF GLOBAL SUPERSTARS

This section explores, as a special topic, the evolution of profits of so-called 'Global Superstars'[115], i.e. the world's most profitable large firms, during the past 20 to 25 years and compares them to the profits of other large global firms.

In a 2022 discussion paper by McKinsey Global Institute, Superstar firms are defined as firms that have a significantly greater share of global economic profits[116] than other firms. From McKinsey's database of 33 000 firms, 5 750 firms that have a combined 2/3 share of global revenue and pre-tax profit are identified and the top 10% of these firms, in terms of economic profit, are classified as Superstar firms. The authors show that the gap between Superstar firms and the average firm has grown since the late 1990s, as has the gap between the firms in the lowest decile of economic profit and the average firm.

This section takes a similar approach and looks at the world's most profitable large firms, based on Lear et al. (2024). The rise of these Global Superstar firms, which we will further document in this section, could be the outcome of structural changes of the economy, with globalisation and technological innovation contributing to the spread of 'winner-takes-all' or 'winner-takes-most' dynamics in many sectors. Alternatively, the rise of such firms could be attributed to institutional causes, such as rising regulatory barriers to entry and the increase in market power combined with anti-competitive business strategies by firms.

I.2.3.3.1 DATA AND METHODOLOGY

The analyses developed in this section are based on the Fortune Global 500 data source[117]. Fortune's Global 500 data is an annual list of the largest 500 global (private and public)

[115] Superstars have been the subject of economic studies for decades. Rosen (1981) wrote his article entitled 'The Economics of Superstars' already in the early 1980s, summarising the role of Superstars as follows, '*The phenomenon of Superstars, wherein relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage, seems to be increasingly important in the modern world.'*

[116] In this paper, Economic Profit = Invested capital*(Return on invested capital – weighted average cost of capital).

[117] A main advantage of Fortune Global 500 is that the data (for firms covered) is consistent, comprehensive and, notably, goes back to 1995. Other databases are beset by missing information, in particular in earlier years. Other data sources considered to be used were ORBIS, Compustat Fundamentals. The main disadvantages of the Fortune Global 500 database are that it is limited to the top 500 global firms by revenue, according to Fortune Global 500 publisher, and the pre-selection done by the publisher comes with

companies based on revenue. The dataset contains information on non-listed firms and state-owned enterprises and covers the period going from 1998 to 2022. It includes several metrics that can be used to identify and characterise Global Superstars: revenue, profit, market value and profit rate (profit over turnover).

Next to the fact that it contains the main variables of interest, the main advantage of the Fortune Global 500 database is that it includes privately owned, publicly listed and state-owned firms, and allows for comparability across jurisdictions and time periods.

I.2.3.3.2 DEFINING GLOBAL SUPERSTARS

As said above, this section seeks to report the evolution of profits of the most profitable large global firms i.e. Global Superstars. In order to define these Global Superstars, the following methodology was adopted:

- For each 5-year period, a composite indicator is constructed using profit rate and absolute profit[118].
- For the objectives of this analysis, market capitalization was not considered suitable to be part of the set of selection criteria.
- For each firm, the 5-year average of profit and profit rate is calculated, over the same 5-year periods, between 1998 and 2022.
- Index values for profit and profit rate are obtained by dividing firms' five-year averages by the highest five-year average (highest within the given period). Hence, the firm with the highest average revenue is assigned an index value of 1, while the index values for all other firms are below 1.
- A firm's composite index value is the unweighted mean of its profit index and profit rate index.

In the final step, for each five-year period from 1998 to 2022, the top 50 firms according to the composite index are identified. These firms are referred to as 'Global Superstars' in this chapter.

Table 2: The Global Superstars – 50 highest-ranked firms by composite index

	1998-2002	2003-2007	2008-2012	2013-2017	2018-2022
1	Microsoft	Microsoft	Gazprom	Apple	Saudi Aramco
2	Intel	ExxonMobil	Vale	Vodafone	British American Tobacco
3	ExxonMobil	Gazprom	Microsoft	Oracle	Apple

two disadvantages: first, the sample size is smaller than for other data sources and, second, the sample is less stable, because firms enter and leave the database every year.

[118] Market capitalization was not considered a suitable metric to define Global Superstars because it brings two problems. First, market capitalization is only available for listed firms (and not for privately held firms and state-owned enterprises). Second, it is impacted (sometimes significantly) by volatile factors, such as interest rates and the evolution of stock exchanges.

4	Merck	Petronas	ExxonMobil	Microsoft	Microsoft
5	Cable and Wireless	Pfizer	BHP	Philip Morris	Meta
6	Philip Morris	GlaxoSmithKline	Petronas	Alphabet	Alphabet
7	GlaxoSmithKline	Johnson and Johnson	Rosneft Oil	Hutchison Whampoa	TSMC
8	Eli Lilly	Merck	Philip Morris	Qualcomm	Tencent
9	Bristol-Myers Squibb	Philip Morris	Alphabet	Pfizer	Pfizer
10	Novartis	Novartis	Petrobras	Johnson and Johnson	Intel
11	Pfizer	Shell	Occidental Petroleum	Gazprom	Rio Tinto
12	Petronas	Petrobras	Nestle	Intel	SK hynix
13	SBC Communications	Coca-Cola	AstraZeneca	Novartis	Samsung Electronics
14	Shell	Intel	Johnson and Johnson	Roche	Novartis
15	IBM	BHP	Coca-Cola	Cisco Systems	Alibaba
16	Johnson and Johnson	National Grid	Novartis	Samsung Electronics	Philip Morris
17	Dupont	China National Petroleum	Oracle	ExxonMobil	Oracle
18	Coca-Cola	Cisco Systems	Shell	IBM	Verizon
19	AT&T	AstraZeneca	Surgutneftegas	AB InBev	Roche
20	Ford Motor	China Mobile Communications	Apple	GlaxoSmithKline	Johnson and Johnson
21	BP	BP	Chevron	McDonald's	Gazprom
22	BellSouth	Wyeth	Merck	Coca-Cola	Comcast
23	LUKOIL	Eli Lilly	Intel	Twenty-First Century Fox	Coca-Cola
24	Abbott	LUKOIL	Roche	Walt Disney	Sanofi
25	Eni	Telstra	Procter and Gamble	Procter and Gamble	Procter and Gamble
26	Verizon	Eni	Vodafone	3M	Cisco Systems
27	Anglo American	Total	IBM	Nestle	Abbvie
28	Telstra	Procter and Gamble	China Mobile Communications	Merck	Merck
29	Roche	BellSouth	Cisco Systems	Petronas	Vale
30	PDVSA	PepsiCo	Anglo American	Toyota Motor	Toyota Motor
31	Philips	Samsung Electronics	GlaxoSmithKline	Telstra	Nestle
32	Procter and Gamble	Toyota Motor	TNK-BP	L'Oreal	BHP
33	Walmart	Chevron	British American Tobacco	Sabic	Softbank
34	AstraZeneca	3M	Telefonica	China Mobile Communications	SAP
35	Enel	L'Oreal	Pfizer	Sanofi	3M
36	Petrobras	Abbott	Oil and Natural Gas	Rosneft Oil	AT&T
37	McDonald's	IBM	Sanofi	Comcast	China Mobile Communications
38	Nokia	Anheuser-Busch	Rio Tinto	AT&T	Home Depot
39	Tyco International	Eon	Total	Chevron	Unilever
40	Daimler	Anglo American	America Movil	Verizon	Honeywell
41	Chevron	Nokia	McDonald's	Time Warner	PepsiCo
42	Nestle	Posco	AT&T	AstraZeneca	L'Oreal
43	Anheuser-Busch	British American Tobacco	Schlumberger	Mondelez	Huawei
44	Minnesota Mining and Mfg	Bristol-Myers Squibb	BP	Delta Air Lines	Medtronic
45	PepsiCo	BT	Sabic	PepsiCo	Mondelez
46	Total	ConocoPhillips	Akzo Nobel	United Technologies	ConocoPhillips
47	Toyota Motor	Nestle	China National Offshore Oil	Unilever	KDDI
48	Kimberly-Clark	Walmart	LUKOIL	Softbank	CK Hutchison
49	General Motors	Roche	China National Petroleum	BT	Anglo American
50	Unilever	Endesa	Abbott	Honeywell	Inditex

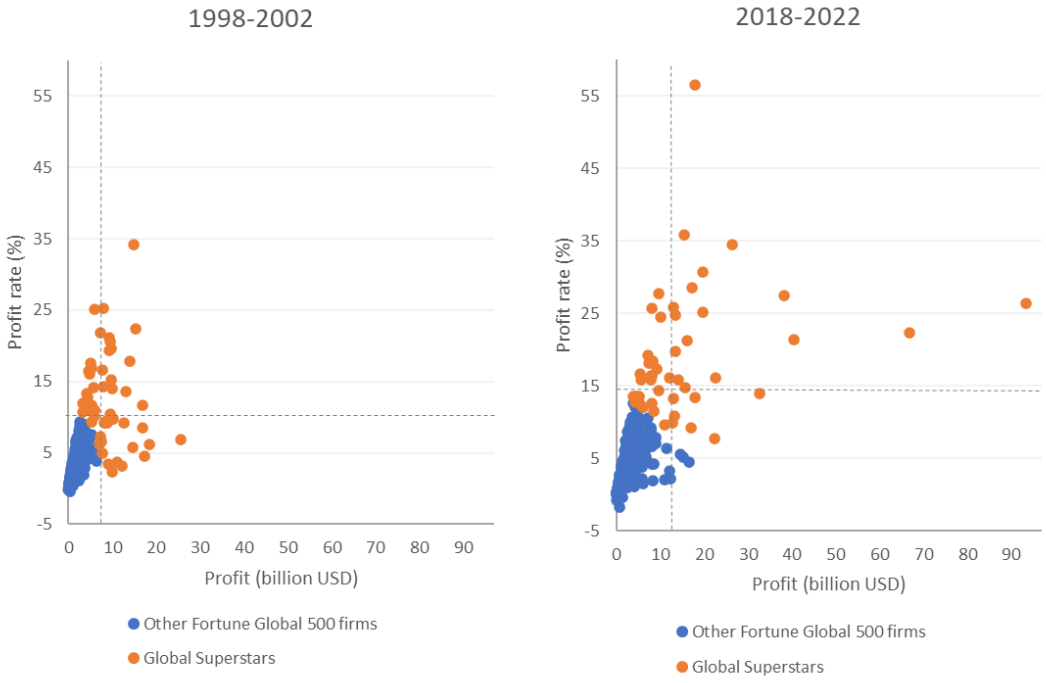
Source: Lear et al. (2024)

I.2.3.3.3 TREND ANALYSIS

Figure 37 below depicts the profit rate and absolute profit (adjusted for inflation) required to qualify as Global Superstars, respectively in the first and the last period studied. The

dashed lines indicate the thresholds required to qualify in the first period for the top 30 in terms of profit and profit rate, respectively, whereas the lines in the right panel illustrates how these thresholds changed (i.e. increased) in the most recent period (i.e., the profit level and the profit rate required to belong to top 30 during 2018-2022).

Figure 37: Evolution of profit and profit rate of Global Superstars vs. other Fortune Global 500 firms (1998-2002 vs. 2018-2022)



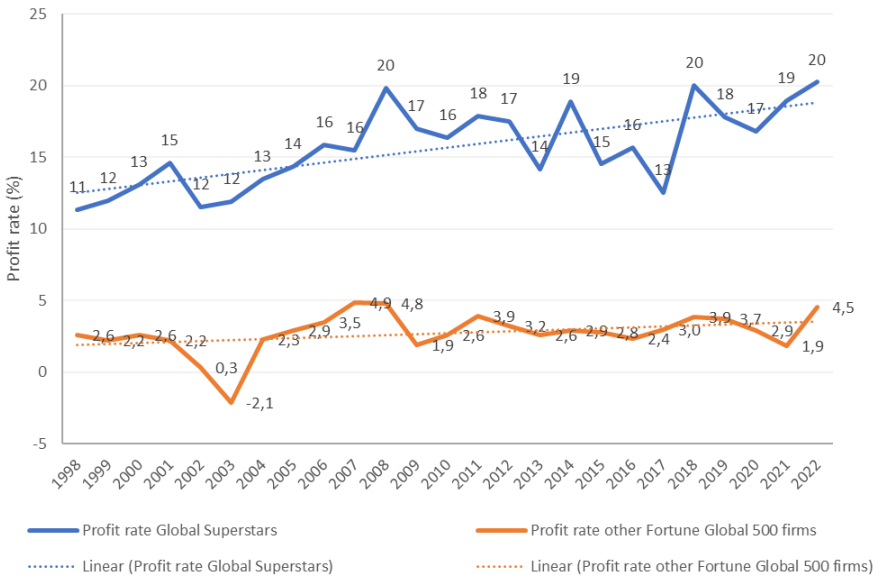
Source: Lear et al. (2024). Note: firms with negative average profit are excluded from the figure to improve readability.

The graphical analysis depicted in the figure above shows that Global Superstars have become more profitable over time, both in absolute terms and in relative terms (profit rate). Even after adjusting for inflation, today's Global Superstars enjoy higher profits and (to a lesser extent) higher profit rates than Global Superstars did 20 years ago.

I.2.3.3.4 EVOLUTION OF PROFIT OF GLOBAL SUPERSTARS

Figure 38 below shows that the profit rate of Global Superstars has almost doubled over the period considered, growing from 11% in 1998 to 20% in 2022. Profits of firms at the top of the distribution have increased significantly more than in the average global firm, resulting in a widening gap between profits of Global Superstars and other Fortune Global 500 firms.

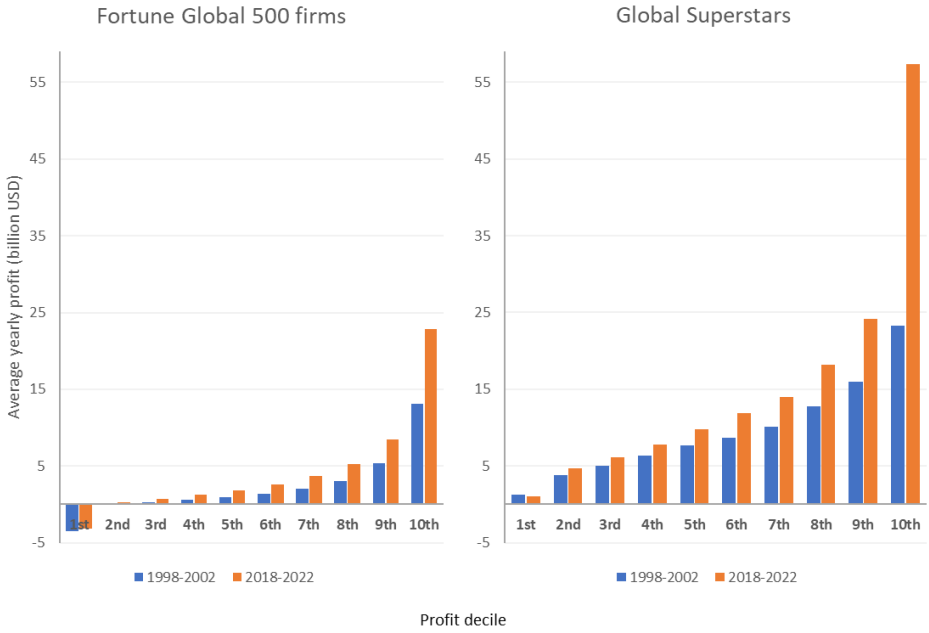
Figure 38: Development of average profit rate of Global Superstars vs. other Fortune Global 500 firms



Source: Lear et al. (2024).

In addition to the development of profitability, one can also look at how the distribution of firm performance changed over time. Figure 39 below compares the distribution of profit for Global Superstars and all Fortune 500 firms (adjusted for inflation). The figure compares the profit by decile across the two five-year periods 1998-2002 and 2018-2022.

Figure 39: Distribution of profit by decile — Global Superstars vs. all Fortune Global 500 firms

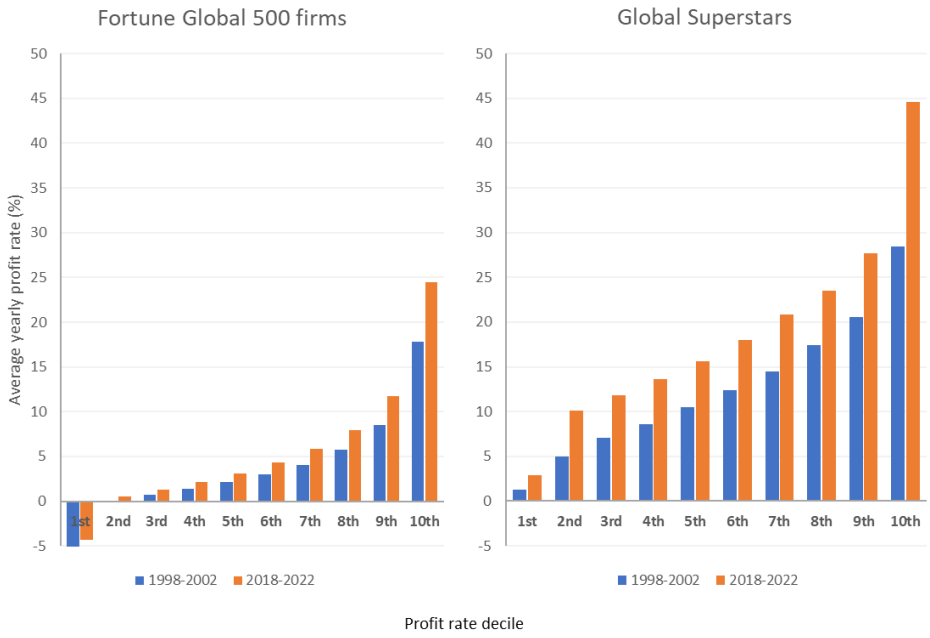


Source: Lear et al. (2024). Note: all values are in 2022 U.S. dollars - adjusted using IMF world consumer price index.

The graphical analysis in Figure 39 above confirms that profits increased along the length of the distribution (with the exception of the first decile in the right panel), but mostly so at the top of the distribution, with the most profitable firms (10th decile) becoming even more profitable, both in absolute terms and relative to less profitable firms. Meanwhile, the profits of Global Superstars have grown substantially since 1998. The growth is particularly pronounced for the top decile, i.e., the top 5 firms.

A similar story emerges when one compares the distributions of profit rate by decile between Global Superstars and all firms in the Fortune Global 500 across the two five-year periods 1998-2002 and 2018-2022, see Figure 40 below. The difference in *average profit rate* between the top 10% of Global Superstars and the top 10% of the firms in Fortune Global 500 grows from approximately 10 percentage points in 1998-2002 to approximately 20 percentage points in 2018-2022.

Figure 40: Distribution of profit rate by decile — Global Superstars vs. other Fortune Global 500 firms

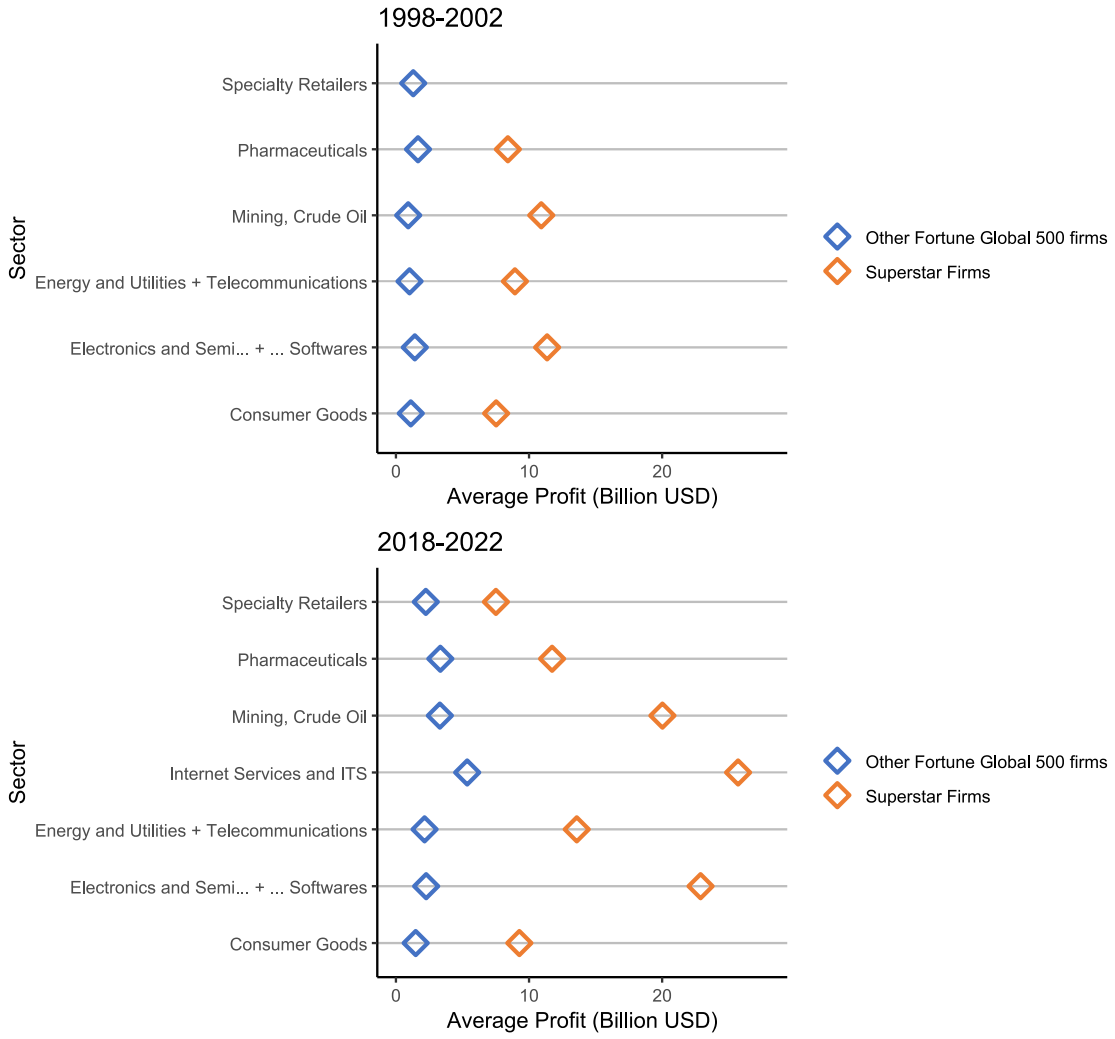


Source: Lear et al. (2024)[119]

Figure 41 represents the distribution of the average profit for Global Superstars (orange) and other Fortune 500 firms (blue) respectively for a selection of sectors in which the top 10 Global Superstars operate in the period 1998-2022.

[119] All values are in 2022 U.S. dollars – adjusted using IMF world consumer price index. A sector-level view on Global Superstars.

Figure 41: Average profit by sector: Global Superstars (orange) vs other Fortune 500 firms (blue). Evolution between 1998-2002 and 2018-2022, per sector.



Source: Lear et al. (2024)[120].

Figure 41 shows that Global Superstars have – on average - larger profits compared to other Fortune 500 companies: the orange diamonds are positioned at the right of the blue diamonds for each sector where superstars are present, both in 1998-2002 and 2018-2022[121].

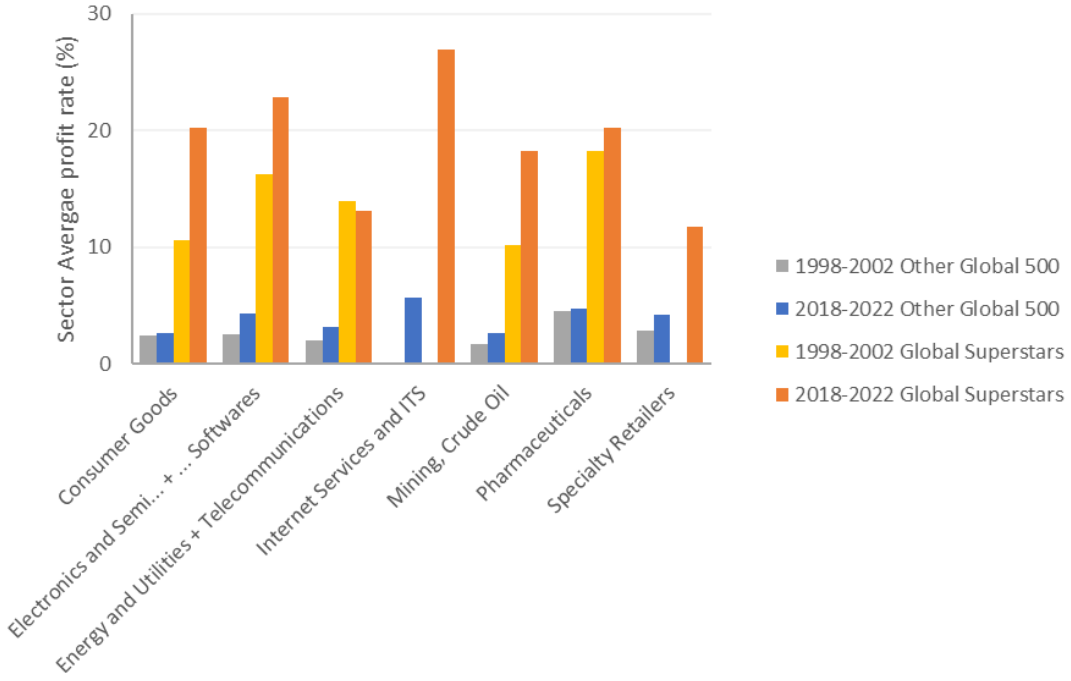
A similar picture emerges when we account for profits instead of profit rates. Figure 42 below shows the evolution of average profit rates for Global Superstar firms as opposed to

[120] All values are in 2022 U.S. dollars – adjusted using IMF world consumer price index. Sectors are based on Fortune Global 500, which differs from the NACE classification system. A '+' between sectors indicates that we combined the respective sectors. Negative profits are not included in the graph.

[121] There are two exceptions. In the first period, no Fortune Global 500 firm active in specialty retailing qualified as Global Superstar, meaning they are not represented on the upper panel in this sector. Furthermore, internet services and ITS was only developed in the second period, meaning this sector is absent on the upper panel.

all other firms in Fortune Global 500, for each sector between two time periods. The graph clearly shows a more pronounced increase in average profit rates for Global Superstar firms.

Figure 42: Average profit rate for Global Superstar firms vs. other firms in Fortune Global 500. Evolution between 1998-2002 and 2018-2022, per sector



Source: Lear et al. (2024); own calculations[122].

Overall, the story that the two figures above are telling is that Global Superstars are distinctively more profitable than other firms, and that the profitability gap with other large firms has increased overtime. This trend is even more pronounced in some sectors such as *Electronics, semiconductors, Software* and *Pharmaceuticals.* In the following section, we will explore in more detail specific sector evolutions.

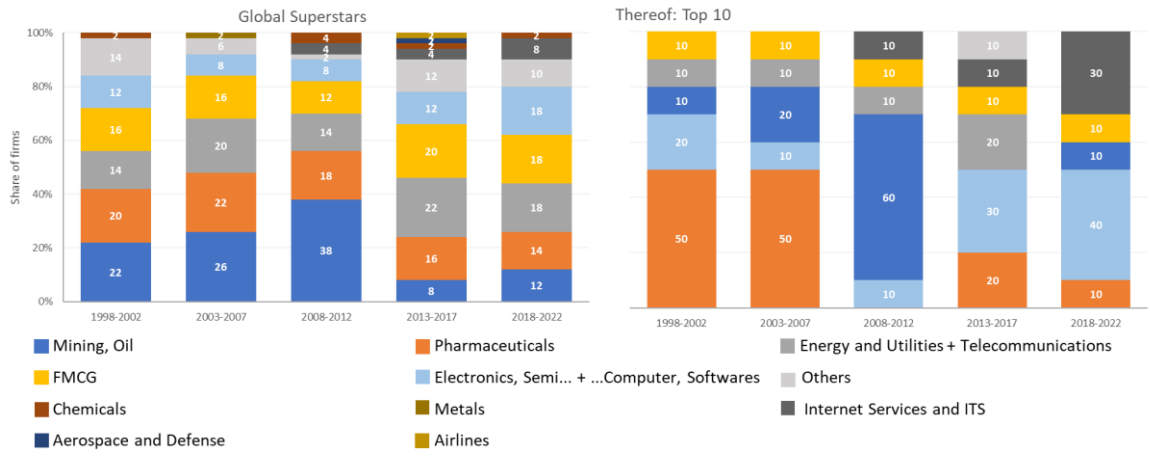
Figure 43 shows in which sectors the Global Superstars are active. The sector allocation is built starting from the industry classification[123] provided by Fortune Global 500 (some sectors are aggregated to enhance the readability of the graphs). The figure shows the

[122] All values are in 2022 U.S. dollars – adjusted using IMF world consumer price index. Sectors are based on Fortune Global 500, which differs from the NACE classification system. A '+' between sectors indicates that we combined the respective sectors. Negative profits are not included in the graph. Some sectors did not exhibit any firms in Fortune 500, hence the missing columns.

[123] This classification takes a consumer perspective, trying to identify in which sector a given company generates the bulk of its turnover. This consumer perspective cannot always be reconciled with the more supply-driven approach of the NACE classification, whereby firms are classified based on their historical sector of activity.

distribution[124] for all 50 Global Superstars as well as the 10 highest ranked Global Superstars of each period.

Figure 43: Sector allocation Global Superstars (in %)



Source: Lear et al. (2024)[125].

Figure 43 shows that Global Superstars are active across a significant number of sectors, but also that this distribution has evolved considerably over time. For what concerns specific sectors, the presence of Pharmaceuticals, Internet services and electronics (at large) appear to have increased at the top of the distribution. In contrast, mining, oil and energy production has become less prevalent amongst Global Superstars. While these companies were still significantly large in terms of revenues, their profits appear to have dropped in the last decade in comparison to other sectors.

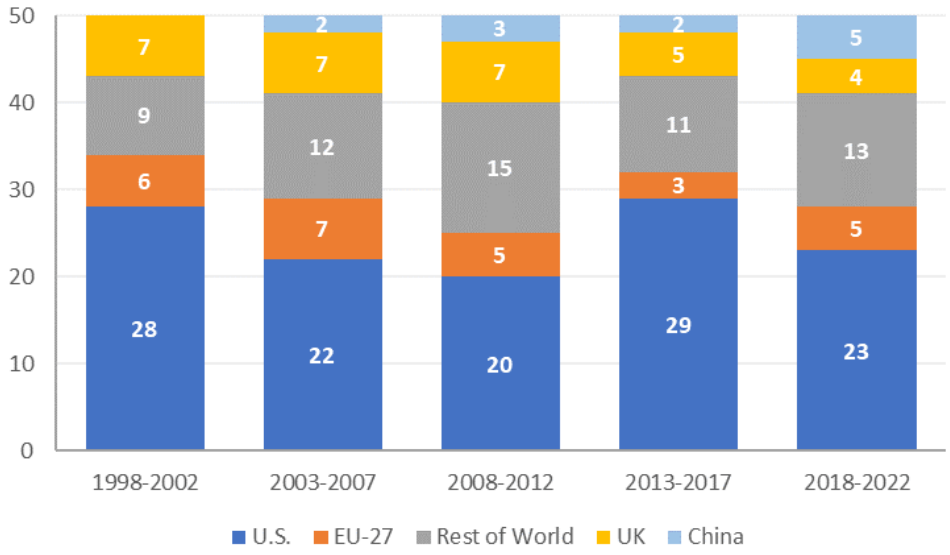
I.2.3.3.5 GEOGRAPHICAL ORIGINS OF GLOBAL SUPERSTARS

Most Global Superstars are active across the globe and their geographical footprint in terms of sales can be much wider than their country of origin. Yet, the geographical incorporation of Global Superstars reflects to some extent a region's capacity to nurture very large companies that are successful on a global stage. Figure 44 shows the number of Global Superstars by region for each five-year period.

[124] The distribution is based on the number of firms. If the sector allocation is based on the share of profit (instead of the number of firms), a similar picture emerges.

[125] Sectors are based on Fortune Global 500, which differs from the NACE classification system. A '+' between sectors indicates that we combined the respective sectors. Sector 'FMCG' is the abbreviation for 'Food and Beverages + Tobacco + Household, Personal and Cosmetic Products'. Sector 'Others' includes the following sectors: 'Motor Vehicles and Parts', 'General Merchandisers', 'Specialty retailers', 'Entertainment', 'Scientific, Photo, Control Equipment', 'Forest and Paper Products', 'Health Care'.

Figure 44: Geographical origin of Global Superstars



Source: Lear et al. (2024)[126].

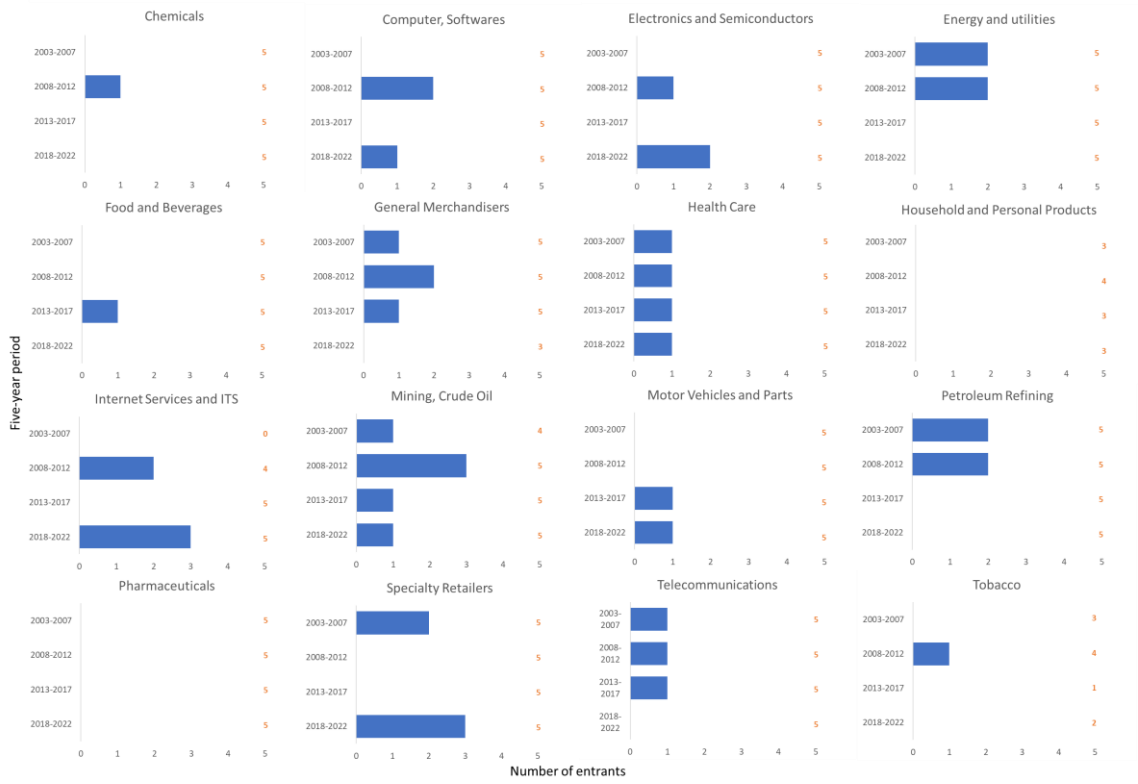
Figure 44 shows that most Global Superstars are incorporated in the U.S. The U.S. hosts around half of the Global Superstars, and while the weight of the U.S. has declined between 1998 and 2012, its presence rose again since then. China hosts an increasingly large number of Global Superstars. Finally, the share of EU and UK incorporated Global Superstars has been rather stable over the last 25 years.

I.2.3.3.6 RANK PERSISTENCE AND NEW ENTRANTS

This section analyses the dynamics of Global Superstars in the ranking. Specifically, we analyse the evolution of so-called 'entrants' from a sectoral perspective. For this purpose, an 'entrant' is defined as a top 5 firm that entered the Fortune Global 500 less than five years before the given period (measured by the difference between the last year of each five-year period – e.g., 2007, 2012, 2017, 2022 – and the first year of appearance in Fortune Global 500 dataset). Figure 45 show the results. It also reports the number of top 5 firms on the right of the graph (this number is lower than 5, when the Fortune Global 500 database does not contain five firms for the sector in the relevant period).

[126] For three Global Superstars the country information recorded in Fortune Global 500 changed within certain five-year periods and is therefore consolidated within each five-year period. The consolidation is done by keeping as country of origin the country with the highest number of entries in the five-year period for that specific firm.

Figure 45: Number of 'entrants' i.e. top 5 firms that entered Fortune Global 500 less than five years before the reference period, and number of firms in the top 5 per sector (right)



Source: Lear et al. (2024). Note: an 'entrant' is defined as a top 5 firms that entered Fortune Global 500 less than five years before the given period.

Figure 45 appears to indicate that well-established firms dominate 'Household and Personal Products', 'Pharmaceuticals', 'Tobacco', 'Food and Beverages' and 'Chemicals' which are characterised by particularly low rates of entry, while more entrant firms make it to the top 5 in other sectors.

I.2.3.3.7 BARRIERS TO ENTRY PROTECTING GLOBAL SUPERSTARS

Broadly speaking, barriers to entry refer to impediments, usually higher costs, that make it more difficult (or even impossible in case of legal monopolies) for a firm to enter a market. While there is no broad consensus on what exactly constitutes barriers to entry, in general these refer to economies of scale, product differentiation, access to capital and intangible assets, access to inputs and intellectual property, access to distribution channels, regulatory barriers or government policies and other cost (dis)advantages[127]. While in general the relevant barriers to entry can only be identified for specific markets and the activities of Global Superstars typically cover a wide range of product and geographic markets, in this

[127] European Commission (2005), Barriers to entry, Note to the OECD Roundtable. See also OECD (2024), Monopolisation, moat building and entrenchment strategies, Note by the Secretariat; European Commission (2024). Note by the European Union.

section we focus on barriers to entry at a more aggregate level, focusing on three sectors where many Global Superstars are active, namely consumer goods, IT (information technology) and pharmaceuticals, drawing on Lear et al. (2024).

These three sectors comprise many of the Global superstars, and at the same time they have been subject to a significant number of merger proceedings and competition investigations. While not necessarily indicative of any infringement of competition laws, the results presented in the previous sections show that the profit and profit rate of Global Superstars in the consumer goods, IT and pharmaceutical sectors have increased significantly over the last two decades.

Consumer Goods

For the purposes of this section, the sector of consumer goods covers the Food and Beverage sector, the Tobacco sector and the Household, Personal and Cosmetic Products sector. Most Global Superstars[128] in these sectors sell branded products. The brands owned by Global Superstars, as well as their investment in brand recognition and marketing, play a key role in their ability to generate profits and maintain these profits over time. In these sectors, Global Superstars hold significantly larger intangible assets than other firms (specifically trademarks).

The combination of brand loyalty and economies of scale constitute barriers to entry, that protect Global Superstars' turnover and profits in some or most (relevant geographic and product) consumer markets. Consequently, entrants face an uphill battle when competing in consumer markets where Global Superstars are most powerful[129].

At the top-end of the revenue and profit distribution, Global Superstars are likely to benefit from these various effects: brand loyalty, differentiation and economies of scale (and possibly economies of scope, due to their portfolio of brands). Most Global Superstars have invested in their brands and other intangible assets for decades and have leapfrogged competitors by building a coherent portfolio of brands, which (in some cases) have become must-have brands for retailers. Consequently, entrants face an uphill battle when competing in consumer markets where Global Superstars are most powerful. The combination of brand loyalty and economies of scale constitute barriers to entry, that

[128] Global Superstars in this sector include Philip Morris, which owns the eponymous tobacco brand, and also the brands Marlboro, L&M, and Chesterfield. Another Global Superstar is Coca-Cola, which does not only own the eponymous soda brand, but also Fanta, Sprite, Schweppes and Minute Maid. Similarly, Nestlé, another Global Superstar, does not only own the eponymous chocolate brand, but also Nespresso and water brands such as Perrier, Vittel and San Pellegrino. Procter and Gamble, yet another Global Superstar, owns shaving products Gillette, baby care products Pampers, feminine care products Always and Tampax, and home care products Mr. Propre, Ariel, Swiffer and Tide.

[129] This paragraph focuses on worldwide effects favouring Global Superstars (such as brand and scale), but other strategies such as exclusive and selective distribution agreements can also favour larger firms. Besides, the European Commission, but also competition authorities at Member State level and in many other jurisdictions routinely investigate abuses of dominant positions, cartels and other restrictive practices in the consumer goods sector.

protect Global Superstars' turnover and profits in some or most (relevant geographic and product) consumer markets.

IT sector

Many IT sectors are characterized by (extreme) economies of scale and scope, as well as direct and indirect network effects[130]. Indeed, as argued theoretically and confirmed empirically by Bessen et al. (2020), IT has increased the advantage of large firms because they are able to use it more effectively. This argument is even more valid in IT sectors, where algorithms developed by firms can in many cases be replicated globally. This is especially the case for Global Superstars that can benefit from the comparative advantage of large firms in using IT developments on a worldwide basis.

Global Superstars in the IT sector can also be protected from entrants on their markets by direct and indirect network effects. While in themselves these network effects may be beneficial for users, they may also give rise to significant barriers to entry, because competitors face an unlevelled playing field as consumers are locked-in by network effects. Until they convince a sufficient proportion of the incumbent's customer base to switch to their products or services, network effects play against them. And, sometimes, only a fraction of customers is available to switch in any given period (because other customers continue using a good or service purchased previously).

The effect described above can be even more pronounced with indirect network effects. Indirect network effects are for instance observed on platforms that connect two categories of users, like users of payment services (shops and their customers). Entrants need to convince both categories of users of the platform to switch providers, some of which are likely to get an excellent deal from using the platform. In this sense, indirect network effects can constitute very powerful barriers to entry, because users' willingness to switch not only depends on the price of the goods or services they purchase, but also on the quality of these goods or services, which depends, indirectly, on the choice made by other categories of users. This indirect effect locks in categories of users who, sometimes, would all have an incentive to switch to an alternative provider.

Pharmaceutical sector

The pharmaceutical sector is characterised by large investments in intangible assets, especially linked to R&D, which are almost always protected by intellectual property rights (much more so than in the IT sector, where proprietary technologies are not always patented). The development of pharmaceutical products requires large-scale studies to prove not only that these products are safe for patients, but also that they cure the

[130] Direct network effects occur when the value of a product or service increases as more people use it. Indirect network effects occur when the value of a product or service increases as more complementary products or services are available.

diseases that they were developed to cure. These large-scale studies require very significant funding, favouring incumbents over entrants.

Over the last decades, the pharmaceutical sector has evolved in two ways: first, most pharmaceutical firms have increasingly focused on specific product categories and, second, product development has increasingly been conducted by small (and often) new firms. Simultaneously, Global Superstars have focused on the (often worldwide) production and distribution of pharmaceutical products and acquired small innovative firms with promising pipelines of products (or reach long-term exclusive contracts with innovative firms). The pharmaceutical sector is also one in which competition agencies have been particularly active: sanctioned practices include excessive pricing, patent settlement agreements amounting to pay-for-delay, vertical agreements and killer acquisitions[131].

Akcigit and Ates (2021) argue that market power has increased significantly in the pharmaceutical industry. According to the authors, since 1995, markups have increased by almost 40%, concentration has risen by almost 80% and profitability has doubled. In addition, they find that the rise of market power in the pharmaceutical industry is characterised by increased markups charged by incumbents, while the role of entrants is relatively minor.

The authors further argue that the market power of large firms in the pharmaceutical industry relates to the intellectual property rights system, specifically some features of current intellectual property rights systems, such as excessive rewards to minor incremental innovations, so-called 'patent thickets', and 'killer acquisitions'.

Furthermore, the main incumbents (which are often Global Superstars) increasingly focus on some specific categories of products (where they enjoy economies of scale and scope) and tie-up with innovative firms at early stages of their development. They thereby gain precious information on the effectiveness of pharmaceutical products under development. Consequently, Global Superstars develop a coherent portfolio of drugs, owning a range of drugs in the same area of pathologies which they can produce, distribute and further develop. But (potential) competitors are maintained at a distance, and prices are set accordingly.

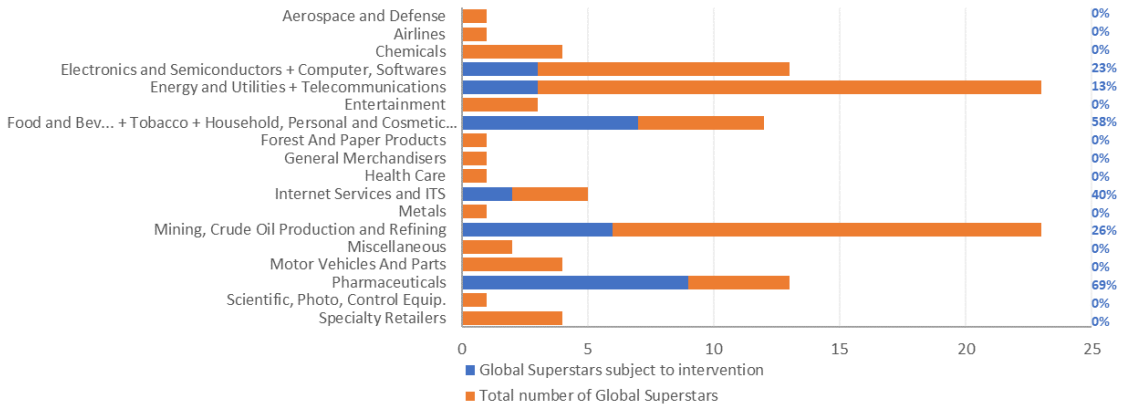
I.2.3.3.8 COMPETITION ENFORCEMENT AND GLOBAL SUPERSTARS

To conclude this section, research by Lear et al. (2024) finds that EU enforcement has been concerned with some of the largest and most profitable firms globally suggesting both that (1) at least some of the global superstars strategically rely on mergers and exclusionary conduct to strengthen or maintain their market leading positions and (2) EU competition enforcement has been tackling some of those attempts both through merger and antitrust enforcement actions.

[131] See Cunningham, et al. (2021).

Figure 46 depicts the number of Global Superstars per sector and, for each sector, the proportion of Global Superstars that have filed a merger to the European Commission that resulted in an intervention after the merger investigation (these interventions include prohibitions, remedies and the withdrawal of the merger following the phase II investigation)[132].

Figure 46: Proportion of Global Superstars that experienced an intervention in EC merger proceedings across sectors



Source: Lear et al. (2024) based on data from Fortune Global 500; European Commission own data [133].

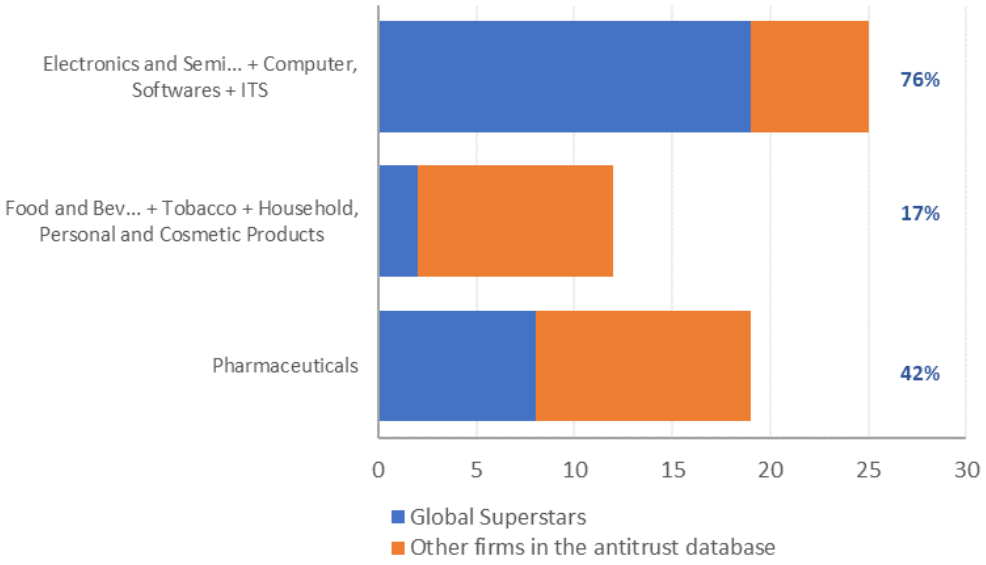
Figure 47 shows the proportion of Article 101 and Article 102 investigations by the European Commission that concern[134] a Global Superstar in the consumer goods, IT and pharmaceutical sectors. The proportion of antitrust investigations that concern Global Superstars is high in the pharmaceutical sector (42%), and even higher in the IT sector (76%). It is instead lower for the consumer goods sector (17%).

[132] These statistics should be interpreted in context, as merger proceedings, by definition, target larger companies and merger reviews do not necessarily imply any wrongdoing.

[133] Sectors are based on Fortune Global 500, which differs from the NACE classification system. A '+' between sectors indicates that we combined the respective sectors.

[134] These investigations do not necessarily conclude that the companies investigated have infringed competition law.

Figure 47: Proportion of EC antitrust investigations that concern a Global Superstar in the consumer goods, IT and pharmaceutical sectors



Source: Lear et al. (2024) based on data from Fortune Global 500; European Commission own data[135].

I.2.3.3.9 CONCLUSIONS ON GLOBAL SUPERSTARS

This subsection has shown that the profit rate of Global Superstars has almost doubled over the last 25 years, growing from 11% in 1998 to 20% in 2022, while there was only a small increase in profit rate for the average Fortune Global 500 firm. Over the same period, the evolution of average revenue of Global Superstars and the average revenue of other Fortune Global 500 companies did not follow a clear trend, but certainly did not double.

Profits of firms at the top of the distribution have increased significantly more than in the average global firm, resulting in a widening gap between profits of Global Superstars and other Fortune Global 500 firms. The results also indicate that the profit of the firms with the highest profits has increased over time and the most profitable firms (10th decile) became even more profitable both in absolute terms and relative to less profitable firms. Meanwhile, profits of Global Superstars have grown substantially since 1998. The growth is particularly pronounced for the top 5 firms.

In terms of geographical origins, the U.S. hosts around half of the Global Superstars. China hosts an increasing number of Global Superstars, as the largest Chinese companies made it to the top of the list. The share of Global Superstars incorporated in the EU and UK has declined slightly over the last 25 years.

[135] Sectors are based on Fortune Global 500, which differs from the NACE classification system. A '+' between sectors indicates that the respective sectors are combined.

At the top-end of the revenue and profit distribution, Global Superstars are likely to benefit from these various effects: brand loyalty, differentiation and economies of scale (and possibly economies of scope, due to their portfolio of brands). Most Global Superstars have invested in their brands and other intangible assets for decades and have leapfrogged competitors by building a coherent portfolio of brands, which (in some cases) have become must-have brands for retailers. Global Superstars are often protected not only by easier access to capital (and access to other resources, including human resources), but also by economies of scale or scope in the production of products and services, be it in the basic production process, or in the marketing of products and services.

Independently of whether the causes of the rise of a particular Global Superstar were overall benign or gave rise to adverse effects, the mere fact that there is not only a bigger gap between the top and the rest, but also less disruption, calls for an increased vigilance of policy makers and competition authorities. Indeed, if barriers to entry exist and if profits have increased over time, it is important to preserve disruption, or at least the possibility that disruption could happen.

I.2.3.4 CONCLUSION ON MARKUPS AND PROFITS

As regards the evolution of **markups and profits:**

(1) On average, markups increased by 7% between 2000 and 2019 across the 23 European countries and 204 industries studied (Calligaris et al., 2024).
(2) The rise in markups is largely driven by changes at industry level (i.e. within industries), rather than by the reallocation of activity towards certain high markup industries, suggesting the increasing trend is widespread.
(3) According to OECD (Abele et al., 2024) there is significant sector heterogeneity as regards the levels of markups ranging from 1.02 to 2.09 with a mean of 1.23 and a median of 1.18 (for 127 industries).
(4) Globally – according to Díez (2021) and De Loecker and Eeckhout (2018) – markups in Europe increased probably less than in the U.S., but more than in Korea and Japan.
(5) According to research based on Koltay et al. (2023), the share of net profits of GDP increased between 1986 and 2022 from around 2% to more than 20%.
(6) According to the McKinsey Global Institute, average accounting profits as measured in ROIC calculated as NOPLAT (= net operating profit less adjusted taxes) have increased for a large sample of European firms from 2000 to 2013 by 4.1 percentage points and have reached 12.5% during the years 2014 to 2019 for firms with a turnover > EUR 1 billion.
(7) The profit rate of Global Superstars has almost doubled over the last 25 years, growing from 11% in 1998 to 20% in 2022, while there was only a small increase in profit rate for the average Fortune Global 500 firm. Further, profits of firms at the top of the distribution have increased significantly more than in the average

global firm, resulting in a widening gap between profits of Global Superstars and other Fortune Global 500 firms.

I.2.4 Possibly Associated Evolutions of Macro-Economic Outcomes

As described in the introduction (and explored in more detail in part II of the present report) economic theory and past empirical evidence suggest that competition is an essential driver of broader macro-economic outcomes such as productivity growth, investments, business dynamism, employment and the resilience of an economy to inflationary shocks.

The first and most basic reason to explore correlations between various metrics of competition and broader macro-economic outcomes is therefore to explore how the evolution of competition in the EU over the past 25 years might relate to a changing macro-economic environment. Several authors have made important contributions in this regard, exploring the possible impact of rising concentration and markups on business dynamism[136], productivity[137], investments[138], wages and the labour share[139], prices[140], the recent inflationary surge[141] and overall growth[142]. A novel macro-modelling study presented in Part II, Section 3, uses markup data and a macro-economic model to explore both the macroeconomic costs of non-competition in a backward-looking scenario and the benefits of increased competition in two forward looking scenarios.

A second (narrower) reason to explore the correlations between competition and macro-economic outcomes such as productivity, the labour share, prices or inflation is to potentially obtain a firmer empirical footing when attempting to disentangle what has driven changes in competition.

The research on the broader macro-economic effects of the observed trends is still in flux (in particular research on the recent inflationary surge) and by its nature highly complex as broad economic indicators such as productivity can be affected by many diverse economic factors. This section presents a few recent insights from the economic literature and the results of a correlation analysis performed by OECD (Calligaris et al., 2024).

As an important caveat, the analysis discussed in this section is mainly descriptive, meaning it neither directly implies a causal relation, nor rules out the existence of overlooked mechanisms which are the drivers of the observed correlations. Furthermore, similar to aggregate trends, correlations are liable to hide significant heterogeneity and the relationship of indicators with economic variables and other proxies of the state of the

[136] See e.g. Calvino et al. (2020).
[137] See e.g. Akcigit and Ates (2021).
[138] See e.g. Gutierrez and Philippon (2017).
[139] See e.g. Deb et al. (2022), Autor et al. (2020).
[140] See e.g. Ganapati (2021), Conlon et al. (2023).
[141] See e.g. Acharya et al. (2023).
[142] See e.g. De Loecker et al. (2020).

economy can vary across industries and countries, thus requiring careful analysis in each case.

I.2.4.1 CORRELATIONS WITH PRODUCTIVITY GROWTH

Decreased business dynamism is hypothesized to have contributed to the observed decline in productivity growth in advanced economies following a period of persistent increase, see for instance Fernald and Jones (2014).

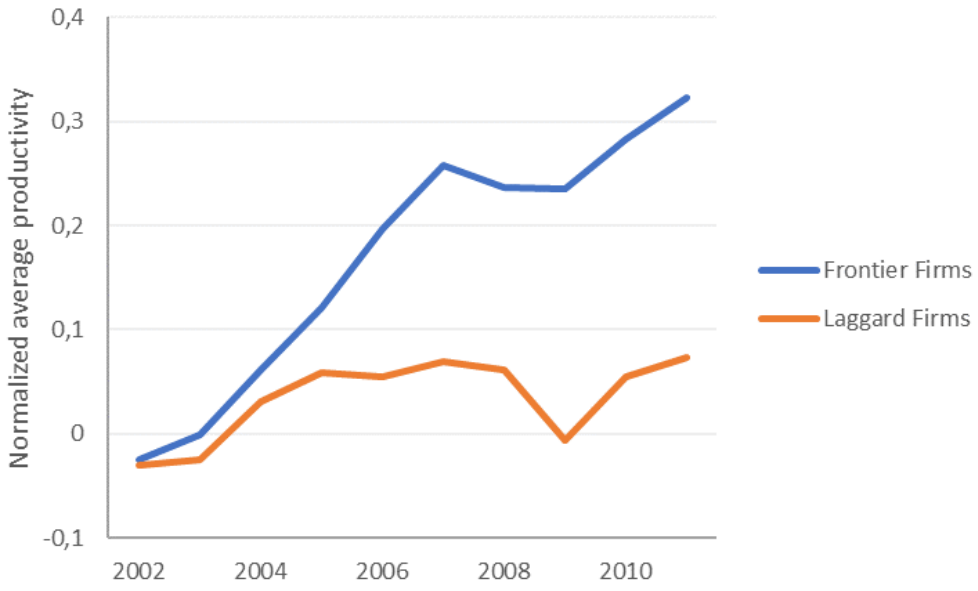
Economists have suggested the existence of an inverted U-shaped relation between competition and innovation (Aghion et al., 2005). In neck and neck competition, efficiency-enhancing innovations yield an immediate edge over the competition, meaning both returns and investment incentives are high. This is referred to as the 'escape-competition effect' (Akcigit and Ates, 2021). However, once markets are sorted into leaders and laggards, the incentive to innovate evaporates as expected returns no longer outweigh costs, both at the top due to a reduced threat by entrants, and at the bottom.

Akcigit and Ates (2021) investigate the decline in U.S. business dynamism using data on patenting as a measure of innovation, singling out the disparity between laggards and leaders within a winner-takes-most framework as the main culprit. Once the most efficient firms establish a sufficient technological lead, entrants and laggards are faced with increasingly lower odds of displacing them, reducing the incentive to innovate. De Ridder (2024) finds a similar inverted U-shaped relationship for the U.S. and France. According to Covarrubias et al. (2020) this slowdown in productivity growth offers perhaps the most compelling piece of evidence for a sequential dynamic, where 'winner takes most' effects initially enhance productivity growth, while in a second step inhibiting the process (see below, section I.3).

Andrews et al. (2016) investigate the recent slowdown in productivity growth by looking at the firms operating at the technology frontier, see Figure 48. They document an increasing gap in labour productivity – measured as real value added per worker – between frontier and laggard firms[143].

[143] Frontier firms are considered to be the firms in the top 5% by labour productivity.

Figure 48: Labor Productivity of Frontier and Laggard Firms



Source: Andrews et al. (2016)

Similarly, Olmstead-Rumsey (2020) provides evidence that in the U.S. small firms' patents have made less significant innovations in the 2000s relative to the 1990s[144]. This gap has suggested the presence of reduced diffusion of technology between leaders and laggards, which might be due to increased complexity, reducing the potential for laggards to adopt innovations, as well as high specialization, prohibitive cost considerations or other resource constraints. These impediments have in turn been linked to digitization and globalization. If a reduction in diffusion generates a more polarized economy characterized by discouraged entrants who are no longer able to catch up to market leaders – which in turn causes a reduction in innovation and dynamism – this could be a cause of concern.

To further examine this dynamic, OECD (Calligaris et al., 2024) study the relation between total factor productivity[145] (TFP) and concentration. They find that industry concentration is not correlated with average firm TFP in that industry. However, TFP is positively correlated with concentration for the most productive firms (i.e. firms belonging to the top decile of the TFP distribution), whereas this relationship turns negative when looking at the bottom 90%. In turn, this suggests a positive relationship between higher concentration and increased TFP dispersion, which is consistent with the hypothesis of reduced diffusion.

[144] See also Schnabel (2024). Specifically, Olmstead-Rumsey (2020) compares the periods 1994-2003 ("1990s") for 2004-2017 ("2000s"), using data on U.S. public firms from Compustat as well as aggregate moments.

[145] TFP is a measure used in economics to evaluate efficiency and productivity. TFP growth is equal to the fraction of output increase over time that is unexplained by the increase of inputs, e.g. labour and capita. It is often identified with technological progress/innovation.

I.2.4.2 CORRELATIONS WITH INVESTMENTS

A potential explanation behind the increase in concentration and markups is the rise of intangible investments. The increasing importance of intangibles may have disproportionately favoured larger firms, who have the financial resources needed to cover the initial investment and the scale needed to fully exploit the gains granted by intangible assets. Intangibles, such as software, are generally not easily adopted by other firms and scalable at low costs. Markup dynamics might also have been influenced by the increased importance of intangibles, reducing marginal costs relative to (sunk) fixed costs (De Ridder, 2024). Therefore, intangibles can increase within-firm markups, as well as causing a shift of market shares towards higher markup firms (Autor et al., 2020).

The relationship of intangibles with both concentration and markups is tested using the intangible investment intensity (investment in intangibles divided by value added at the sector level). OECD (Calligaris et al., 2024) finds that investments in intangible assets are positively related to markups and concentration.

In the case of concentration, investment intensity in (i) software and (ii) innovative property are positively correlated with CR4. Software requires substantial initial investments but can then be used repeatedly at low or zero marginal costs. Hence, the returns from these investments are likely to be positively correlated with the firm scale of operations and are likely to disproportionally advantage large firms. Similarly, innovation property is mainly composed of R&D investments, which often imply high sunk costs that can create barriers to entry, leading to higher industry concentration.

These findings are consistent with the ones presented in Bajgar et al. (2021), which suggest that intangibles have played an important role in the increase of industry concentration and tend to benefit larger firms which are better placed to invest in them, as well as the findings of Calligaris et al. (2018), which documents higher markups in more digitally intensive sectors.

A finding similar to the latter was documented in Section I.2.3, which demonstrated a stronger increase in markups in both service sectors (Figure 32) and digitally intensive sectors (Figure 33). A positive but weakly significant relation was found between markups and digital investment intensity at the industry level. However, further analysis revealed that this relationship became more significant within the upper half of the TFP distribution, and even more so in the top decile. This is consistent with a 'winner takes most' framework within which the most efficient firms are able to enlarge the gap between them and their less efficient competitors based on (among others) intangible investments.

I.2.4.3 CORRELATIONS WITH THE LABOUR SHARE

One important claim is that rising market power could lie at the heart of an observed secular decline in the labour share of value added (De Loecker et al., 2020). Similarly, Autor

et al. (2017) suggest that this decline is due to superstar firms which employ less labour while obtaining higher returns.

OECD (Calligaris et al., 2024) therefore investigated the correlation between industry concentration and the labour share, which is defined as the employees' compensation over value added. On average, they find that the labour share and concentration are negatively correlated, and that this relationship is driven by the top decile of most productive firms; for firms belonging to the rest of the distribution the relation is not statistically significant.

The analysis seems consistent with 'winner takes most' effects, where concentration is related to the increasing importance of large firms, that are more productive and less labour intensive. It is also consistent with the results on the importance of intangibles, as the latter is likely to favour larger and more productive firms. This is further supported by research from the IMF (2019)[146], which argues that rising markups have accounted for at least 10% of the decline in the labour share in the average advanced economy. A negative correlation between markups and the labour share is also documented by De Loecker and Eeckhout (2018) for a sample of 59 countries, whereas this increase in markups was found to be driven by market share reallocation towards the largest firms.

I.2.4.4 CONCENTRATION AND PRICE

As will be discussed in more detail in part II, a product market experiencing a higher degree of concentration is, all other things being equal, likely to experience higher prices compared to a less concentrated market for the same product. That is probably the reason why Schmalensee (1989) points out that 'In cross-section comparisons involving markets in the same industry, seller concentration is positively related to the level of price.' On the other hand, the exact relationship between concentration and prices in any given market must also take into account the reverse effects of prices on concentration, as well as efficiencies, and will therefore depend on sector and market specific conditions (Syverson, 2019).

Evidence by OECD (Calligaris et al., 2024) shows a positive relation between CR4 and prices when controlling for industry, although it should be noted that price data was obtained from the Euromonitor dataset, and therefore only a limited sample of 46 out of 127 industries was considered.

By contrast, research by Bajgar et al. (2021) for 13 countries including 10 EU Member States and Ganapati (2021) for the U.S., suggests that at least before the most recent inflationary surge increasing concentration might not have been associated with higher prices and lower output, but possibly even associated with lower prices and/or higher output in the sectors concerned. Research by Conlon et al. (2023) suggests that increasing markups might also not have been associated with higher prices.

[146] Cited above.

This can be considered as (partially) good news, suggesting that increased markups and profits over the past 25 years were – at least before the recent inflationary surge – more likely the result of reduced costs, rather than higher prices.

On the other hand, given the presence of increasing markups, profits and entrenchment, important questions arise as to (1) why those rising markups and profits were not competed away by challengers and entrants; (2) whether the pass through of cost savings to customers is working as it could/should; and (3) why rising markups and profits are no longer accompanied by rising productivity growth. Some ongoing research also suggests that rising concentration may have made the economy less resilient when it was hit by multiple shocks (starting with the Covid-19 pandemic) and also less responsive to monetary policy measures[147].

I.2.4.4.1 INFLATION

The mid-2021 surge in inflation, initially triggered by supply chain disruptions following the Covid-19 pandemic, has sparked discussions regarding its underlying drivers: whether it solely stemmed from supply-side cost shocks or was exacerbated by the presence of increased market power. Notably, the coincidence of inflationary pressures with historically elevated profits has fuelled debates on the role of market power in driving inflation, as observed in studies by (2023) and Kharroubi and Smets (2024).

Past contributions highlight the deflationary effect of effective competition. Rogoff (2003) argues that a breakdown of trade barriers and pro-competitive reforms led to a global decline of inflationary pressure. Przybyla and Roma (2005) find that between 1980 and 2001, higher product market competition reduced average inflation rates. Andrews et al. (2018) suggest that integration with global value chains has reduced inflationary pressure. They also asked the question whether stalling globalisation combined with declining contestability of markets (as evidenced by rising mark ups) could lead to inflationary pressures '[…] thereby letting the inflation genie out of the bottle'. In that regard they state that '*if more intense competition in product and labour markets contributed to global disinflation over recent decade, then it follows that waning structural reform ambition … poses an upside risk to future inflation*'.

While it seems that lower costs, rather than higher prices, are the main driver behind the increasing trend in markups, a persistent increase in profits suggests that higher margins were not eroded away under competitive pressures and only a fraction of cost savings have been passed on to the consumer. In contrast, if an exogenous shock to costs is largely passed on to the customer, this reflects a situation in which firms are able to exhibit rent seeking behaviour by imperfectly passing on positive cost shocks (i.e. lower costs) to the consumer, while doing the opposite in the presence of negative cost shocks.

[147] Kouvavas et al. (2021). Duval et al. (2021).

Although there is no conclusive evidence that higher market power enabled opportunistic behaviour, Bräunig et al. (2022) show that the pass through of negative cost shocks has been higher in more concentrated industries. Weber and Wasner (2023) claims that malfunctioning competition played a role both in the initial stages of the inflationary episode by amplifying the effect of cost shocks on prices, as well as in keeping prices at a higher level in the face of decreasing costs. Acharya et al. (2023) document a similar persistence in inflation, while also finding that firms with higher pricing power ex ante were able to raise their markups more. They furthermore document evidence consistent with inflation being present in markets that were (initially) not exposed to supply-side constraints. They stress that while supply chain disruptions drove inflation upwards, they also created inflation expectations, allowing firms with market power to sustain and enhance their margins.

Further research on this important topic would be necessary.

I.2.5 Overall conclusions on the evolution of competition in the EU

Overall, the research summarised above suggests that over the past 25 years in Europe:

(1) Like in other advanced economies, average concentration, markups and profits at broad industry level in the EU appear to have increased; the rise in profits and markups appears to be correlated, indicating that rising markups are not exclusively due to rising fixed costs;
(2) behind the observed averages, there appears to be some considerable sector heterogeneity and more limited country heterogeneity;
(3) both the levels and the increase of these three indicators in the EU were likely more moderate compared to the U.S. during the same period; mark-ups and profits in the EU seem to have increased more compared to Japan and South Korea;
(4) average concentration at the narrow market level in consumer facing markets appears to be high and seems to have increased from 2012 to 2019; concentration in those consumer facing markets is higher than, and strongly correlated with, concentration at the broad industry level in the associated industries; within the EU, there are some significant country differences even when controlling for country size; average market concentration in consumer facing markets in the EU seems to be – on average – below the corresponding measures for the U.S., Canada, Japan and South Korea;
(5) business dynamism at the top of the firm distribution and as measured by entry rates and job reallocation rates seems to have declined both at the industry level between 2000 and 2019 and at the market level between 2012 and 2019; business dynamism at the top has been particularly low in more concentrated industries;
(6) the gap between industry leaders and followers in terms of profitability and productivity seems to have increased;

(7) from a dynamic point of view, higher concentration seems to be positively correlated with (i) reduced churn at the top of the distribution and (ii) rising productivity dispersion. Moreover, firms at the frontier of the productivity distribution have, on average, a lower labour share. Such a relationship is even stronger in more concentrated industries;
(8) research by Bajgar et al. (2021) for 13 countries including 10 EU Member States and Ganapati (2021) for the U.S., suggests that, at least before the most recent inflationary episode, increasing concentration might not have been associated with higher prices and lower output, but possibly even associated with lower prices and/or higher output in the sectors concerned. Research by Conlon et al. (2023) suggests that increasing markups might not have been due to higher prices. This suggests that higher markups and profits are the result of lower costs, rather than higher prices;
(9) on the other hand, given increasing markups and profits – in particular at the top of the distribution of firms – combined with increasing entrenchment, the question arises whether the pass-through of cost savings is working as optimally as it could/should and why rising markups and profits are/were not competed away by challengers and entrants. Some ongoing research also suggests that the market power may have made the economy less resilient when it was hit by multiple shocks, starting with the Covid-19 pandemic and the associated inflationary shock.

I.3. LIKELY MAIN DRIVERS OF THE OBSERVED EVOLUTION OF COMPETITION IN THE EU

This Section presents and discusses evidence on *the likely main drivers of the observed evolution of the various indications of competition in the EU*.

It (i) provides a taxonomy of the main candidate drivers and channels discussed in the economic literature, (ii) discusses the economic evidence in support of the different candidate drivers, and (iii) discusses the evidence on whether overall and on balance competition in the EU increased or decreased.

I.3.1 A TAXONOMY OF THE MAIN CANDIDATE DRIVERS

The research on the evolution of competition reported above shows that the nature and intensity of competition changed across many sectors of the economy (not just the digital sector, but also across many other manufacturing and services sectors), across many countries and over a long period of time. This suggests that these changes have likely been driven by *common and long-term changes* in how firms in today's economies create value and compete.

As discussed in the introduction, historically the main drivers of changes in the nature and intensity of competition have been evolving fundamental economic factors often driven by technological progress ('structural drivers') or evolving public policies (hereinafter 'institutional drivers') or a combination of both. It does therefore not come as a surprise

that as regards the changes in the nature and intensity of competition observed during the last 20-25 years the economic literature is also exploring these two broad categories of candidate drivers.

Some authors emphasise more the importance of structural changes to the economy. They discuss four broad partially overlapping and intertwined structural changes which occurred during the last 20 to 40 years, namely the digitalisation of the economy, the rise of intangible investments, globalisation and the rise of M&A transactions[148].

Other authors emphasise more possible institutional drivers i.e. the role of pro-competitive or anti-competitive regulation and the role of changes in competition enforcement[149].

When discussing these structural and institutional candidate drivers the economic literature identifies various – sometimes complementary and sometimes conflicting – channels through which the drivers could have affected the competitive process[150]. When investigating these channels, it is possible to distinguish between channels which

- (i) increase competition ('benign' for competition), or (ii) decrease competition ('adverse effects') or (iii) *both* increase and decrease competition at the same time (channels with both 'benign' and 'adverse' effects for competition).
- affect the competitive process more (i) on the supply side of markets or (ii) on the demand side.

The following simplifying and schematic table, which will be developed in more detail below, sets out the main drivers and channels discussed in the literature distinguishing between (i) structural and institutional drivers and channels, (ii) channels affecting the supply ('S') or the demand ('D') side or both and (iii) channels increasing competition (benign), decreasing competition (adverse effects) or both having benign and adverse effects for competition at the same time.

Table 3: Potential drivers of increased concentration, markups, entrenchment and inequality between firms discussed in the economic literature and their effects on competition

Potential drivers of increased concentration, markups, entrenchment and polarisation	**S**	**D**	**Increase intensity of competition and reward the most productive firms with higher market shares ('benign' effects)**	**Decrease intensity of competition by raising barriers to entry and expansion for smaller and emerging competitors ('adverse' effects)**
1. Structural drivers				
a. Digitalisation				
Increasing investments in proprietary IT and data	x		(i) increasing returns to scale of IT solutions lower marginal and	(i) higher fixed costs for entrants (ii) investment costs are 'sunk'

[148] See e.g. Autor et al. (2020), Haskel and Westlake (2018), Bessen (2022).
[149] See Philippon (2019), Baker (2019).
[150] The discussion here is similar to and inspired by the discussion in Bessen (2022) and Philippon (2019).

across the economy (not just in the digital sector)			average costs (ii) enable higher product differentiation at low cost (iii) synergistic efficiencies from combining various assets	(iii) weak diffusion of innovation and productivity improvements (iv) barriers due to necessary access to complementary assets (v) enable various new forms of exclusionary conduct
Network and platform effects	x	x	Significantly amplify positive effects of scale economies	Significantly amplify negative effects of scale economies and raise switching costs
Lower search and quality comparison costs for customers		x	'Superstar' effects in markets where quality matters for competition	n.a.
b. Increasing investment in other intangibles and in particular R&D, patents and brand advertising	x		(i) increasing returns to scale (ii)enable innovative and differentiated products (iii) synergistic efficiencies	(i) raise fixed costs (ii) endogenous sunk costs (iii) enable various forms of strategic exclusionary conduct
c. Globalisation				
More competing suppliers	x		In industries competing globally increased number of potential rivals	May lead to increased concentration domestically
Access to more customers		x	(i) increases potential returns to high fixed costs and therefore incentivises greater investment	(i) in 'Suttonian' industries with high endogenous sunk costs the extension of the addressable market favours disproportionately larger existing firms => extension of concentration to more markets (ii) due to the rising importance of investments in proprietary IT solutions more industries have become 'Suttonian' industries
Outsourcing of labour	x		larger firms with sufficient scale will become more efficient	higher fixed costs of setting up global supply chain
d. New types of firm conduct linked to structural changes	x		(i) Increase of efficiency enhancing complementary mergers without negative effects on competition (ii) some innovations in pricing practices may have brought benefits to consumers	(i) Increase of harmful M&A by leading firms including pre-emptive acquisitions of emerging competitors/'killer acquisitions' (ii) new forms of limit pricing excluding competitors (iii) new forms of (tacit) coordination aided by algorithms (iv) exclusionary conduct based on patents and other IP rights (v) no-poach and non-compete agreements (vi) …
2. Institutional drivers				
a. Regulation and lobbying				
Product market regulation decreasing or increasing regulatory barriers	x		Product market reforms aiming at lowering barriers (e.g. market integration in Single market, DMA)	Regulation aiming at protecting legitimate public interests (health, safety) raises fixed costs favouring larger firms and creating barriers for challengers and entrants

More concentration enables more lobbying/rent seeking	x		n.a.	Favours large firms and raises barriers for challengers and entrants
b. Weakening of competition enforcement			n.a.	Increases market power and raises barriers for challengers and entrants

As regards the **digitalisation of the economy** there are three main potential causal channels discussed in the literature.

The first and probably most discussed channel is the rise of investments in proprietary and customised software, data, related assets (such as scanners for the collection of data) and the setting up of internal IT-organisation hereinafter referred to as **investments in proprietary IT-solutions and data**.

In 1980 in an influential book on business strategy Porter (1980) claimed that firms had to choose between two generic mutually exclusive types of business strategies, namely a strategy built on having lower costs than competitors or a strategy based on product differentiation. He argued that it was impossible to combine the two because differentiation implied complexity and complexity implied higher costs.

The IT revolution which has played out over the last 40 years seems to have allowed leading firms in many sectors of the economy to overcome this fundamental dilemma. Firms in sectors such as general consumer retail, specialist consumer retail for example for furniture, sports equipment or apparel, automotive, low-cost air transport or transport by bus seem to have been able to leverage powerful and innovative IT solutions to offer consumers a differentiated and complex set of products based on equally differentiated and complex price points (typical features of a differentiation strategy) while maintaining at the same time lower costs than many of their competitors (typical feature of a low cost strategy).

As set out in the economic literature[151] the rising importance of investments in proprietary software, databases and related assets and capabilities may have 'benign' and 'adverse' effects on the competitive process at the same time.

Investments in proprietary IT-solutions and data may have benign effects for competition, first, because they allow firms with high IT-adoption to offer a larger variety of highly differentiated products at various price points while at the same time procuring inputs and producing at relatively lower costs than their competitors.

Secondly, investments in proprietary IT-solutions scale better than investments in classical tangible investments for example in a new factory. Investments in IT solutions do not increase the marginal costs of the firms involved: selling to additional customers does not

[151] See Bessen (2022), Haskel and Westlake (2018).

lead to additional IT costs. They also lead to lower average costs with every additional customer (sometimes referred to as 'increasing returns to scale') favouring thereby large firms which manage to increase their customer base for example by expanding globally. Contrary to investments in most tangible assets (e.g. a new large factory) the economies of scale due to IT-solutions also do not diminish when they reach a certain threshold level, but are scalable mostly without limitations.

Thirdly, like other investments in intangible assets (e.g. investments in patents, brands, human capital) they are synergistic with other tangible or intangible assets. Investments in proprietary IT-solutions can thus lead to significant additional efficiencies, if they are combined with the 'right' data and scanners and sensors and managed by the 'right' IT-organisation. This favours again larger well-managed firms which dispose of, or can procure, the assets and capabilities required to achieve these synergies.

At the same time, the rising importance of investments in proprietary IT solutions has also features which create increased barriers to entry and expansion for challengers and entrant firms for essentially five reasons:

(1) Potential challengers and entrants have to incur initial high fixed costs to build their own proprietary IT-solutions.
(2) Those fixed cost are 'sunk' cost, i.e. in case of a failed challenge or entry cannot be recouped; this makes it more risky and difficult for challengers and entrants to finance such investments.
(3) Large scale proprietary IT solutions are typically highly customised and integrated with other assets of a firm, take years to be built, are protected by business secret, are usually not licensed to others (as there is no interest for the firm to do so) and are therefore difficult to imitate or replicate for a potential competitor. The innovation and productivity improvements embedded in proprietary software solutions do therefore not 'diffuse' as well a as past technological innovations of market leaders even where those innovations were patented[152].
(4) In those sectors where synergies with other assets are important, challengers and entrants need to have access to the necessary complementary assets in question (e.g. data); otherwise they will be unable to reap the full potential benefits of the investments.
(5) Since the investments in proprietary IT solutions are not just 'sunk' but also endogenously determined (i.e. discretionary) and since diffusion and synergies are so important, the rise of proprietary IT solutions also enables multiple forms of exclusionary strategies and conduct which may or may not be illegal. Firms can for example engage in strategic 'limit pricing' or selective 'predatory pricing'. They can also withhold or degrade access to essential complementary inputs, conclude no-

[152] As explained by Bessen (2022), for patented innovation (i) the publication of the patent provides transparency over the chosen technology path and (ii) in many instances the patent owner has an incentive to licence its innovation.

poach agreements or agree non-compete clauses in labour contract to limit diffusion and once established as industry leaders decide to innovate less than they would in a competitive environment and 'just enough' to keep competitors out of the market.

The second digitalisation related channel discussed in the literature is the rise of **network and platform effects**.

Network and platform effects can further considerably amplify both the benign and the adverse effects on competition discussed above for other proprietary IT-solutions. On the positive side they may allow for the creation of even better products, greater product variety and differentiation and lower average costs. On the negative side, they further increase barriers to entry through increased switching costs for customers and higher fixed/sunk costs.

During the last 20-25 years network and platform effects have been of key importance in particular in the digital sector for internet services, software and online retail. The strong presence of such negative effects in the digital sector during the past 25 years is one of the reasons why the Commission has focussed some of its enforcement efforts on that sector and why the EU has now adopted the sector specific Digital Markets Act.

Network and platform effects have also been present in the past in a few other sectors such as payment services. Going forward they are likely to become increasingly important in more traditional sectors such as automotive and agriculture.

Network and platform effects are nonetheless unlikely to be one of the main drivers of the trends reported above. This is because during the last 20-25 years they have been present mostly only in the digital sector which in itself represents only around 3-4% of EU gross output. This is a crucial difference with the channel discussed above of rising investments in proprietary solution which play an important role in many more industries representing together ~70% of EU gross output[153].

The third digitalisation related channel discussed in the literature is that the rise of the internet has **reduced the search costs** for consumers and customers and facilitated price and quality comparisons. As a result, the firms with the best products can gain quickly large market share with winner-takes-most dynamics[154]. These effects are strongest in markets where firms compete mainly on quality (e.g. heart surgeons, football players, pop singers, rare whiskeys). They also become more pronounced when the number of consumers increases due to globalisation.

While this is an important consequence of the digital revolution, this effect - in isolation - is unlikely to be one of the main drivers of the observed trends as it would lead to frequent

[153] Bessen (2022).
[154] Superstar effects in a narrow sense as identified by Rosen (1981).

massive reallocations of market shares depending on which firm currently offers the products with the best price quality relationship. By contrast, the data shows that in most sectors business dynamism and the frequency of the reallocation of market shares have decreased[155].

As regards **business investments in other intangibles such as R&D, patents or brand advertising,** the past 20-25 years have seen a parallel rise in R&D expenditure, patenting and brand advertising across many sectors which may also be an explanation for the observed trends of rising concentration, markups, entrenchment and productivity dispersion. Investment by firms in R&D, patents and brand advertising have from an economic point of view similar (albeit not identical) characteristics as investments in proprietary IT solutions and data and are therefore often discussed together under the heading 'investments in intangibles':

- Such investments in R&D, patents and brands can increase the intensity of competition and benefit consumers by enabling the most efficient firms for example in the pharma sector to offer innovative products, to reap important economies of scale by expanding globally and to make further efficiency gains by combining the innovations with other intangible or tangible assets.
- *At the same time* they favour larger established firms and raise barriers to entry for challengers and entrants because they involve (a) high fixed costs, (b) sunk costs, (c) require complementary assets and capabilities (e.g. in order to bring a pharmaceutical invention to the market globally a firm needs to dispose of a large and sophisticated organisation ensuring regulatory approval in jurisdictions around the globe) and (d) enable various forms of strategic exclusionary conduct such as 'killer acquisitions', anticompetitive patent settlements, patent thickets or patent holdups.

As regards **globalisation**, three main channels are discussed in the literature.

The first channel is an increase in the number of suppliers. Globalisation exposes firms to more import competition due to the expansion of more efficient foreign firms into new markets. This increases competition and puts a downward pressure on prices forcing domestic producers to consolidate. This consolidation in turn may lead to increased domestic concentration. At the global level this effect (absent 'Suttonian' effects discussed below) should however be mainly a deconcentrating force and a force reducing markups and profits.

The second channel related to globalisation is an increase in the number of potential customers: globalisation has opened up additional markets for exporting firms.

[155] Philippon (2019), p. 52.

In traditional manufacturing industries such as steelmaking a geographic widening of the addressable market leads to more intense competition and more competitors as more firms will be able to reach the level of minimum efficient scale. In this type of industries (*type 1 industries*) an increase in the number of customers leads to more competitors and less concentration on the new wider geographic 'market'.

Economic scholars Shaked and Sutton (1987) have however found that in other industries characterised by large endogenous (i.e. discretionary) 'sunk' fixed costs (*type 2 industries*) such as (i) advertising intensive industries (e.g. beer, carbonated soft drinks), (ii) industries which require high upfront R&D costs (e.g. pharma, manufacturing of large commercial aircraft) a geographic widening of the addressable market may *not* lead to the emergence of a large number of new competitors, but extend a concentrated market structure to the wider market. This is because in type 2 industries the returns to scale are such that access to larger markets reduces the average costs of incumbents further increasing their efficiency, while raising the fixed cost barriers for potential entrants. In other words, in type 2 industries the increase of the addressable market disproportionately benefits larger firms.

In that connection it is important to note that the rise of intangible investments during the last 20-25 years in particular as a result of growing importance of investments in proprietary IT solutions even in traditional manufacturing sectors such as automotive, furniture or clothing may have increased the relative number of type 2 industries and thereby made 'Suttonian effects' associated with endogenous sunk costs more prevalent across the economy.

The third channel related to globalisation is the rise of outsourcing of production and of global supply chains. On the positive side, such outsourcing increases the efficiency of firms making use of outsourcing. On the negative, costs setting up global supply chains involve increased fixed costs which constitute a barrier for potential competitors. This channel may therefore again favour larger firms which can incur the larger fixed costs and the risks related to global supply chains.

As regards **new types of firm conduct** linked to the other structural changes discussed above the economic and antitrust literature discuss mainly (i) a possible increase of harmful M&A by leading firms including acquisitions of nascent competitors (ii) new forms of limit pricing by industry leading firms excluding competitors, (iii) new forms of (tacit) coordination possibly aided by algorithms, (iv) various forms of exclusionary conduct based on patents and other IP rights, (v) no-poach and non-compete agreements limiting the diffusion of knowledge and innovations across firms.

As regards the rise of 'adverse' M&A the idea is that the number of transactions which remove important competitive constraints between existing competitors or remove competitive constraints from emerging competitive threats (e.g. killer acquisitions in pharma, pre-emptive acquisitions of emerging competitors in the digital sector) might have

risen. This would then directly help to explain the rise in concentration, markups, profits, entrenchment and dispersion.

When discussing the effects of M&A it must be borne in mind, first, that (i) many mergers do not negatively affect the competitive process (in particular mergers in industries and markets which are not concentrated or mergers bringing together complementary capabilities) and (ii) that also 'benign' mergers with significant efficiencies can lead to an increase of concentration or higher markups through lower costs. Observing an increase in M&A is therefore not as such sufficient evidence that there are more anticompetitive mergers than in the past.

Secondly, and on the other hand, there is evidence that some of the most harmful types of M&A transactions may be structured ways to escape legal scrutiny or public attention[156]. Therefore analysing only publicly reported M&A may underestimate the competitive harm brought about by M&A transactions.

As regards the **changes to regulatory barriers and lobbying** the economic literature discusses three partly related channels.

The first 'benign' channel increases competition by pro-competitive regulatory reforms. Such pro-competitive reforms can come from market integration policies, trade policies, sectoral policies or competition policy. Examples include pro-competitive reforms of the single Market or of trade policies[157], of regulation in the areas of telecommunications[158], payment services[159] or the recent Digital Markets Act[160].

The second channel with – often involuntary – 'adverse' effects for competition consists in regulation raising barriers to entry and expansion in the pursuit of important and legitimate public interest objectives such as the protection of health and safety, the protection of the environment or the protection of workers. Citizens expect the State to ensure that they receive high quality, safe and environmentally unproblematic products and services. Governments have therefore during the last 20-25 years continued to impose ever higher standards on firms for example in the area of the safety of pharmacological products, chemical products or passenger aircraft. This type of necessary regulation raises however also often the fixed and sometimes variable costs of competing in the industry concerned.

[156] Wollmann (2019), Cunningham et al. (2021).
[157] See OECD (2014) with a literature review summarising various pieces of research documenting how those two policies have increased competition (see for example references on page 5).
[158] See e.g. Article 1(2)(a) and (b) of the European Electronic Communications Code (Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018, OJ L 321, 17.12.2018): 'implement an internal market to achieve … sustainable competition' and 'ensure the provision of … good quality services … through effective competition'.
[159] See e.g. Recital (1) of Regulation (EU) 2024/886 of the European Parliament and of the Council of 13 March 2024 as regards instant credit transfers in euro (OJ L, 2024/886, 19.3.2024): 'to create favourable conditions for increased competition'.
[160] See Article 1(1) of the Digital Markets Act (Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022; L 265/1): ensuring 'contestable and fair markets'.

As a result, regulatory barriers to competition may have increased across many industries favouring inadvertently larger firms and thereby contributing to higher concentration, higher markups and profits, declining business dynamism and growing productivity dispersion.

The third channel is lobbying. It is well documented that often the most effective lobbying comes from the side where the economic stake is bundled in the hands of a few (e.g. established firms in a concentrated market), rather than from the side where interests are dispersed among many (e.g. customers, new entrants)[161]. While not all lobbying is necessarily bad for competition, there is evidence[162] that it aims at least in part to protect profits of existing firms and to raise or maintain barriers for potential challengers or entrants. Lobbying is more likely to succeed if the industry is more concentrated. The observed increase in industry concentration may therefore have contributed to more successful lobbying and thus have contributed to raise barriers to compete for challengers and entrants.

As regards the **weakening of competition enforcement** by competition authorities such as the Commission, the economic literature[163] discusses the hypothesis that for example under the influence of the 'Chicago school' of economics, or due to insufficient resources antitrust enforcers may have become significantly less interventionist than in the past. As a result, they would have allowed significantly more anticompetitive M&A deals and intervened less often and robustly against anticompetitive conduct than in the past.

I.3.2 DISCUSSION OF THE ECONOMIC EVIDENCE IN SUPPORT OF THE DIFFERENT CANDIDATE DRIVERS

In order to explore empirically which of the potential channels discussed in the previous subsection may have been the main drivers of the observed increases in concentration and markups, OECD (Calligaris et al., 2024) performed an extensive regression analysis.

A regression analysis is a statistical method used to estimate the relationships between a dependent variable and one or more independent variables (also called 'predictors'). By analysing empirical data such a regression analysis can (i) quantify the strength of such relationships and (ii) help to identify significant 'predictors'. It is however necessary to bear in mind that kind of regression analysis discussed here provides essentially only descriptive evidence on the extent to which different variables are conditionally correlated, but does not as such imply *causal* relationships. It provides therefore qualitative and suggestive evidence, but not definitive proof.

OECD (Calligaris et al., 2024) regresses concentration and markups against several structural and institutional variables identified above as potential drivers of the observed

[161] See e.g. Stigler (1971); Becker (1983); Baldwin and Robert-Nicoud (2007).
[162] See for example OECD(2021) Lobbying in the 21st century, Zingales (2017), Lancieri et al. (2022).
[163] See for example the discussions with further references in Philippon (2019), Bessen (2022), Eeckhout (2021), Baker (2019).

trends including (i) intangible investment intensity analysing in a second step separately investments in proprietary IT-solutions and in R&D and patents, (ii) openness to trade (OTT) as a proxy for globalisation, (iii) proxies of product market regulation, and (iv) indicators of M&A activities of leading firms. Also the relationship of concentration with macro-economic indicators such as (v) productivity and (vi) the labour share is explored.

The regression results are consistent with prior findings in the literature that (i) several drivers have likely contributed to the observed trends and that (ii) the main drivers of the evolution of competition in the EU during the last 20-25 years were likely similar to the ones in the U.S. although the trends observed in the EU regarding concentration, markups and profits are likely more muted.

I.3.2.1 STRUCTURAL DRIVERS

The regression analysis in OECD (Calligaris et al., 2024) finds that both concentration and markups are positively correlated with the intensity of intangible investments in the industry concerned.

More in detail:

- concentration is found to be strongly positively correlated with the intensity of intangible investments in the industry concerned. This correlation is comparatively even stronger (in statistical terms) for intangible investments in proprietary IT-solutions than for intangible investments in R&D and patents;
- the correlation between markups and intangible intensity, while positive, is found to be weaker than the one between concentration and intangible intensity. Investment intensity in R&D and patents is positively correlated with markups, while the analysis does not find a statistically significant positive relation between markups and investments in IT solutions.

In line with economic theory and the findings of other researchers[164] this analysis by the OECD team suggests that the rising importance of intangible investments across many manufacturing and services industries (not just in the digital sector) has disproportionately benefited larger and successful firms and reallocated market shares to them: large successful firms have become even larger and more successful.

Openness to trade (OTT) is found to be overall negatively correlated with both markups and concentration. As such, as predicted by economic theory and prior empirical research, more openness to trade therefore appears to increase competition[165].

However, pro-competitive effects of trade appear to be present mainly in less intangible-intensive sectors (type 1 industries). When interacting the two channels of intangible

[164] Bajgar et al. (2021), Bessen (2022), Brynjolfsson et al. (2023).
[165] See for further examples from the literature OECD(2014).

intensity and OTT, the positive relationship of intangibles on concentration and markups appears stronger in industries more exposed to international trade. Put differently, trade seems to magnify the relationships between intangible intensity and concentration and markups in type 2 industries.

These results suggest that, as predicted by Sutton (2001), in industries where 'sunk' investments in intangibles matter, globalisation did not lead to more competition, but has allowed large multinational firms to extend their leading positions to the entire globe.

This analysis taken together with other existing research suggests that like in other jurisdictions important drivers of the observed trends in the EU economy have probably been *structural 'winner-takes-most' dynamics* mainly due to (i) digitalisation (mainly the rise of investments in proprietary IT solutions), (ii) the rise of other intangibles (patents, brands, human capital), and (iii) globalisation through scale effects.

These structural 'winner takes most' dynamics have likely *both*

- allowed large globally active firms which have successfully invested in proprietary IT solutions or other intangibles (patents, brands, human capital) to become more efficient than their competitors and to gain market shares at their expense (reallocation effect of competition, as such 'benign' for competition), and *at the same time*;
- raised barriers to entry and expansion for smaller challengers and entrants, as they have now to overcome (i) higher fixed costs which are also sunk, (ii) a more limited diffusion of innovation and productivity gains than in the past and (iii) increasing opportunities for incumbents to engage in legal or illegal strategic exclusionary conduct enabled by the more concentrated market structures and the rise of intangibles ('adverse' effect for competition).

The hypothesis that the main drivers of the observed trends in competition in the EU have been mainly structural 'winner-takes-most' dynamics characterised by both benign and adverse effects is corroborated by several other pieces of evidence from the present report and the economic literature:

- according to the evidence reported in Section I.2 the trends on essentially all relevant indicators of concentration, markups and business dynamism point in the same direction across most advanced economies suggesting that the main drivers are structural. If institutional factors were the main drivers, one would expect to see more divergences between countries with different regulatory and competition enforcement regimes;
- the research on concentration set out above has shown that concentration increased in particular in already more concentrated sectors consistent with the hypothesis that due to structural changes in the economy favouring firms with scale economies, large firms are getting larger;

- the research on markups set out above has shown that markups have increased mainly at the top of the markup distribution and not for average firms. Markups also increased more in IT-intensive sectors than in other sectors;
- the research on the evolution of the profits of Global Superstars set out above has shown that profits increased mainly at the top of profit distribution and less for other large firms belonging to the same sectors. Some of the largest increases in profits have been observed in intangible investment intensive sectors such as IT, pharma, consumer goods and retail, while profits of leading firms in more traditional manufacturing sectors such as steel, automobiles or engineering have remained similar to those of the past. Higher profits in the former groups of sectors are also found to be associated with high barriers to entry;
- the findings of the research on rising entrenchment at the top and decreasing entry set out above is consistent with the hypothesis that at the same time structural factors have raised barriers to entry and expansion for challengers and entrants;
- as regards productivity growth, past research shows that leading firms at the productivity frontier have continued to experience considerable productivity growth while follower firms have found it increasingly difficult to compete creating a growing gap between leaders and 'laggards'. The regressions conducted by the OECD team show that this dispersion of productivity is more pronounced in more concentrated sectors again consistent with the 'winner-takes-most' hypothesis;
- as regards the labour share both prior research and the regressions of the OECD team show that firms at the frontier of the productivity distribution have, on average, a lower labour share and that this relationship is even stronger in more concentrated industries;
- recent research on correlations between measures of competition and prices shows that at least before the recent inflationary surge prices in the EU were stable[166] and higher concentration was not correlated with higher prices[167]. The observed relatively stable prices are consistent both with benign effects that leading firms have been able to increase their margins and profits mainly because they were able to lower their costs and with adverse effects that rising concentration and barriers to entry and expansion have prevented that higher markups and profits are competed away or passed through to customers and consumers via lower prices;
- as regards the responsiveness of firm prices and profits to shocks and monetary/financial policy measures recent research shows positive correlations between higher concentration/markups and lower responsiveness to shocks and monetary and fiscal policy measures[168].

[166] Kouvavas et al. (2021).
[167] Ganapati (2021).
[168] Duval et al. (2021), and Kouvavas et al. (2021).

I.3.2.2 INSTITUTIONAL DRIVERS

As regards the potential *institutional* drivers, first, according to the regression analysis conducted by the OECD team the rise of *regulatory* barriers to entry and expansion to entry and expansion may also have contributed to some extent to the observed winner-takes-most dynamics.

The OECD (Calligaris et al., 2024) regression analysis explores whether concentration and markups in industries downstream of industries with higher regulatory burden experience higher concentration and markups. It uses for this purpose an indicator which captures the degree of dependence of single industries on the use of inputs from sectors with burdensome regulations.

The OECD (Calligaris et al., 2024) regression analysis finds that industries with a higher dependence on inputs coming from industries with more burdensome regulations display, on average, higher concentration, lower markups and higher prices at the product market level. One possible interpretation of these results is that concentration increases downstream because, if inputs are more regulated and become more expensive, bigger downstream firms are advantaged relative to small firms, as they may be able to run operations at larger scale or diversify their inputs by importing them from less regulated industry-countries, meaning that they are more shielded from the higher costs induced by regulation.

The evidence on this point is however less complete than on the structural factors discussed above as (i) the OECD (Calligaris et al., 2024) regressions provide direct evidence only about the effects of increasing regulation on downstream markets and (ii) prior research also by researchers from the OECD using different indicators failed to find such a possibly causal link.

While it is plausible that rising regulatory barriers in industries such as pharma, the chemical industry or aircraft manufacturing may favour larger firms in those industries themselves (due to higher fixed costs) as well as in downstream industries through the mechanism explored by the OECD team and while it is also plausible that these two effects have also made a significant contribution to the overall winner-takes-most dynamics described above, the evidence which we dispose of at this stage is not sufficient to conclude with a high degree of certainty that rising regulatory barriers across many industries would have contributed significantly to the observed winner-takes-most trends. Further research in this area would be necessary.

Second, as regards a potential *weakening of competition enforcement* the regression analysis of the OECD team finds that in the EU M&A by industry leading firms has likely also contributed to the observed rise in concentration and markups. According to the regressions the magnitude of this effect is however small. A 10 percentage point higher share of M&A activity by the top 4 firms is associated only with a 0.2% higher markup and 0.7% higher CR4.

These results, first of all align with previous literature which also finds a relatively small, but also discernible contribution of M&A by leading firms to increased concentration[169].

Second, as explained above, mergers can lead to higher concentration and markups both when their 'benign' or when their 'adverse' effects dominate. A contribution of M&A by leading firms to the observed trends of increased concentration and markups is therefore neither automatically worrying nor automatically benign.

In this regard, a number of recent studies consider that there may have been some underenforcement of the competition rules also in the EU[170]. Wollmann (2019) also provides evidence that harmful M&A and other transactions may be structured in a way to escape antitrust scrutiny altogether[171].

On the other hand, the stability of EU competition enforcement over time, a metastudy of several ex post evaluations of merger decisions in Europe, as well as the nature of the observed changes suggest that the significant changes observed in concentration and markups can likely not be explained *mainly* by a weakening of competition enforcement in the EU:

- EU competition enforcement in both merger control and antitrust has been remarkably stable over the last 20-25 years. Koltay et al. (2023) for example show a relatively stable intervention rate except for the three years after the financial crisis. This in itself makes it implausible that the observed significant changes in concentration and markups were mainly driven by a *weakening* of competition enforcement;
- a metastudy of ex-post evaluations of mergers[172] found that the evaluated mergers typically increased price by only a small amount. Such price increases happened mainly in unconditionally approved mergers and that remedies mitigated price increases even in concentrated markets;
- the nature of the observed changes points to growing concentration mainly as a result of organic growth or the acquisition of complementary firms which merger control could not prevent. Moreover, the research above also suggests that average markups have increased mainly as a result of the reallocation of market shares to more efficient and higher markup firms (between-firms effects) and therefore not

[169] Bajgar et al. (2021); IMF Staff Discussion Note (2021).
[170] Stiebale and Szücs (2022) analyse the impact of 194 horizontal mergers analysed by the Commission between 1999 and 2007. They find that following those mergers the markups of rivals increased by 2 to 4% suggesting that there may have been underenforcement in some of the analysed merger cases during that period. Affeldt et al. (2021) calculate the compensating efficiencies that would prevent a merger from harming consumers for 1 014 horizontal mergers affecting 12 325 antitrust markets scrutinized by the European Commission between 1990 and 2018 and conjecture on that basis that overall horizontal merger enforcement of the EU Commission, although stricter than the enforcement by other authorities, may have been overall too lax during that period.
[171] Wollmann (2019).
[172] Ormosi et al. (2015).

so much as result of firms increasing their markups (within-firms effects) for example through higher prices.

If anything, there is evidence that EU competition enforcement evolved in parallel with the changing economic environment during the last 20-25 years (see below subsection I.4) and might therefore, as suggested by some observers, have contributed to ensure that the observed – mainly structural – trends towards increased concentration, markups and profits have been less pronounced in the EU than in the U.S.

Overall, the regression analysis of the OECD team and evidence from previous literature suggest:

- the rise of regulation raising barriers to entry and expansion may also have made a significant contribution to the observed 'winner-takes-most' trends. The evidence at our disposal at this stage is however not sufficiently developed and consistent to draw firm conclusions. Further research in this area is necessary;
- the rise of M&A by leading firms has likely made a small, but discernible contribution to rising concentration and markups. While some studies consider that EU competition enforcement may have been sometimes too lax during the last 20-25 years, the magnitude and nature of the observed changes can probably not be explained by such limited underenforcement. If anything, EU competition enforcement evolved in parallel with the changing economic environment during the last 20-25 years (see below subsection I.4) and may actually have contributed to ensure that the observed trends towards increased concentration, markups and profits have been less pronounced in the EU than in the U.S.

I.3.3 DID THE INTENSITY OF COMPETITION IN THE EU OVERALL INCREASE OR DECREASE?

As to the question whether *overall the intensity of competition in the EU increased or decreased during the last 20-25 years* or, in other words, which of the benign or the adverse effects of the drivers discussed above have *on balance* had more impact, it is useful to differentiate between (i) different *aspects of competition*, (ii) different *categories of firms*, (iii) different *sectors*, (iv) different *countries* and (v) different *time periods*, before (vi) concluding on the overall balance of effects.

(1) As to *different aspects of the competitive process*, the evidence reported in sections I.2 (evolution of indicators of competition and po) and I.3.2 (regression analysis) above suggests:

Reflecting the 'benign' consequences of structural changes during the last 20-25 years, digitalisation, globalisation and the related rise to the top of efficient firms with innovative business models in sectors such as general consumer retail, specialist consumer retail for furniture, sports equipment or apparel or low-cost airlines have likely brought *at least initially* (see below the discussion of the evolution of competition over time) significant

benefits to consumers in terms of increased product variety and lower quality adjusted prices.

At the same time, the 'adverse' effects of the structural changes during the last 20-25 years (i.e. rising concentration and rising barriers to entry and expansion) have probably contributed to the emergence of an economy in which dynamic competition appears to have weakened with a number of possible consequences:

- dynamic competition has declined both (i) at the top reflecting higher concentration and more limited competition between leaders and (ii) as measured by entry rates reflecting more limited competition by challengers and entrants;
- in many sectors markups and profits of leading firms have increased considerably and appear to be also increasingly persistent[173]. The evidence on markups and profits reported in section I.2.3 above therefore shows that increased markups and profits are not competed away or passed on to consumers, suggesting increased market power and ineffective competitive constraints[174]. For example, the reported trends in the beer industry (see section II.1 below) suggest that during the last decade firms in high price countries Belgium and France have been able to raise their prices and margins further, widening the price gap with lower price Germany;
- while according to economic theory high profits are not bad *per se* as they may be a necessary reward to incentivise innovation and risk taking[175], the reported combination of significantly rising markups and profits with low or decreasing churn at the top[176] as well as the rise of profits by firms or in industries which do not innovate a lot (e.g. branded consumer goods, oil&gas extraction, retail)[177] raise concerns[178].
- contrasting with the increasing profit levels, the level of investments is overall worryingly low, suggesting that some of the most profitable firms may be subject to limited competitive pressures to invest in better or new products[179];
- the worrying low aggregate levels of productivity growth, investments, innovation and overall growth in the EU during the last decade after the financial crisis (sometimes referred to as 'secular stagnation') have been found by various researchers[180] to be associated with lower business dynamism, increased concentration and increased dispersion of markups and productivity growth between frontier firms and laggards;

[173] See above section I.2.3.
[174] See for example De Loecker et al. (2020).
[175] This fundamental insight originates from J. Schumpeter.
[176] See section I.2.3. above.
[177] See the section on global superstars I.2.3.4 above.
[178] See for example Eeckhout (2021), with further references.
[179] See for example I. Schnabel (2024) with further references.
[180] See the regression analysis in OECD(2024a) reported in section I.2.4.1. See also Akcigit and Ates. (2021), Andrews et al. (2015), Barrela et al. (2022), Biondi et al. (2023).

- the also worrying decline in the labour share[181] has also been found to be associated with rising concentration and markups[182].

(2) As to different *categories of firms* the evidence reported in section I.2. and in particular in the sections on markups and profits, the section on superstars and the sections on productivity dispersion suggests:

On the one hand, competition as experienced by the vast majority of firms which are small, or which do not belong to the top of the markup or profit distribution, has likely not decreased or become less intense. If anything, for these firms technological change and globalisation may even have intensified competitive constraints. That is possibly why a majority of respondents to the survey of EU-based exporting firms responded that domestic competition in the EU is intense in their respective sectors and has increased in recent years, as will be discussed in part II of this report.

On the other hand, as the research reported in section I.2. shows, competition as experienced by leading firms has likely decreased. The growing concentration in already concentrated sector, rising markups and profits at the top of the distribution of firms and declining business dynamism at the top suggest that in many sectors both competition between leading firms and competition from challengers and entrants have decreased.

(3) As to different *sectors* the evidence reported in section I.2. above and in the literature suggests:

There seems to be significant sector heterogeneity as regards the balance of benign and adverse factors affecting competition.

Miller (2024) summarizes and evaluates a set of six industry studies (also for the U.S.) that examine market power over long time horizons in specific settings. A theme that emerges from these industry studies is that technological advancements, including sector specific technological advances, matter a great deal for the evolution of economic outcomes. By contrast, he finds that the studies do not point to weak antitrust enforcement as contributing to greater market power.

Covarrubias et al. (2020) attempt to disentangle for the U.S. the presence of benign and adverse effects by industry sector. They find that in the IT hardware manufacturing sector ('durable computer manufacturing') benign drivers seem to dominate. It exhibits high intangible capital intensity but remains relatively competitive, likely as a result of intense foreign competition. By contrast, the evolution of concentration and markups in telecommunications, banking, and airlines are predominantly explained by the adverse effects of rising barriers to entry and expansion. They exhibit high concentration, high profits and low productivity growth. Interestingly, some sectors such as the pharma and the software sector exhibit both strong benign and adverse effects.

[181] See for example Autor et al. (2020), De Loecker et al. (2020).
[182] See the regression analysis in OECD(2024a) reported above- in section I.2.4.3.

For Europe, the OECD team[183] has developed a multi-indicator sector scorecard of 127 narrowly defined industries that compares them according to the degree of competition present and the ensuing 'antitrust risk' in the sector concerned. Using firm-level data several indicators of competition, each capturing different facets of competition in an industry, are combined into a composite indicator which allows to tentatively rank industries according to their competitive intensity. The industries with the highest antitrust risk include gas, telecommunications, pharma, rail transport, beverages, cement and aerospace. The sectors exhibiting the lowest antitrust risk include the manufacturing of textiles or plastic, freight transport by road, travel agency activities or architectural & engineering activities.

It follows from this type of research, first, that many unconcentrated sectors have likely continued to be subject to intense mainly 'benign' effects of technological change and globalisation and experienced effective competition. Also, some concentrated sectors with large firms such as retail, car manufacturing or the manufacturing of semiconductors seem to have experienced, during the last 20-25 years, relatively intense competition with significant technological and business process innovations and leapfrogging at the top (e.g. Tesla, Nvidia), likely associated with positive effects for customers and consumers.

Second, on the other end of the spectrum, sectors belonging for example to the consumer goods sector such as household and personal care products, breakfast cereals, carbonated soft drinks, tobacco or beer, or to concentrated business to business sectors such as aircraft manufacturing, cement, pesticides and seeds have likely experienced a rise in concentration, a further widening of the gap between leading firms and followers combined with limited churn at the top and may have brought overall possibly only limited additional benefits for customers, consumers and the wider economy.

Third, as pointed out by Covarrubias et al. (2020) some sectors such as software and pharma have likely experienced both an increase in the benign consequences of structural change and the related adverse aspects. In both sectors important technical progress with significant benefits for consumers took place and at the same time the market power of leading firms and barriers to challenge those firms – including barriers based on strategic exclusionary conduct – have likely also increased.

(4) As to differences between *countries* the evidence reported here suggests:

The observed trends regarding concentration, business dynamism, markups, profits and the associated trend regarding productivity dispersion and the decline of the labour share are directionally similar in many advanced economies, reflecting that the dominant drivers are likely structural and not institutional.

On the other hand, the trends in the EU regarding concentration, markups and profits are on average more subdued than in the U.S. Moreover, within the EU the rise of concentration

[183] OECD (Abele et al., 2024).

and markups is in some countries less pronounced than in others, with Germany as a notable example of such less pronounced trends.

One possible explanation is the different sector mix in different countries. In the U.S. economy sectors more strongly affected by the structural changes discussed in this Section (e.g. IT, consumer goods, pharma) may have a comparatively greater weight than for example in Germany where traditional manufacturing sectors may have a greater weight.

Another possible explanation is institutional differences, in the sense that more vigorous competition enforcement in EU or in countries such as Germany may have contributed to ensure that the adverse effects of the structural changes discussed above have been less pronounced than in the U.S.[184]

(5) As to differences between *different time periods* the evidence reported here and from the economic literature suggest:

The winner-takes-most dynamics discussed in this Section imply that the balance between benign pro-competitive effects of structural change and the adverse effects reducing competition may change over time and have possibly been *sequential*.

During an initial phase, firms which make the best use of the new opportunities provided by digitalisation and globalisation outcompete previous incumbents with better products and lower costs. During this first phase the balance of benign and adverse effects is positive for customers, consumers and the overall economy: important product innovation takes place, quality adjusted prices decrease and productivity growth increases.

During a second phase the adverse effects of the 'winner-takes-most' dynamics (higher fixed and endogenous sunk costs, reduced diffusion, increased opportunities for exclusionary conduct) are on balance stronger than the benign effects: the 'winners' reap significant profits, while being subject to decreased competitive constraints from peers (due to increased concentration) and from challengers and entrants (due to increased barriers).

Several economic scholars have presented mainly for the U.S.[185], but partly also for Europe[186], economic evidence for such a sequential scenario. Their research seems to confirm that the benign effects of winner-takes-most dynamics may have dominated during the early years of the digital transformation and globalisation while the adverse effects seem to have dominated during more recent years and in particular after the financial crisis.

Bessen (2022) finds for the U.S. economy that during a first period (roughly from 1980 to 2000) average measures of business dynamism at the top as well as average productivity growth increased in parallel with concentration and markups. During a second period (roughly from 2000 to 2019) business dynamism at the top and productivity growth

[184] Philippon (2019).
[185] Bessen (2022), Aghion et al. (2023), and Akcigit and Ates (2021).
[186] De Ridder (2024).

declined reflecting a period where the adverse effects due to increased barriers dominated. Covarrubias et al. (2020) find also for the U.S. economy that benign effects dominate roughly until 2007 while the adverse effects dominate afterwards.

Interestingly, from a European perspective, De Ridder (2024) develops a similar model offering a unified and sequential explanation for the rise of market power, the slowdown of productivity growth and the decline in business dynamism which he structurally estimates on French and U.S. micro data. He suggests in line with the above that the rise of intangible inputs such as software can explain these trends. In his model, after initially boosting productivity, the rise of intangibles causes a decline in productivity growth consistent with the empirical trends observed in both the U.S. and Europe.

(6) As regards the overall effects on welfare, De Loecker et al. (2021) introduce a model in which two channels can cause a change in market power as measured by markups: (i) technology, via changes to productivity shocks and the cost of entry, (ii) market structure, via changes to the number of potential competitors. They find for the U.S. economy that changes in technology and market structure over the period 1980 to 2016 yielded positive welfare effects from reallocation of market shares to the most efficient firms and the exit of less efficient firms, but even larger off-setting negative welfare effects from deadweight loss and increasing overhead. According to their estimates overall, welfare in the U.S. was 9 percent lower in 2016 than in 1980.

Pellegrino (2023) develops another model to estimate the welfare consequences of the increase in oligopoly in the U.S. from 1996 to 2019 which expressly takes both the benign and the adverse aspects of structural change into account. He estimates that in 2019 oligopoly lowered total surplus by 11.5% and depressed consumer surplus by 31% while both numbers were significantly lower in the mid-90s, i.e. 7.9% and 21.5%, respectively.

Overall, the evidence presented in this report and from the literature suggests that on average competition in the EU seems to be weaker than in the past while the market power of firms at the top of the markup and profit distribution seems to be more pronounced. This development may have contributed to adverse macro-economic trends in the EU such as (i) reduced business dynamism and (re-)allocation of resources, (ii) higher productivity dispersion and slower productivity growth, (iii) higher wage inequality and a lower labour share and (iv) a reduced responsiveness to economic shocks and economic policy measures.

I.4. A TAXONOMY OF COMPETITION RISK AT SECTOR LEVEL

This section presents an analysis by the OECD team of competition at sector level. OECD (Abele et al., 2024) develops a new composite indicator which combines various indicators of competition with the aim to establish a 'scorecard' of 127 industries in the EU, ranking them according to their degree of competition. This 'scorecard' can be used to identify sectors in which competition is potentially more at risk compared to other sectors.

The analysis underlying the composite indicator and ranking is based on the same firm-level data and largely the same indicators (see Table 4 below) as the analysis of the evolution of industry concentration, markups and entrenchment reported above.

This exercise is closely related to a strand of literature which attempts to identify sectors which are at highest risk from a competition perspective. Perhaps most relevant is prior work by Ilzkovitz et al. (2008) and Antonielli and Mariniello (2014), both providing a ranking of manufacturing industries in the EU based on market characteristics which are assumed to facilitate anticompetitive activity[187].

Table 4: Categories of indicators of the scorecard

Industry Structure	Industry Outcomes	Industry Dynamics
***Concentration*:** share of gross output accounted for by the 4 largest firms in an industry (CR4)	***Market power*:** firm-level markups.	***Entrenchment*:** average number of firms that were in the industry top 4 the previous year.
	***Revenue profitability*:** ratio of industry-level gross profits (EBIT) over industry-level gross output.	***M&A activity*:** value of acquisitions of top 4 firms within the same industry as a share of total within-industry acquisitions.
	***Asset profitability*:** ratio of industry-level gross profits (EBIT) over industry-level assets.	***Firm age*:** average age of top 4 firms in each industry.
		Market share instability: average of absolute industry share changes of top 4 firms between t and t-1.

Source: OECD (Abele et al., 2024). Note: the three categories of indicators receive equal weight in the computation of the composite competition indicator (33% each). Within each category each variable receives equal weight.

As the individual indicators relied on for the scorecard are measured in different units, each is normalized using a Z-score, allowing for comparability[188]. This process enables the

[187] Characteristics which are assumed to facilitate collusion include a low number of active firms, a transparent market which reduces the probability of price cutting and high barriers to entry, lowering the chance of outsiders entering the market and destabilizing the collusive agreement. Further examples include Motta (2004), Symeonidis (2003) and Grout and Sonderegger (2007).

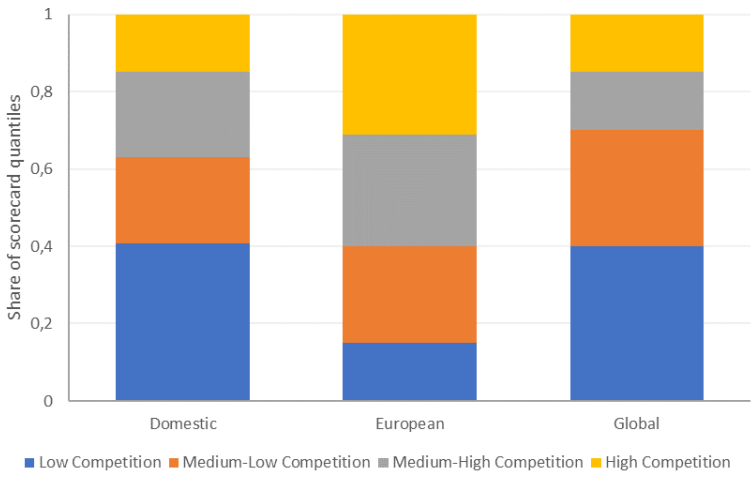
[188] Essentially, the Z-score measures how many standard deviations (which measures how spread out the data is around the mean) an observation at industry level lies above/below the mean across all industries, allowing for an aggregate ranking. As an example, if the indicator under consideration is CR4, a Z-score of 0 means that the joint revenue share of the top 4 firms in a particular industry is exactly equal to the average across all industries, whereas a Z-score of +1 (-1) means that the CR4 is one standard deviation above (below) the mean. The final composite indicator is obtained by first calculating a sub-indicator for each of the three categories in Table 4, which is the average across each individual Z-score within that category. Averaging over these three sub-indicators yields the final aggregate Z-score. For each industry-indicator pair, the former being denoted by the subscript s, whereas the latter is given by the variable x, the Z-score is given by the following formula:

$$Z_s = \frac{x_s - \bar{x}}{\sigma}$$

aggregation of industry performance across multiple indicators into a singular 'score' and the creation of a corresponding ranking. For the final scorecard of industries, see Annex 3 as well as OECD (Abele et al., 2024)[189].

One important consideration to be made is whether the degree of competition is influenced by an industry's geographic scope. Several contributions suggest that globalization resulted in more intense competition, which might indicate that industries in which firms compete on a global scale would perform better compared to their European and national counterparts. Figure 49 presents the distribution of industries by levels of competition for each geographical market. This graph suggests that European markets are the most competitive, as many industries characterized as such compete on the common market. While speculative, this could indicate that European integration, both economically and politically, has at least partly succeeded in guaranteeing free trade and creating a level playing field between the various member states, thereby contributing to a competitive environment.

Figure 49: Share of scorecard quartiles by geographic bucket



Source: OECD (Abele et al., 2024)

In an exercise similar – but not identical – to Koltay et al. (2023), Ilzkovitz et al. (2008) and Antonielli and Mariniello (2014), OECD (Abele et al., 2024) further relates the composite indicator to EU competition enforcement interventions in the areas of mergers and antitrust. The composite indicator can be used to assess how well targeted the Commission's interventions have been, under the presumption that an industry which is

With $\bar{x}$ denoting the mean value of a certain indicator across all industries, and σ denoting the standard deviation.

[189] The final ranking was subject to several robustness checks, consisting of comparisons with alternative composite indicators, which allowed for variation in the included metrics, as well as alternative weighting schemes which attached a higher weight to some indicators relative to others. While doing so results in a reshuffling of the ranking, this was mainly restricted to the third and second quartile. the firms at both the top (first quartile) and bottom (fourth quartile) of the ranking stayed largely the same.

ranked low in terms of competitive intensity should be scrutinized more by competition authorities in comparison to sectors where competition seemingly functions well.

The number of interventions within each industry, disaggregated by type (merger, antitrust or cartel), are obtained from a DG Competition case database[190]. Out of 127 industries, 97 were subject to an intervention at least once. In examining the relation between industry score and antitrust interventions, a positive and statistically significant relation was found between a higher Z-score and an increased risk of merger and non-cartel antitrust interventions[191].

To illustrate this relationship, Figure 50 depicts the relation between the ranking and how often an industry has been subject to merger interventions[192]. The x-axis contains the different NACE industries which are included in the scorecard. Moving from left to right along the x-axis, these categories are ranked according to the composite indicator and grouped together by quartile. Quartile 1 contains the industries which performed best across all indicators (industries with more competition and less competition risk), whereas for quartile 4 the opposite holds (industries with less competition and higher competition risk). The y-axis depicts the corresponding 'intervention score', which is an indicator of the degree to which an industry has been subject to merger interventions by the EC[193].

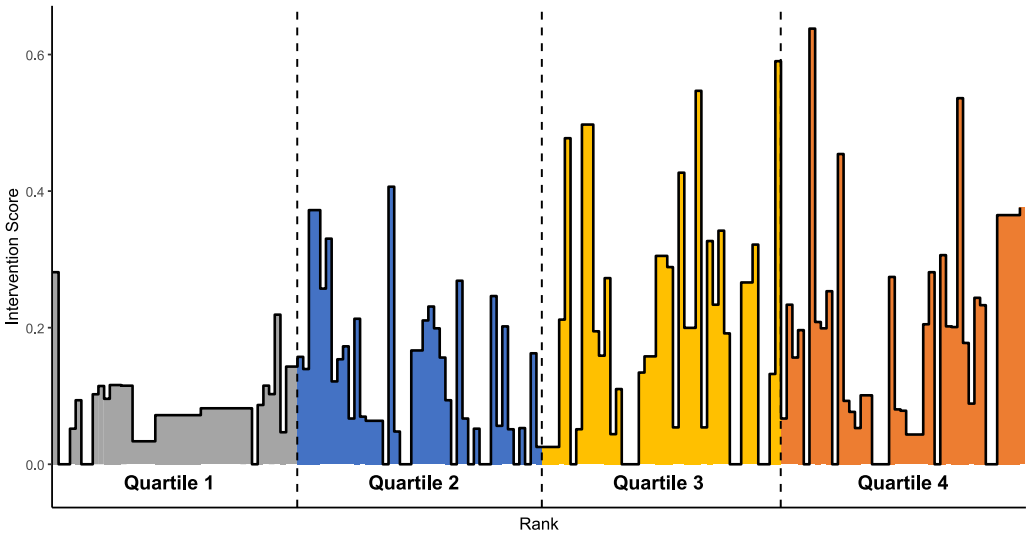
[190] The number of interventions for each industry is modelled as a function of industry size (measured by total gross output in millions of euros over the sample period, as larger industries are presumed to be a more likely target for intervention) and either the composite indicator or its constituent parts individually. This includes antitrust interventions under article 102 (abuse of dominance) and 101 (non-cartel infringements) TFEU, as well as merger interventions and cartel cases. Cartel and antitrust interventions are only available from 2004 onwards, rendering this the cut-off as prior interventions are excluded from the sample.

[191] It was found that an increase in the Z-score by one caused more than a doubling (a 2.15 times or 115% increase) in the rate of antitrust interventions per EUR mil. of gross output at the industry level. In the case of mergers, a similar increase in the Z-score is associated with a 72% increase in the rate of interventions per EUR mil. of gross output. Both estimates are statistically significant at the 1% level, whereas the estimate on cartel interventions, while positive, is not.

[192] This analysis employs merger cases from the period 1998-2023.

[193] This score is composed of the number of merger cases and interventions against firm(s) in a specific industry. As larger industry categories are more likely to be subject to interventions by construction, an intervention rate is constructed by dividing the number of actual interventions by the total number of merger cases, as larger industries are also presumably subject to more cases. Consequently, should a large industry be subject to a high number of cases but a low number of interventions, this results in a low intervention rate, thereby controlling for an 'industry size' bias. However, sectors which have been subject to a single intervention and a single case would be assigned an intervention rate of 1. Based on the intervention rate, this would categorize them as a higher risk in comparison to an industry with 100 cases, but only 99 interventions. In order to control for this issue, the final intervention score is the average of the intervention rate, and a weight representing the total number of cases. This weight is an index, which is constructed by dividing the number of cases at the industry level by the largest industry specific case number, meaning the weight ranges from 0 to 1.

Figure 50: Merger intervention score by NACE sector

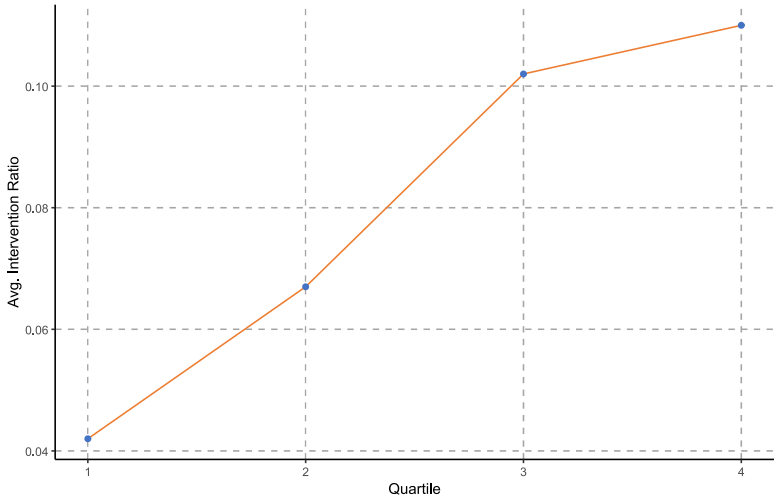


Source: Own calculations based on OECD (Abele et al., 2024)

This figure demonstrates that the industries where competition is considered to be more at risk based on the scorecard are also those industries that are more frequently the target of merger interventions based on the intervention score. An overall increasing trend in the intervention score can be discerned, although it should be noted that a significant degree of sectoral heterogeneity remains. Further clarity is provided by Figure 51, which depicts the average intervention rate by quartile, which equals the ratio of the number of interventions in a specific industry to the total number of merger cases within that industry. For the 1st quartile, less than 1 out of 20 cases results in an intervention. However, in the 4th quartile, this figure has more than doubled, as over one out of ten cases results in an intervention.

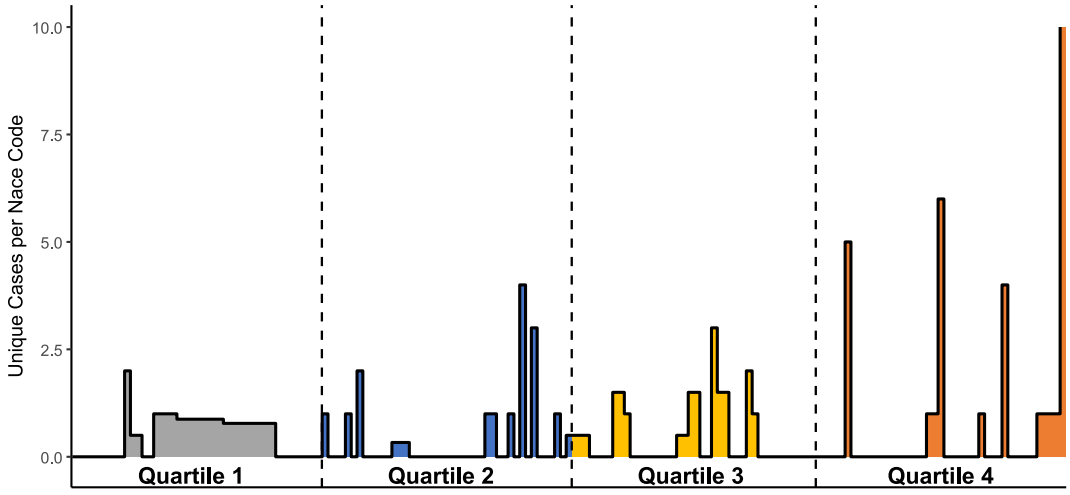
Lastly, Figure 52 displays the number of non-cartel antitrust cases per NACE sector. Although trends are perhaps less salient due to the more limited number of cases compared to mergers, this figure is consistent with the notion that sectors where competition is considered to be more at risk are on average also those sectors subject to a higher number of (non-cartel) antitrust cases.

Figure 51: The average merger intervention rate by quartile



Source: Own calculations based on OECD (Abele et al., 2024)

Figure 52: The number of non-cartel antitrust cases by NACE sector



Source: Own calculations based on OECD (Abele et al., 2024)

Although these results remain descriptive, they imply that merger and antitrust interventions were appropriately targeted, insofar as they align with the scorecard. Sectors where competition was found to be more at risk based on the scorecard were more frequently subject to interventions. However, as mentioned, caution should be taken as the various metrics used to quantify the intensity of competition are themselves not perfect.

PART II: ECONOMIC EVIDENCE ON WHY COMPETITION MATTERS

Most businesses and customers will not need much convincing that competition matters for prices, product quality, product variety and product innovation. Likewise, competition law and economics practitioners are familiar with the impact of effective or weak competition at the level of a narrow antitrust markets. This is the central issue assessed in individual antitrust and merger cases.

By contrast, fewer observers may be familiar with the economic research exploring how, and to what extent, competition affects broader economic outcomes at industry level or even across an entire economy.

The following three chapters will explore successively why and how competition matters: for prices in an entire industry and across countries (section II.1), for the competitiveness of EU-firms (section II.2) and for macro-economic outcomes such as investment, productivity, employment and overall economic growth (section II.3).

II.1. COMPETITION AND PRICES: INSIGHTS FROM PRICE CONCENTRATION STUDIES

According to the well-known Structure-Conduct-Performance (S-C-P) paradigm, market structure (S) is an important determinant of the way firms compete (C) and, ultimately, of market performance (P), such as the level of output, prices, investment and so on[194]. While it is clear that the chain of causes and effects which is stipulated by the S-C-P paradigm is neither mechanistic nor one-directional (see further below), it is also clear that market structure is a vital element in describing how competition works in any given market.

In practice, market structure is often first analysed by considering its level of concentration[195]. Market concentration can be measured in a number of ways: as the number of (significant) firms operating of the market, as the CR4 concentration ratio (which sums the market shares of the top 4 players), or through the Hirschman-Herfindahl index (HHI)[196].

The ability to measure concentration also makes it feasible to examine, where possible, the empirical relationship between market structure and market outcomes. In economics, the central object of 'price concentration analysis' is to assess whether prices are increasing with market concentration, i.e. whether prices are higher in markets where there are a few

[194] See e.g. Clark (1940).
[195] See Bishop and Walker (2010).
[196] The HHI is equal to the sum of the squared market shares of all firms active on a given market multiplied by 10 000. In contrast to the CR4, it not only looks at the market shares of the largest firms but considers how market shares are distributed as it attaches a higher weight to larger firms.

players (high market concentration), than in markets where there are many players (low market concentration).

The purpose of the present section is not to provide an exhaustive overview of the economic literature[197], but to provide, on the basis of an investigation of a limited number of illustrative sector/country studies performed by Lear et al. (2024), detailed evidence and understanding of the extent to which the relationship between industry concentration and prices observes certain empirical regularities and, notably, (i) whether and to what extent industry concentrations are correlated with higher prices and/or worse performance in terms of other variables of interest to customers (notably investment) and (ii) what can, in these illustrative cases, be the order of magnitude of the additional costs borne by customers exposed to malfunctioning competition in the sectors concerned.

Specifically, the sections below will focus on a range of B2B and B2C sectors, namely mobile telecom and airlines (for which substantial data analysis has been performed by Lear et al. (2024)), as well as beer, mortgages, modern consumer retail and cement (for which a more descriptive assessment has been prepared). These sectors cover products and services which are used by many households and businesses and play an important role in everyday life. They are also characterised by sometimes significant price differences between Member States[198].

Before proceeding to the specific sector analyses (in subsections II.1.2 – II.1.6), it is necessary to first outline a number of methodological issues that are important to point out to properly appreciate the strengths and weaknesses of such analyses.

II.1.1 CONCENTRATION AND PRICES – METHODOLOGICAL ISSUES

The methodological premise to price concentration analysis is that market concentration provides a useful approximation of the level of competition. From the outset, it is worth pointing out that the concept and purpose of price concentration analysis (exploring the relationship between market structure and market outcomes such as price) accords very well with basic economic intuition: in most markets the degree of market concentration (e.g. when measured by the number of firms in the market) matters for price[199]. In many economic models there is a well-defined causal relationship between a change in the number of firms in a given market, and price. In particular, a smaller number of firms in the market creates a greater incentive for the remaining firms to increase price. By focusing on this relationship, price concentration analysis can provide useful insight on the actual presence and magnitude of the causal effect of concentration on market outcomes.

[197] See, however, Lear et al. (2024), section 2, for an overview of the literature.
[198] See Lear et al. (2024), section 2, for greater detail.
[199] Lear et al. (2024), section 2.1.2.

The above basic insight is not confined to the number of firms in the market, but extends to other, more comprehensive measures of market concentration such as the CR4 concentration ratio or the HHI. Various models of market competition suggest that the more concentrated the market in terms of CR4 or HHI, the less competitive pressure firms face, which in turn leads to higher markups, prices and profits[200].

It is also known, however, that the relationship between concentration and price, even in a given market, is not always straightforward, in particular when concentration is not measured in terms of the number of players in the market but in terms of metrics based on market shares (such as the CR4 or the HHI). When, for instance, the largest player in the market is also the most efficient and is able to gain significant market share over time by reducing its price (to some extent), concentration as measured by market shares would increase in such a scenario, but this increase would be accompanied by lower prices[201]. In such cases, markets might even exhibit an inverse relation between concentration and price.

Price concentration analysis can be performed either by comparing prices across different geographic areas with different levels of concentration, a comparison of markets over time (e.g. following entry or exit in the market or other changes in market structure), or a combination of both. In practice, most recent studies exploit the latter approach and exploit variations in market structure across markets and over time to establish an empirical relationship between market structure and price.

However, for the estimated relationship to be correct ('unbiased') it is of paramount importance to make sure that important differences between sectors (such as differences in cost levels, demand conditions and regulation) are properly controlled for. Otherwise, the observed differences in price across markets might merely reflect differences in those specific conditions, rather than the difference in the level of concentration. Likewise, it is important that any observed changes in the market structure over time are not themselves caused by the prices that prevail within that market (so as to avoid 'endogeneity bias'). Otherwise, the estimated relationship between market concentration and price will in fact reflect a mix of causes and effects, but not a clean causal effect.

One might argue that markups are more directly related to the question of market power and that it could be more accurate to study the relationship between market concentration and profit margins or markups. However, a number of factors make that it is better to focus on price. First, there is the question of measurement. An important strength of a price concentration analysis is that prices, as opposed to profits or markups, can more easily be

[200] This relationship holds in most models used by economists to describe and analyse competition: Cournot models (where companies compete for volume), Bertrand models (price competition with differentiated products), as well as bidding markets. Furthermore, more concentrated markets are widely understood to foster collusion. See also Ivaldi et al. (2003).

[201] The workhorse model in which this dynamic holds is discussed by Melitz and Ottaviano (2008). See also Miller et al. (2022).

measured, and even at product level rather than at firm level. The price concentration analysis can therefore look at the relationship between prices and concentration at the product market level. Second, studies assessing the relationship between concentration and profit margins and markups may be difficult to interpret: low markups may reflect intense competition but may also be observed when markets are populated with inefficient firms, perhaps due to a lack of competitive intensity. A more direct approach to assess the effects of competition, notably from the perspective of customers, is therefore to focus on the relationship between concentration and prices.

II.1.2 MOBILE TELEPHONY: CONCENTRATION, PRICES AND INVESTMENTS

Over the past 15 years, the mobile telecommunications industry has seen increasing consolidation. The industry has experienced several four-to-three mergers around Europe and beyond, thus increasing market concentration on a global scale[202]. Within this general consolidation trend, the industry also experienced entries of Mobile Virtual Network Operators (MVNOs). These telecommunications service providers do not possess their own frequency spectrum and infrastructure, but instead lease Mobile Network Operators' (MNOs') network facilities.

This section presents the research findings of Lear et al. (2024) on the relationship between price and market structure in the mobile telecommunications sector using a novel dataset covering 29 countries (23 EU countries, as well as Canada, U.S., Japan, South Korea, Australia and New Zealand) over the period 2009-2019[203] (the so-called 4G era)[204]. The long time period allows to exploit substantial variation in market structure induced by new MNO entry, MNO exit (through merger), changes in concentration as measured by the HHI, as well as changes in the number of MVNOs[205].

In mobile communications, pricing is a complex issue, with fixed and usage-based price components, and the pricing schedules/profiles that change over time and country. Hence, choosing the 'right' measure of price in this industry is not an easy task. The approach used in the present analysis is to use ARPU, the average revenue per unit/user[206]. The main advantage of this metric is that it is a simple measure of how much consumers spend over

[202] Over the same period, some mergers have been blocked by competition authorities, including the European Commission. For example, case M.7612 - Hutchison 3G UK (owner of Three UK) / Telefonica UK (owner of O2).
[203] The year 2019 is chosen as the concluding data point to avoid confounding demand and supply factors that may have been related to the Covid-19 pandemic.
[204] Specifically, the analysis presented in this part draws on Lear et al. (2024), sections 2.2 and 2.3.
[205] The mobile telecommunication industry provides a relatively 'ideal' setting for a cross-country panel study on the relationship between market structure and prices. In fact, differently from other industries, mobile telecommunications is not a free-entry industry. Instead, operators need to be awarded spectrum licences to operate in the market. Therefore, the regulated environment of different countries allows changes in the number of MNOs to be taken as largely exogenous events, helping to interpret the results as causal and unbiased. When using country HHI as the main variable to measure market structure, the research implements a so-called instrumental variable approach to address potential endogeneity issues. See Lear et al. (2024), section 2.2 for more details.
[206] Data source: GSMA-I.

time on mobile telecoms and of the 'effective price' paid for this service. It therefore avoids several measurement issues that might occur when using the so-called basket approach[207], which measures the price of a fixed bundle of mobile services for different usage profiles[208].

The dataset confirms some well-documented empirical regularities from the economic literature. First, from Figure 53 below, one can observe that throughout the period analysed (2009-2019) the average ARPU is considerably higher (almost the double, in fact) in the U.S. compared to the EU[209]. Although in both regions ARPU is decreasing over time, the relative trend appears also stronger in the EU (see right hand panel), thus suggesting an even larger differential compared to the U.S. over time.

Figure 53: Evolution of ARPU in EU countries and the U.S.: ARPU levels (left panel) and relative change in % (right panel)

Source: Lear et al. (2024)

Second, countries with fewer market players are characterized by a higher average ARPU. Figure 54 compares the trend in ARPU for EU countries with three and four MNOs throughout the time frame of analysis[210]. One can observe that EU countries with three MNOs have consistently higher average ARPU compared to countries with four MNOs. Notably, the negative trend is very similar across the two groups of markets, suggesting that the difference in ARPU is likely to persist in the long run.

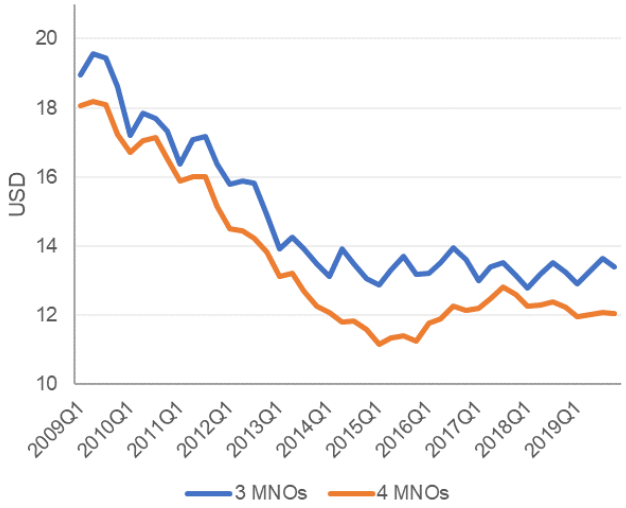
[207] See Genakos et al. (2018).

[208] The ARPU approach is, however, complemented with robustness checks using publicly available pricing data based on basket approach.

[209] In line with Philippon (2019), Faccio and Zingales (2022). The latter estimate that the higher mobile service prices in the United States vis-à-vis Germany or Denmark represent a USD 44-65 billion a year transfer from consumers to shareholders, contributing to income and wealth inequality.

[210] In other words, the chart contains markets that are characterised by different market structures and that do not experience either new entry or merger activities within the panel. The group of countries with three MNOs include Belgium, Czech Republic, Estonia, Finland, Greece, Hungary, Latvia, Lithuania and Portugal. The group of countries with four MNOs: Denmark, Poland, Romania, Spain and Sweden.

Figure 54: Evolution of ARPU in European countries based on the number of MNOs

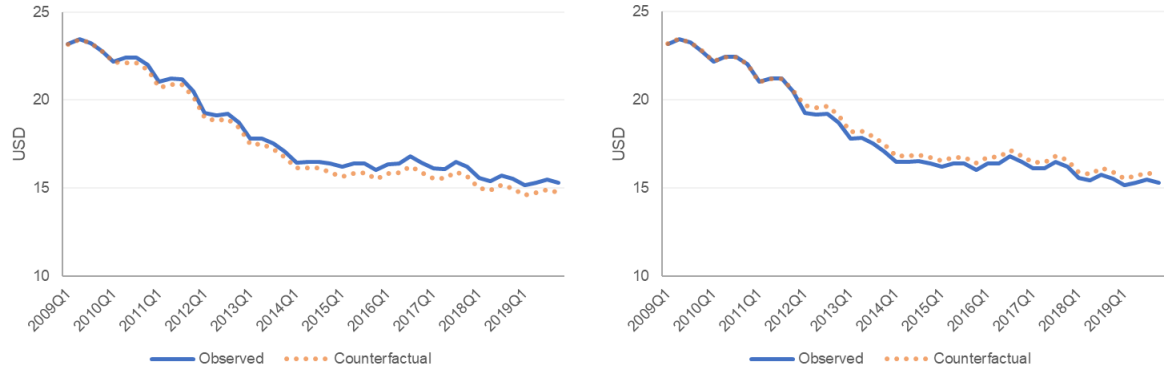


Source: Lear et al. (2024). Grouping based on countries with a constant number of MNOs over the period

Clearly, the above preliminary empirical assessment does not account for underlying cross-country differences that may explain the variation in price. Indeed, any cross-country comparison between ARPUs is not straightforward as customer habits, usage profiles, consumer purchasing power, regulations and tax rules may differ. Nonetheless, one can test if, following a change in market structure (e.g. merger or entry), it is possible to observe a change in prices compared to geographical markets that do not experience such a change (the control group), thus accounting for differences that are unobservable to the researcher (e.g. as they cannot be measured). This is the main reasoning behind the empirical strategy used by Lear et al. (2024), who have estimated a panel-based fixed effect model that controls for unobservable country-specific factors affecting market structure and prices. Overall, the results point to a strong and significant positive relationship between market concentration and prices. In particular, the estimates suggest that one additional MNO is associated with a reduction in average revenues per user (ARPU) by 7%. The impact is mostly driven by EU countries, in which one additional MNO is associated with a 9% reduction in ARPU.

The results from the above econometric analysis can also be used to obtain the estimated average price (ARPU) that would emerge in Europe without any merger or entry. Figure 55 below shows the evolution of the observed mean price in Europe (solid line) together with the price that would emerge absent mergers (left panel) or entry (right panel). Given the estimated negative relationship between the number of MNOs and price, absent the merger we would observe a lower average price (dotted orange line). On the other hand, without entry, average price would be higher than the observed one (idem).

Figure 55: Counterfactual estimates on ARPU without mergers (left panel) or entry (right panel) in Europe



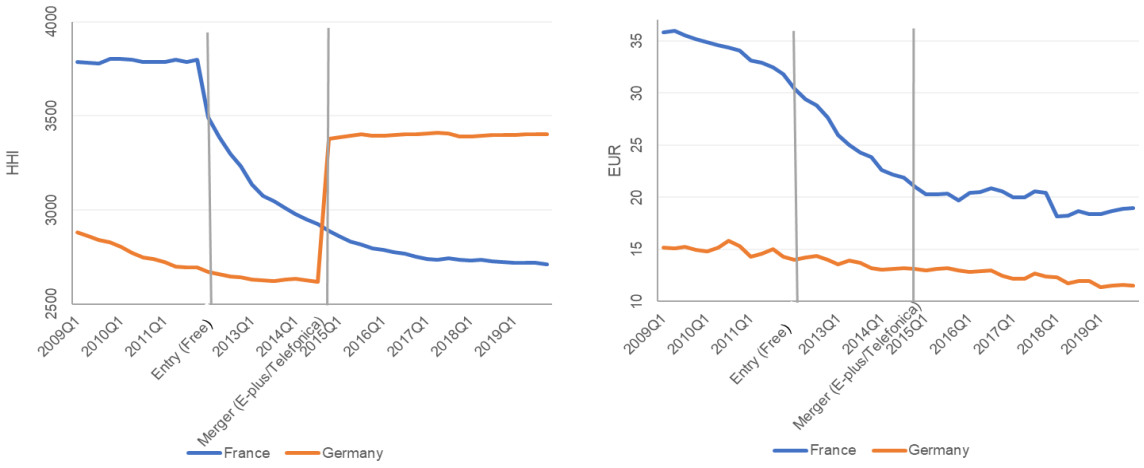
Source: Lear et al. (2024)

It is interesting to zoom in on how changes in the number of MNOs can affect prices by considering the specific example of market structure changes in France and Germany. Average ARPU decreased much more sharply following entry of a fourth player (Free Mobile) in France in 2012, compared to Germany where industry consolidation took place following the exit of a fourth player (E-Plus) in 2014, with some remedies imposed to counteract the effects of the merger[211]. Figure 56 below shows the evolution of the HHI in both countries (left panel) as well as the ARPU (right panel). As can be seen, both events affected market structure, thus changing the competitive landscape, while the gap in ARPU narrowed[212].

[211] See Case COMP/M.7018 - Telefonica Deutschland / E-Plus (2014).

[212] According to Bourreau et al (2021), the sharp decline in ARPU in France may in substantial part be explained by the introduction of low-cost alternatives ('fighting brands') by the incumbents in response to the entry of Free Mobile. They find that the entry of Free Mobile increased consumer surplus by about €4.6 billion or about 7.7 percent of industry sales during the period 2012–2014. After deducting the loss in producer surplus (profits), the overall welfare gain would still be €2.2 billion and 3.7 percent of industry sales. By contrast, the change in ARPUs after the exit of the 4th MNO in Germany may have been attenuated by (i) the remedy package put in place by the Commission (which was a 'capacity type' remedy, not just a regular access remedy, cf. https://ec.europa.eu/commission/presscorner/detail/en/IP_14_771), as well as (ii) some degree of customer inertia (gradualism in market adjustment) which may explain the more gradual change in ARPU observed.

Figure 56: The impact of entry and merger on HHI (left panel) and ARPU (right panel)



Source: Lear et al. (2024)

As regards MVNOs, the empirical research shows that these virtual operators have an impact on price which is very close to zero and not statistically significant, which suggests that they pose a negligible competitive constraint on MNO pricing. This may be explained by the fact that MVNOs are a source of product differentiation and segmentation for MNOs (allowing them to distinguish customer segments by price sensitivity) rather than a real competitive threat for the MNOs[213].

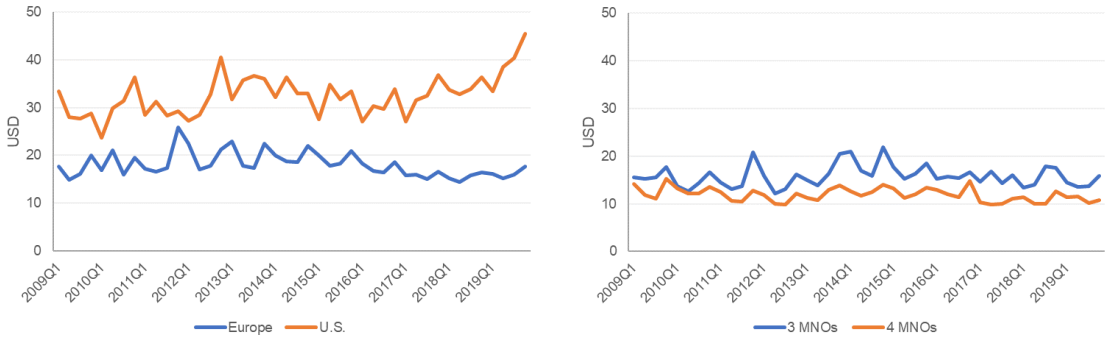
The dataset used in the analysis above can also be used to study the relationship between market structure and investment in mobile telecommunications. In this setting, the main variable of interest is mobile capital expenditure (CAPEX), both at the operator and country levels[214]. Given available information on the number of connections (both at operator and country levels), it is possible to compute average capital expenditure per connection (or user), which is a more comparable (even if still imperfectly comparable) measure across operators and different countries. It should be noted that investment levels are not an objective in themselves (as capital efficiency is also important), rather they are interesting as a proxy for improvements in the quality and availability of communications services as experienced by users.

A descriptive analysis of the dataset provides first insights into the relationship between investment and market structure in mobile telecommunications. Figure 57 below shows the evolution of CAPEX per user in the two regions. First, a simple comparison between Europe and the U.S. (left panel) shows that the level of investment in the U.S. (a four-player MNO market in the period investigated, but with higher and more stable ARPU than in the EU) has been consistently larger than in the EU. CAPEX per operator increases at the same rate

[213] See Ennis (2006).
[214] Following the approach of Genakos et al. (2018).

on the two sides of the Atlantic. Second, when focusing on the EU, the relationship between pre-existing levels of concentration and investment is less clear-cut. The figure (right panel) compares the trend in CAPEX per user for EU countries with three and four MNOs throughout the time frame of analysis[215]. Countries with four MNOs display a lower level of CAPEX per user compared to European countries with three MNOs.

Figure 57: Evolution of CAPEX per user in Europe and the U.S. (left panel) and in European countries, by number of MNOs (right panel)



Source: Lear et al. (2024). Grouping (right panel) based on countries with a constant number of MNOs over the period

At first sight, the above descriptive chart comparing 3-MNO countries with 4-MNO countries (right panel) might create the impression that investment per user is typically (slightly) higher in countries with three MNOs than in countries with four MNOs and that, as a result, further consolidation also *within* countries (from four to three players) could lead to higher investment levels at user level. However, one must be very cautious in drawing such conclusions. First, the selection of countries in the chart above is incomplete as it only portrays a limited set of countries, namely only those with a constant number of MNOs (3 or 4) over the entire period[216]. Second, there may be systematic differences between the two groups which are not yet accounted for. In particular, the 4-MNO group contains several larger countries (Spain, Poland, Romania) where some economies of scale may drive down CAPEX per user as fixed network costs can be spread over more users[217]. In other words, investment per user in 3-MNO countries may be higher, on average, because of these countries being small markets with few users, not because they have only three players in the market. As a result, any simple *cross-country* comparison (of 3-MNO vs. 4-

[215] That is, we focus on EU countries characterized by different market structures that do not experience either entry or exit during the period of analysis. The group of countries with three MNOs include Belgium, Czech Republic, Estonia, Finland, Greece, Hungary, Latvia, Lithuania and Portugal. The group of countries with four MNOs: Denmark, Poland, Romania, Spain and Sweden.

[216] Countries in the sample with three MNOs: Belgium, Czech Republic, Estonia, Finland, Greece, Hungary, Latvia, Lithuania and Portugal. Countries with four MNOs: Denmark, Poland, Romania, Spain and Sweden.

[217] Lear et al. (2024), p. 103. Given that costs of network deployment and operation are largely concentrated in local access networks, there are limits to the economies of scale available in bigger relative to smaller national markets.

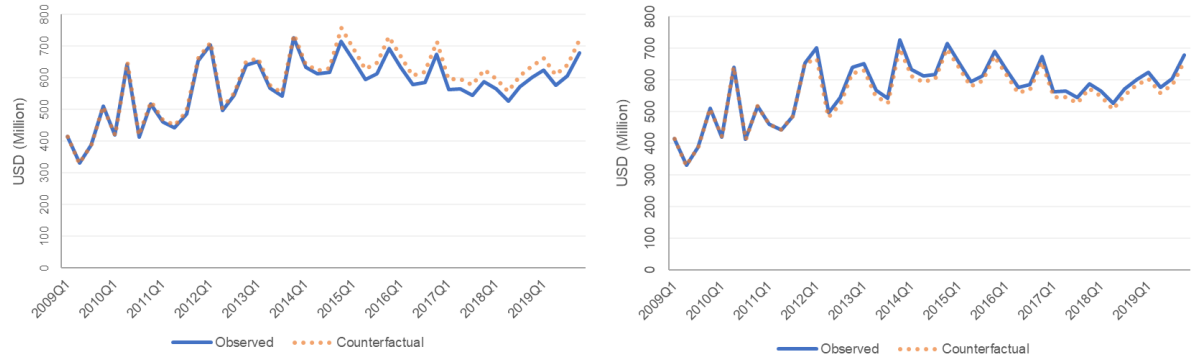
MNO countries) does not give us a complete answer to the question of what might happen if further consolidation would take place in any given country. To properly assess the *causal* effect of within-country consolidation it is necessary (as with the price concentration analysis before), to properly control for cross-country differences. One way to do so is to test, using the full sample of 29 countries[218], whether following mergers or entry, one observes a *variation* in investment levels compared to geographical markets that do not experience them (control group), thus accounting for shocks that are unobserved to the researcher.

The empirical results of this test point to a negative relationship between market concentration and investment. Regression results show that a rise in the number of MNOs is positively associated with country-level investment in mobile telecommunications (+10%). When using the HHI as the main variable of interest, the estimates are, on the other hand, statistically insignificant[219]. The below figure visualises the obtained estimates using the number of MNOs. Given the estimated coefficient, without mergers (in the counterfactual) we would observe a higher average CAPEX, while without entry a lower one would emerge. All in all, the charts suggest a meaningful negative relationship between country-level CAPEX and concentration. It should be noted that a higher CAPEX level with an increase in MNOs may be attributable (at least in part) to the unavoidable costs of deploying an additional network, or elements thereof, and thus less relevant to user experience of network quality. Conversely, higher capacity utilisation rates may lower CAPEX needs per user for a given user-experience quality on a smaller number of networks, provided network capacity limits are not reached.

[218] The full set of countries goes beyond the selection of countries depicted in Figure 57 and comprises 23 EU countries (as well as Canada, U.S., Japan, South Korea, Australia and New Zealand). For further details, see Lear et al. (2024), Section 2.2.

[219] Interestingly, the regression analysis also shows a significant positive effect of MVNOs on aggregate investment (+0.3%), which appears consistent that MVNOs, by making mobile telecoms services more accessible to different consumer segments spurs demand and, hence, investment in mobile networks.

Figure 58: Counterfactual estimates on CAPEX without mergers (left panel) or entry (right panel) in Europe



Source: Lear et al. (2024)

Finally, when focusing on EU countries characterized by different levels of concentration at the starting period of the analysis, one can observe that 4G roll-out has been similar across market with different concentration levels[220].

Summarising, the above research suggests that consolidation in mobile telecoms tends to lead to higher prices for users, while positive effects on investment in networks relevant to user experience or 4G roll-out could not be reliably discerned. An approximation by Lear et al. (2024) of the cost savings for European citizens deriving from higher competition (computed as the savings that would arise if all EU countries had four MNOs operating in the market) amounts to approx. EUR 800 million per year[221].

II.1.3 AIRLINES: CONCENTRATION AND PRICES

In the past 25 years, the airline industry, both in the EU and in the U.S., has seen quite some consolidation among established players, alongside new entry mostly by low-cost carriers (LCCs). The present section seeks to illustrate how, and to what extent, differences in the level of concentration impact upon price levels (fares per mile) in the sector[222]. It does so on the basis of data from a period (2015-2019) preceding the Covid-19 crisis, i.e. it covers a relatively stable time period within which to study this relationship. At the same time, the pre-Covid focus of the analysis is also a limiting factor in that the significant changes in market structure that have occurred in the market due to the financial impact of the crisis and, where relevant, the support measures of the public authorities, are not comprised in the below presentation[223]. The same applies to other (recent) changes that

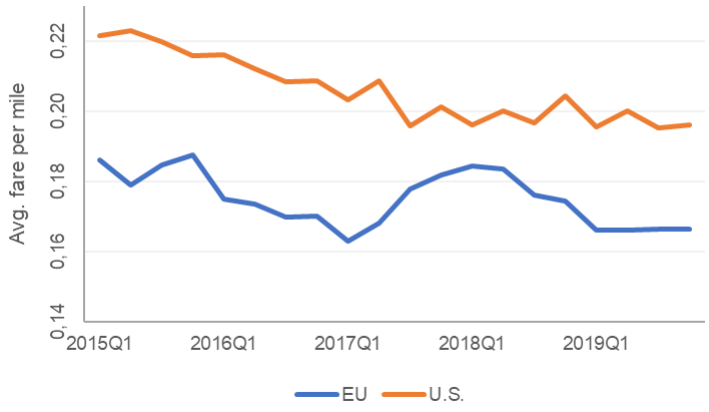
[220] Lear et al. (2024), Figure 2.8.
[221] Lear et al. (2024), p. 98.
[222] The analysis draws on the research conducted by Lear et al. (2024), section 2.4.
[223] For more detailed data on the impact of the Covid-19 crisis on the airline market in Europe, one can refer to European Commission (2023a).

may have affected market structure and/or prices, such as the increasing importance of emission costs (ETS) to European airlines or changes in the degree to which airlines face capacity constraints (airport slots, planes).

From the outset it is worth noting that on the one hand, the overall HHI of the EU airline industry throughout the period analysed (2015-2019) is lower than the one in the U.S. The aggregate HHI in the U.S. was 1 700 at the end of the sample period (2019) while in the EU it was only 600. This is because European airlines typically have a regional focus within the EU (i.e., their share of the EU industry as a whole is small). On the other hand, when we look at the route level, we do not see highly unconcentrated markets, but rather similar frequencies of monopolies, duopolies and so forth as in the U.S. Correspondingly, at *route* level, the HHI is approximately 6 000 at the end of the sample in the U.S. while in the EU it was slightly higher at 6 500. The latter figure should again be taken with caution, however as several routes in the EU may be substitutable to some degree (for example, a consumer who needs to go to Brussels can consider also nearby airports such as Charleroi). Performing the calculation at the regional (EU-NUTS2) level, the HHI gets closer to 2 700 (and roughly stable over the period considered), significantly lower than the route level concentration in the U.S. (which was increasing further over the period).

As regards pricing, one can observe that the average fare per mile in the U.S. in the period observed is significantly higher than in EU, by approx. 15%. The following chart presents the average (passenger weighted) fare per mile[224] in the two markets between 2015 and 2019:

Figure 59: Average fare per mile in EU and U.S. (expressed in 2015 euros)

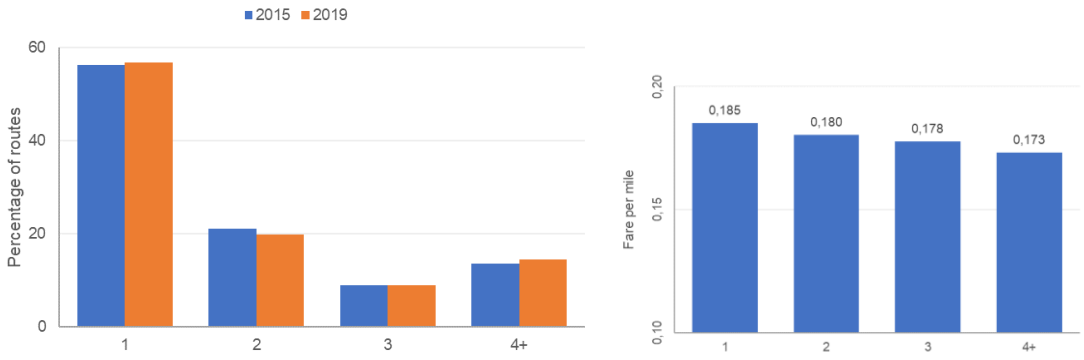


Source: Lear et al. (2024)

[224] Lear et al. (2024). Data source: Cirium data and data from the Bureau of Transportation statistics. The average fares per mile are weighted using the number of passengers and expressed in 2015 euros.

Several potential factors may play a role in this regard: factors related to the type of product that consumers demand (and their willingness to pay for it), and factors related to the supply of the service, in particular the level of competition between airlines. Starting from the former group of factors, due to geography, long distance commuting patterns, and the availability of alternative means of transportation, U.S. consumers travel a substantially longer distance than EU consumers. This difference in flight time may explain the larger importance of LLCs in Europe that persists until this day, both in terms of market share (the European market sees LLCs serving 50.5% of passengers against 38.4% in the U.S., and the EU top 5 list of airlines by volume includes three LCCs, ranked 1st, 2nd, and 4th.) and in the impact they have on observed price differences across the two regions[225]. In addition, the number of players operating per route is bound to have an impact on prices. Figure 60 below presents the relative frequency of routes in the EU for the years 2015 and 2019 (left panel) as well as the corresponding average price level expressed in fare per mile (right panel). It appears to show that fares per mile are lower on routes operated by more airlines.

Figure 60: Percentage of routes served by number of airlines (left panel) and average fare per mile (right panel) in the EU



Source: Lear et al. (2024)

The available data on concentration and price at route level allows to assess the relationship between price and market structure empirically. Specifically, econometric analysis of this relationship can exploit the variation in market structure across routes to estimate its effect on the price paid by passengers, controlling for other factors influencing price (such as the cost of fuel, seasonality effects, the presence of LCCs or the share of premium-service tickets sold by companies operating the route).

[225] It is worth noting that U.S. airlines offer to their passengers a service at a higher price than EU airlines for both types of carrier, i.e. legacy and LCC. In other words, the lower average fares per mile in Europe are not solely due to the higher market share of LCCs. See Lear et al. (2024), p. 117. This finding underlines the need to go beyond mere measures of concentration and to always look for further factors that may have an impact on competition and price levels.

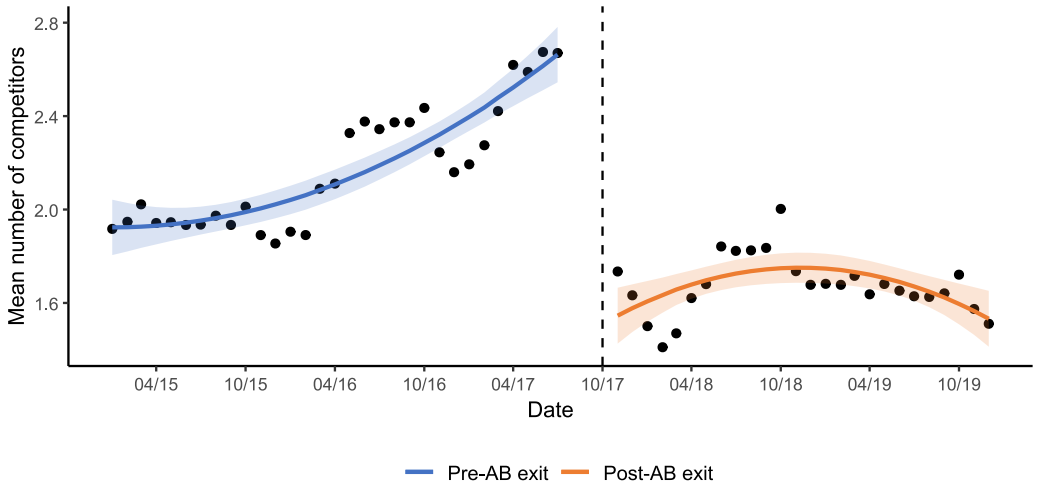
The results of this analysis clearly indicate that a lower number of airlines is associated with a higher price per mile travelled[226]. The estimated coefficients imply that, compared to the baseline competitive market structure of four or more competitors, the fare per mile in a monopolized route is, *ceteris paribus*, 5.6% and 5.9% higher in the EU and in the U.S. respectively[227]. In the case of a duopoly, in comparison to the same baseline, the fare per mile is 2.6% higher in EU and 3.6% higher in the U.S., while in the case of a triopoly the fare per mile is 0.9% higher in the EU and 0.6% higher in the U.S. Lastly, the analysis indeed reveals the impact on price of having a stronger presence of LCC, which is negative and highly statistically significant.

Next to the above descriptive econometric analysis, Lear et al. (2024) have also performed a different empirical strategy that aims at quantifying a *causal* relationship between the two main variables of interest. This empirical approach exploits an event that exogenously affected the market structure in many routes across Europe: the bankruptcy, in 2017, of Air Berlin and the acquisition of several of its assets by Lufthansa. This analysis, which takes the form of an event study, consists in comparing, before and after the event, prices on each and every Air Berlin route, thus holding everything constant (at least in the short run), but for the number of airlines. Figure 61 below shows the average number of airlines before and after the exit of Air Berlin from the market. This number was increasing in the months before exit, reaching a level of approximately 2.7 carriers in July 2017, but it dropped abruptly after the bankruptcy to approximately 1.6 and remained around that level until the end of the sample period (December 2019).

[226] Lear et al. (2024), Table 2.6.

[227] One might argue that routes with four competitors is not a very common phenomenon (applying to approx. 15% of routes in the EU, cf. Figure 60) and may not be realistic for some routes with lower passenger volume. In any case, the estimated price differences remain substantial even when compared with other benchmarks. For instance, prices per mile for monopoly routes are ca. 3% higher than for duopoly routes and another 2% higher when compared to routes with three players.

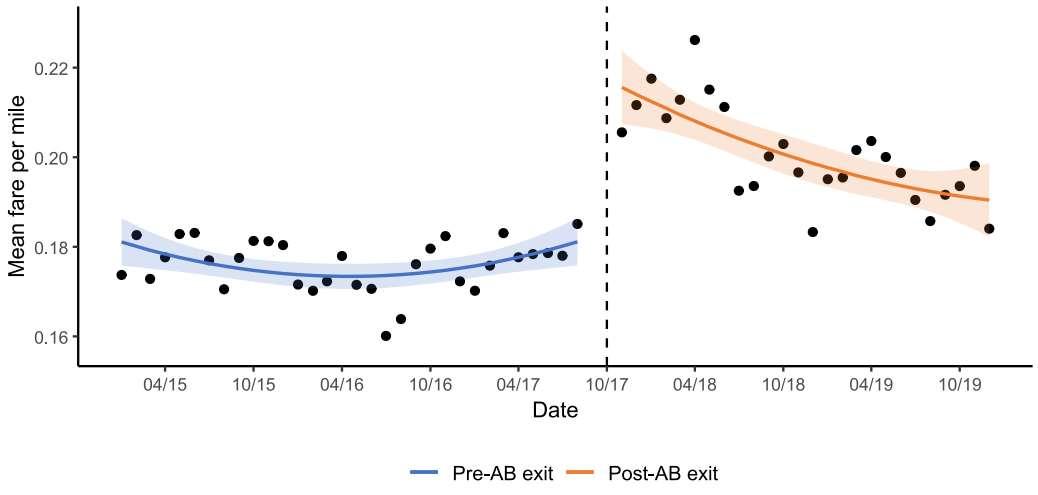
Figure 61: Number of airlines in Air Berlin routes before (blue) and after (orange) Air Berlin's exit



Source: Lear et al. (2024)

The impact of Air Berlin's exit on price levels is reported in Figure 62. One can observe that the average fare per mile paid by passengers travelling on Air Berlin's routes (in EUR) was fairly stable around 0.18 before the exit of Air Berlin, but after that suddenly increased to 0.215 (an increase of 19.4%) and remained above 0.19 throughout the following year (despite the volumes of passengers flying went back to the pre-exit levels rather quickly). On average, the price paid by passengers in the two years following Air Berlin's exit has been approximately 0.20, i.e. 11% more than the average price before the exit.

Figure 62: Average fare per mile in the routes served by Air Berlin before (blue) and after (orange) its exit



Source: Lear et al. (2024)

The regression analysis further points to the fact that the observed price impact of Air Berlin's exit was more pronounced on concentrated routes than on less concentrated routes.

To conclude, the empirical analysis shows that, in line with the literature, market structure has a strong impact on prices, which are found to be substantially higher in markets that are more concentrated. An approximation by Lear et al. (2024) of the potential gains for the consumers from a more competitive landscape in the EU airline industry (approximated here by increasing the number of airlines at route level by one) suggests a potential gain in the order of EUR 900 million per year[228].

II.1.4 INSIGHTS FROM THE COMPARISON OF CONCENTRATION AND PRICES FROM FOUR OTHER SECTORS

The above findings for mobile telecoms and airlines are also visible in a number of other sectors. While clearly more limited in scope, Lear et al. (2024) have evaluated the relationship between market concentration and prices in a number of sectors, notably the sector for beer, mortgages and modern consumer retail (all B2C markets) as well as the cement sector (B2B).

For beer, mortgages, modern consumer retail and cement, Lear et al. (2024) identify a subset of EU countries and analyse price differences across them, as well as differences in the relevant price determinants, including concentration. They find that differences between the lowest and highest prices observed in the samples, are around 66% for beer, 37% for mortgages, 38% for modern consumer retail and 80% for cement. Overall, cost differences do not appear to fully justify the observed price differences between countries. Differences in regulation may be a contributing factor, but also differences in market structure (market concentration) may determine part of the observed differences. The specific findings for each of these sectors are briefly set out below.

Beer

To descriptively illustrate the relationship between market concentration and prices in the beer sector, Lear et al. (2024) have collected market share and price data for five countries (Belgium, Czech Republic, France, Germany and Italy) between 2007 and 2022[229]. The dataset includes information about the volumes and the values of beer sales for both on-

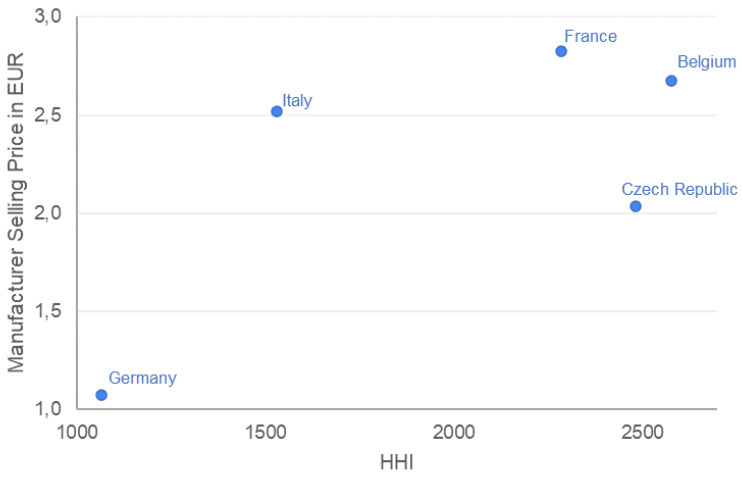
[228] The exercise consists in increasing the level of competition in all markets that are relatively concentrated – i.e. monopoly routes, duopoly routes, and triopoly routes – by one operator, and calculating, holding everything else constant, the savings that passengers would enjoy thanks to a lower price per mile travelled. This exercise comes with its own limitations, however. Firstly, the total number of passengers is kept constant despite the fact that a lower price would induce more people to travel, Secondly, it does not consider that having one more airline active in each route would increase substantially the costs to operate flights, both for the companies and for airports, thus partly offsetting the price reduction due to stronger competition. Finally, a full welfare analysis, would also imply to consider other elements, such as the increased environmental costs that the higher number of passengers would produce.

[229] Data source: Euromonitor, complemented with Alethius calculations.

trade and off-trade distribution (at producer level). While the dataset does not allow for controlling many other factors that may be important to better understand the price concentration relationship (let alone perform an analysis of causal relationships), it conveys useful insights.

To investigate the role of competition in explaining observed price differences, Figure 63 below shows a scatter plot between the HHI and manufacturer selling price (MSP) in 2021. The limited number of countries in the sample may not allow for drawing strong conclusions. While one cannot observe a very clear relationship between prices and market concentration, it is notable however that Germany, the country with the lowest HHI, has also the lowest prices: prices observed in Germany are 66% lower compared to other countries in the sample[230]. The cost of inputs is not found to be systematically lower for Germany than for other countries, thus excluding the possibility that lower costs explain the observed price differences[231].

Figure 63: Beer price at manufacturer level (in EUR) and HHI based on volumes for five Member States, 2021



Source: Lear et al. (2024)

The reported trends in Lear et al. (2024) on average beer prices furthermore suggest that during the past decade firms in high price countries Belgium and France have been able to even further raise their prices and margins further widening the price gap with lower price Germany.

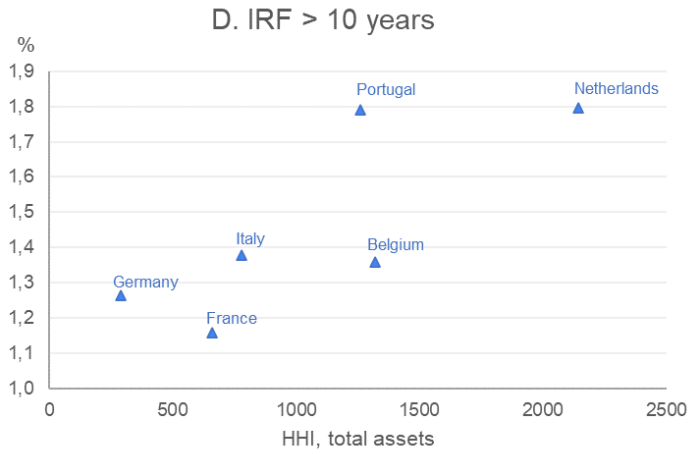
[230] See also the report of the Belgian Competition Authority (2024) for similar findings as regards Germany, Belgium, France and the Netherlands for the year 2022.
[231] There may also be certain demand factors at play, however, e.g. the types of beer consumed in countries may differ and hence also the consumption mix. See also Belgian Competition Authority (2024) for similar observations.

Mortgages

Lear et al. (2024) also explore the price-concentration relationship on the European market for residential mortgages. The purchase of a home arguably constitutes the most important component of household finance, as it often represents the biggest investment in an individual's lifetime for a large share of the population. In the overwhelming majority of cases, households will rely on a mortgage loan to finance the purchase of their house. In Europe, these mortgages are generally extended to households by banks. Even if there are still relatively many banks in Europe, concentration at country level has increased especially since the 2008-2012 financial crisis (after which the number of European banks decreased by 40%)[232] and there are important cross-country differences in the level of concentration.

Using data from the ECB[233], a specific analysis is conducted for the mortgage markets in seven European countries: Belgium, France, Germany, Italy, Lithuania, the Netherlands and Portugal. These countries exhibit large heterogeneity in the price that banks charge customers on their mortgages. The analysis reveals that those countries where prices are higher also tend to have higher level of banking concentration. This relationship is especially pronounced for fixed interest rate loans of longer duration (> 10 year), as illustrated by Figure 64 below[234].

Figure 64: Mortgage rates (in 2021) for fixed interest loans of longer duration (> 10 year) vs. concentration



Source: Lear et al. (2024)

For mortgages, more concentrated markets thus tend to have higher mortgage rates, with rates differing by as much as 71 basis points (0.71 percentage points) between the highest

[232] Own computations based on ECB series of total number of credit institutions.
[233] ECB Statistical Data Warehouse.
[234] Lithuania is not displayed in the chart as fixed interest rate loans exceeding 10 years are relatively rare in this country.

priced countries (Netherlands and Portugal) with relatively high levels of concentration and lower priced countries (e.g. France, Germany) with comparatively less concentrated markets, even if one should take into account that differences in mortgage risk across countries may also account for some of these differences.

Modern consumer retail

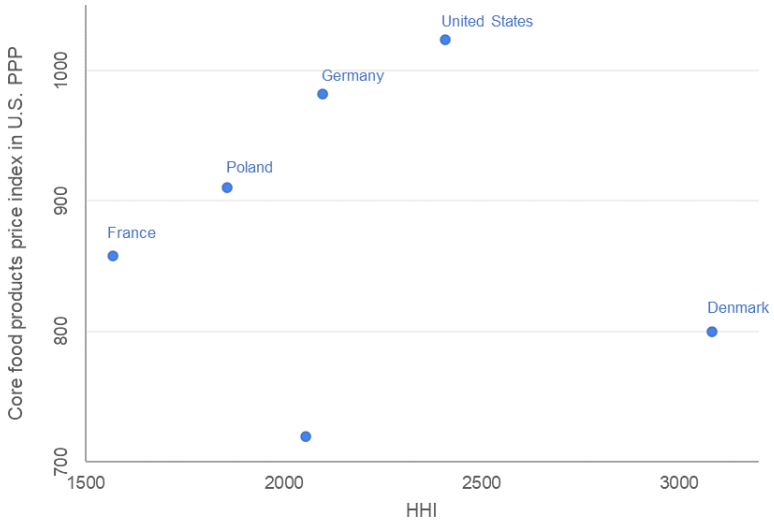
Modern consumer retail refers to all formats of retail stores such as supermarkets, hypermarkets, department stores, discount stores, specialty stores, convenience stores and online retail. Modern food retailers have to some extent replaced traditional grocery stores among the developed countries since they offer a much larger variety of products for a cheaper price[235]. Effective competition in this sector can have particularly important beneficial effects for households and the overall economy, as grocery prices influence not only the affordability of basic goods, but also the overall well-being, financial stability, and quality of life of most consumers.

In their analysis, Lear et al. (2024) descriptively focus on the relationship between concentration and prices charged by grocery retailers for food using a sample of five Member States (Belgium, Denmark, France, Germany, Poland) and the United States. The aim is to study whether a higher market concentration is correlated with higher selling prices for consumers. To attenuate the impact of widely differing food patterns across countries, the research focuses on the prices for a selection of basic goods: 1kg apples, 1kg chicken, 12 eggs, 1kg flour, 1l milk, 1kg onions, 1kg potatoes, 1kg rice, 1kg sugar and 1kg tomatoes[236].

Figure 65 shows the relationship between the price index (as measured in July 2023) and the market concentration index (HHI, measured in 2020-2022). A broad correlation seems to arise: the basket of basic goods is more expensive in countries where market concentration is higher, even if Belgium and Denmark seem to behave in a different way with respect to other sampled countries.

[235] Ernst and Young, Cambridge Econometrics Ltd. and Arcadia International (2014).
[236] Data sources: www.globalproductprices.com and https://www.esmmagazine.com.

Figure 65: Relationship between July 2023 price index and HHI at country level



Source: Lear et al. (2024)

Overall, while substantial price differences in the price of groceries are observed across Member States, the pattern does not reveal a very clear link between concentration measured at the national level and prices. This may be due to the fact that competition also (if not mainly) occurs at local or regional level, and to a range of other confounding factors. However, existing empirical literature that could rely on more granular, local data seems to confirm that concentration does matter for prices and other relevant outcomes for consumers (most notably variety)[237].

Cement

Cement is of fundamental importance for the construction industry, being a key input for the production of concrete and mortar. The cement industry is predominately a business-to-business (B2B) industry since most buyers are businesses active at some other level of the construction supply chain: cement is often sold to concrete producers, who in turn sell concrete to construction firms; other buyers of cement include wholesalers and resellers, or producers of prefabricated concrete; in some cases, cement is sold to construction firms directly. The production of cement and concrete is often vertically integrated and mergers between cement and concrete producers have been relatively common over the past 50 years.

The research by Lear et al. (2024) conducts a descriptive price-concentration study of the European cement industry, using national level pricing data for a sample of eight Member

[237] See Lear et al. (2024) for more details.

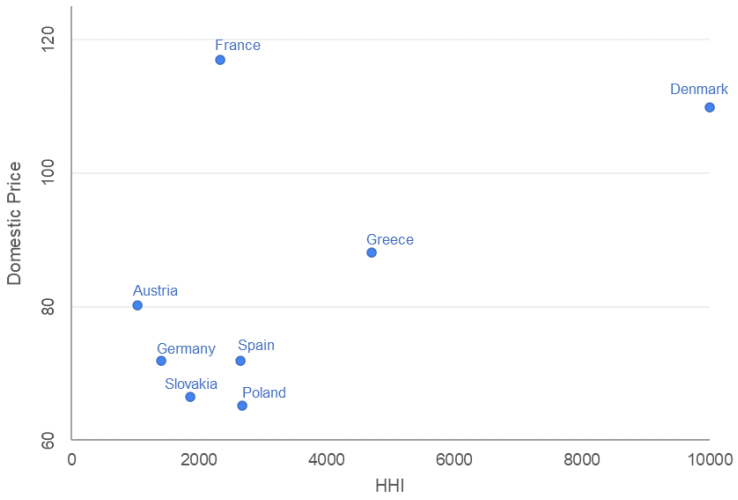
States, namely: Austria, Denmark, France, Germany, Greece, Poland, Spain and Slovakia[238]. The analysis reveals that there is substantial price variation for cement across countries, with prices in France almost the double of those in Poland or Slovakia. Some of these differences may be related to market structure, in the absence of other clear explanations such as differences in the cost of input (e.g. lime)[239]. The reporting level of the data is not sufficient, though, to match pricing to local or regional markets (the relevant geographic dimension in this market) so results must be considered suggestive only.

Figure 66 below shows the relationship between the HHI, measuring (local/regional) market concentration, and the domestic (national) price across countries in 2020. Overall, a weak association between market concentration and domestic price appears. Denmark and Greece have particularly concentrated cement markets and also relatively high prices. France, which is another high price country, has a HHI (based on averages of local markets) that is considerably higher than its simple national average by producer, due to producers in France having a relatively strong regional focus. Furthermore, Lear et al. (2024) postulate that competitors in France may be less exposed to the threat of imports (even from nearby cross-border competitors) due to market preferences for cement satisfying national certification requirements. By contrast, Slovakia's HHI (based on the averages of local markets) is considerably lower than the one suggested by national production figures, particularly due to its proximity to foreign producers.

[238] Data sources: PRODCOM (Eurostat) and https://www.cemnet.com/global-cement-report/ (The Global Cement Report™, 13th Edition, accessed 14/01/21). Specifically, Eurostat data on sold production, exports and imports of cement was used to calculate average domestic and import price for Portland cement in each sample Member State.

[239] For the purpose of obtaining data on market concentration, Lear et al. (2024) have used Eurostat data on the emissions of carbon dioxide by each company as a proxy for their level of cement production. The latitude and the longitude of European cement companies were then used to get a local concentration index in a radius of 250km around each company. Subsequently, these indices were used to compute the average national concentration index broadly reflective of local conditions in each country.

Figure 66: HHI and domestic price of Portland cement for eight EU Member States in 2020



Source: Lear et al. (2024)

II.1.5 Conclusions

The overall picture that emerges from the price concentration studies is one of surprisingly large price differences between Member States (as well as between the EU and some other jurisdictions) which are not easily explained by cost factors, and that differences in concentration levels as well as market regulation may be important contributing drivers for the observed price differences.

For both mobile telecommunication services and air transport, Lear et al. (2024) have performed detailed empirical analyses that confirm that prices are positively related to the level of concentration. For mobile telephony higher concentration also appears to be associated with lower investment or at least not with higher investment.

For a number of other sectors, which were chosen to illustrate a cross-section of economic activity, Lear et al. (2024) have performed a more qualitative assessment. The sectors examined include beer, mortgages modern consumer retail and cement. Due to the lack of causal analysis in the qualitative studies, much care is needed to avoid over-interpreting the associated results. Overall, however, the concentration and price data from the sectors examined is generally consistent with the view that market structure could be an important driver of observed price differences.

II.2. COMPETITION, PRODUCTIVITY AND COMPETITIVENESS

II.2.1 WHY COMPETITION MATTERS FOR PRODUCTIVITY AND COMPETITIVENESS

Broadly defined, the competitiveness of an economy is its ability to generate sustainable long-term economic growth (and therefore its ability to raise the standard of living of its citizens), often considered in comparison to other economies[240]. The main 'engine' of long-term growth is an economy's ability to innovate[241], including the invention of new technologies and adoption of novel, more efficient business practices in production and firm operations[242]. Typical indicators of the competitiveness of an economy are (i) GDP per capita and (ii) measures of an economy's dynamism such as in particular productivity growth[243].

There is strong and consistent empirical evidence that industries which face greater competition experience stronger productivity growth (thus increasing competitiveness and ultimately growth) and that weak competition undermines productivity growth[244]. According to a comprehensive review of the economic literature conducted in OECD (2014) this fundamental point *'has been confirmed in a wide variety of empirical studies, on an industry-by-industry, or even firm-by-firm, basis. This finding is not confined to 'Western' economies, but emerges from studies of the Japanese and South Korean experiences, as well as from developing countries. The effects of stronger competition can be felt in sectors other than those in which the competition occurs. In particular, vigorous competition in upstream sectors can 'cascade' to improve productivity and employment in downstream sectors and through the economy more widely.'*[245].

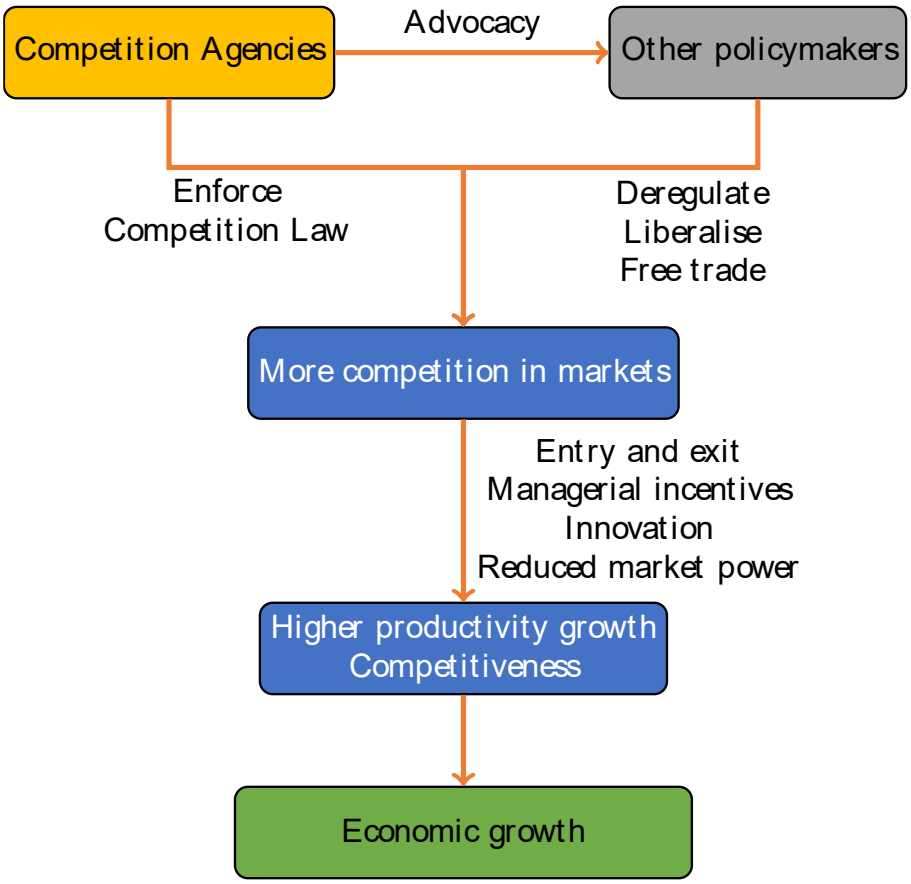
The main channels through which effective competition boosts (and weak competition reduces) productivity and growth are:

(1) competition reallocates market share to more efficient firms and forces inefficient firms to shrink or even exit (often referred to as the 'between firms', 'reallocation' or 'selection' effect of competition)[246]
(2) competition forces managers to run their business more efficiently ('within firms' effect)[247]
(3) competition forces firms to invest and innovate ('dynamic' effect)[248]

[240] The term is often used when comparing the economic performances of different 'competing' economies. The concept is not entirely uncontroversial, see Krugman (1994).
[241] See European Commission (2024a).
[242] On the importance of innovation for economic growth see recently Akcigit and Van Reenen (2023) with a foreword by E. Macron and several important contributions on endogenous growth theory.
[243] Productivity is often defined as the amount of value added generated per worker (labour productivity).
[244] See, in particular, OECD (2014), as well as references in the remainder of this section.
[245] OECD (2014), p. 2.
[246] See e.g. Nicodème and Sauner-Leroy (2007), Arnold et al. (2008), Decker et al. (2017).
[247] See e.g. Nickell (1996); Bloom and Van Reenen (2007) and (2010), as well as Bloom (2015).

The OECD sums up the economic research on the macroeconomic effects of competition in the infographic below[249], providing evidence from the economic literature for each of the relationships in the graph.

Figure 67: Macroeconomic effects of competition



Source: OECD (2014)

In addition, the literature suggests that effective competition will not only improve an industry's productivity, but also its resilience to shocks which is important in a world exposed to crisis moments. Conversely, less competition would make an economy 'brittle' and thus less resilient to external shocks[250].

The effectiveness of competition in an economy is not just a minor factor contributing to the productivity and competitiveness of an economy, but plays a fundamental role in that

[248] See e.g. Shapiro (2012), Galindo and Méndez-Picazo (2013), Aghion et al. (2018), Federico et al. (2020), OECD (2023). See also e.g. Matsa (2011) in relation to product quality.
[249] See OECD (2014), and the sources quoted therein.
[250] See the references in footnote 7.

respect. Based on cross-industries and cross-country comparisons conducted by the McKinsey Global Institute, Lewis (2004) posits that differences in competition in product markets across nations are likely as important as cross-national differences in macroeconomic policies and more important than cross-national differences in labour and capital markets in explaining variation in productivity and economic performance.

It is well documented in the economic literature that many successful sectors in the economy do not witness productivity growth necessarily because all firms present in the market gain in productivity, but rather because the more efficient and innovative firms grow at the expense of the less performing firms (e.g. firms that are less efficient or have less appealing products), i.e. through a market selection effect[251]. At the same time, competition also appears to be vital for firm-level (within-firm) productivity improvements[252].

Since competition and productivity are so central to so many aspects of an economy's performance, it is not surprising that for example Ciapanna et al. (2022) empirically find significant beneficial effects of pro-competition reforms in Italy on essentially all fundamental macro-economic parameters namely (i) consumption, (ii) investments, (iii) inflation, (iv) exports, (v) the need for imports and (vi) GDP growth.

Competition fosters both the productivity and the competitiveness of EU firms at the global stage. In line with this, research by for example M. Porter in his book *'The competitive advantage of nations'*[253] and by H. Simon in his book on European '*Hidden Champions*'[254] suggests that effective competition 'at home' within the Single Market is not just a driver of firms' competitiveness within the Single Market, but also an important driver of EU firms' global *export* competitiveness.

The objective of the next subsection is to analyse specifically the impact of domestic market competition (i.e. competition within markets in the EU) on the export performance of European firms outside the EU. The economic literature identifies two main dimensions along which domestic competition can affect export performance[255]: the impact of upstream competition in the input markets and the impact of own-market (horizontal) competition. Pro-competitive regulation in input markets, such as energy or logistics, contributes to export competitiveness of downstream companies when they benefit from

[251] See Bailey et al. (1992), Foster et al. (2001); Disney et al. (2003); Bartelsman et al. (2004), Foster et al. (2006); Aghion and Howitt (2006); Economic Advisory Group on Competition Policy (2008); Veugelers, R. (2010); Bravo-Biosca, A. (2010); Syverson, C. (2011); OECD (2014); Bravo-Biosca et al. (2016); Calvino et al. (2020).
[252] See Ganapati (2021).
[253] M. Porter (1990), The competitive advantage of Nations.
[254] H. Simon (2009), Hidden Champions of the 21st Century. *London: Springer*.
[255] The competitiveness of companies on global markets may depend also on other factors not affected by competition such as domestic regulation or infrastructure.

lower costs and higher quality of their input products. A recent study by the Commission on the EU mid-caps landscape identified rising energy prices and other production inputs as an emerging major challenge for such companies[256]. Regarding direct competition, a positive impact on export performance may be assumed when it incentivises companies to innovate, which in turn gives them an advantage over international competitors. Companies that face low levels of competition at home, in turn, may have an incentive to seek rents from their strong position domestically, rather than to sell products on international markets at lower prices. On the other hand, some authors suggest that more competition in the domestic market may be detrimental to exports, since it prevents firms from reaching the scale that would enable them to compete in international markets[257].

In what follows, this section will present the results of a novel survey, conducted as part of Lear et al. (2024) and led by E. Argentesi, which explores the relationship between domestic competition and export competitiveness for EU-based exporters in today's economic realities. Specifically, the impact on domestic competition on a company's ability to export successfully was tested by administering a survey among European firms that operate in leading export sectors. The survey provides new evidence by focussing on three potential channels linking domestic competition and export competitiveness, namely competition in input markets for goods, competition in input markets for services, and direct competition faced by a company for the products they produce.

II.2.2 Effective competition 'at home' as a driver of export competitiveness of EU firms – Evidence from a novel survey

This section presents a novel survey study, part of Lear et al. (2024) and led by E. Argentesi, which explores the relationship between domestic competition and export competitiveness for EU-based exporters in today's economic realities. Specifically, the impact on domestic competition on a company's ability to export successfully is tested by administering a survey among European firms that operate in leading export sectors.

II.2.2.1 Data and methodology

For the purpose of this report, the impact of competition at home on export success has been tested based on a survey among European firms that operate in leading export sectors[258]. To our knowledge, it is the first cross-EU survey that focusses specifically on the impact of domestic competition in *upstream* markets for goods and services, as well as *direct* competition, on the ability of companies to compete at global level. The survey covers

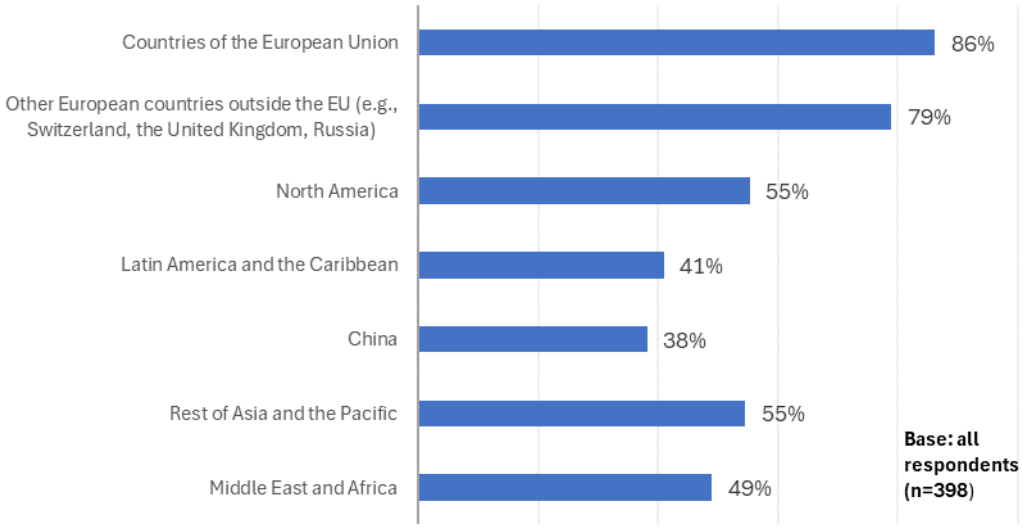
[256] Dachs et al. (2022).

[257] See e.g. Chou (1986); Pagoulatos and Sorensen (1975); Pagoulatos and Sorenson; (1976).

[258] More specifically, these are European companies that operate in the top export sectors of each country covered by the survey or in the top export sectors for the EU-27 as whole. The metric used to identify the top export sectors is a combination of i) the absolute value of exports outside the EU, and ii) the share of worldwide exports.

11 EU Member States, namely Germany, France, Italy, Spain, the Netherlands, Belgium, Austria, Poland, Czech Republic, Romania and Sweden. Export destinations of responding companies cover – apart from EU Member States – a broad spectrum of extra-EU regions, including other non-EU countries, North America, China and other Asian countries, Latin America, as well as the Middle East and Africa (see Figure 68 below). In total, 398 respondent firms took part in the survey were interviewed (out of a total of 4 346, leading to a response rate of 8.1%)[259]. Respondents to the survey were mostly small and medium-sized enterprises (SMEs) or mid-caps, with a particular emphasis on companies: around half of all respondents have less than 50 employees[260] and around half of all respondents indicate to have generated a total turnover of less than EUR 10 million in the previous year[261].

Figure 68: Characteristics of the firm and its export activity, international markets to which the company exports (multiple answers possible)



Source: Lear et al. (2024)

[259] See Lear et al. (2024) for further details on the sample selection process.

[260] Characteristics of respondents to the survey in terms of number of employees: Less than 10 employees: 20%; between 10 and less than 50 employees: 33%; between 50 and less than 250 employees: 29%; between 250 and less than 1 000 employees: 14%; between 1 000 and 5 000 employees: 3%; more than 5 000 employees: 1%.

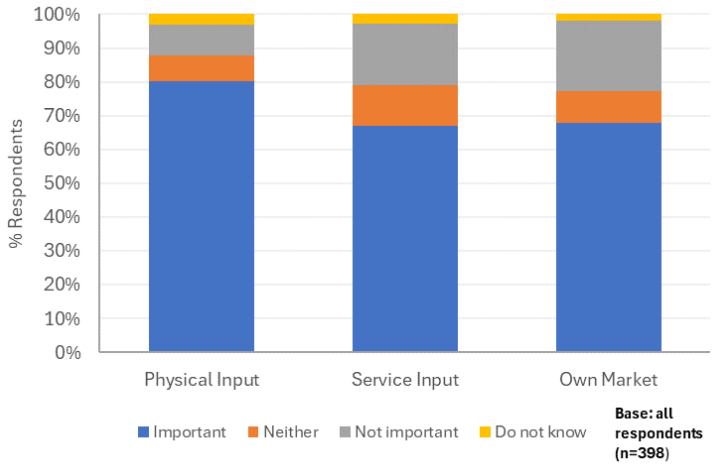
[261] Characteristics of respondents to the survey in terms of number of turnover: EUR 500 000 or less: 5%; more than EUR 500 000 and up to EUR 2 million: 18%; more than EUR 2 million and up to EUR 10 million: 25%; more than EUR 10 million and up to EUR 50 million: 28%; more than EUR 50 million and up to EUR 250 million: 14%; more than EUR 250 million and up to EUR 5 billion: 4%; more than EUR 5 billion: <1%; rest: no substantive response.

II.2.2.2 MAIN FINDINGS

As to the overarching question of this section, this survey among export companies suggests that, in line with the prior research by Porter cited above, competition matters, and competitive domestic markets[262] support exports in a positive way. As further detailed in Figure 69 below, 80% of responding companies confirm a perceived positive impact of competition for physical inputs. Conversely, only a negligible share of 9% of respondents consider that upstream competition for physical inputs is not important for their export success. This result supports the argument that having access to quality input goods at low prices is an important factor for a company's ability to be competitive on export markets. In the same logic, 67% of respondents also highlight a significant importance of competitive input markets for services[263] for their export success.

More noteworthy perhaps, also 67% of respondents emphasize that domestic competition for the production and sale of their own product has an important impact on their export success. In other words, two in three respondents to the survey indicate that facing direct competition at home is an important factor for being a successful exporter, while only a small part (21%) of respondents do not see an important impact of direct competition on their export success.

Figure 69: Perceived importance of competition in markets for input goods, services and own product markets for export success



Source: Lear et al. (2024)

The following two sub-sections will discuss in some more detail the results obtained for (i) competition in input markets (both goods and services), and (ii) direct competition. While this report focusses on the role of competition, it has to be noted that domestic

[262] Meaning the national market or EU-wide market.
[263] It is also worth noting that 84% of respondents procure their main physical inputs in the EU, which confirms that domestic competition in upstream markets can have substantial effects for respondents.

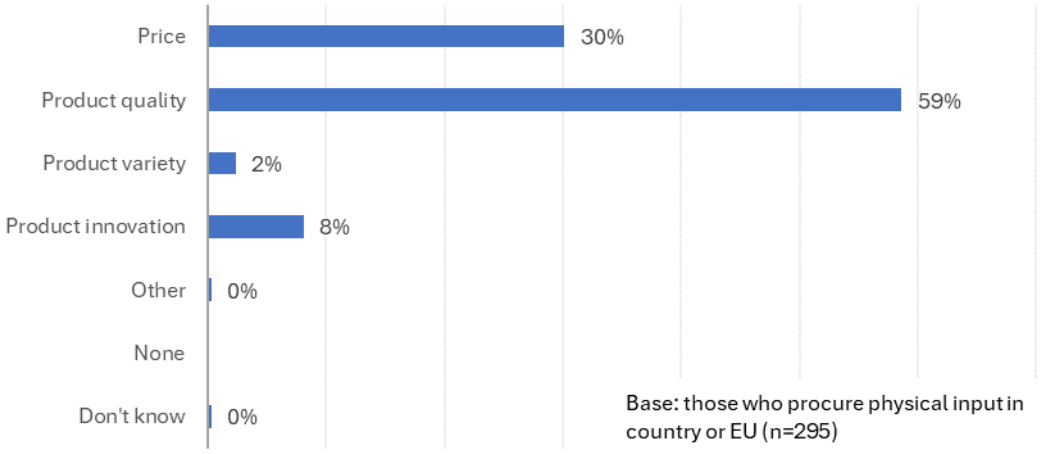
competition, both upstream and directly, is not the only external factor that may have an important impact on a company's export performance. Companies responding to the survey indicated that the most important external factors for export success are skills and qualifications of the workforce, labour costs and transport infrastructure.

II.2.2.2.1 SURVEY RESULTS ON UPSTREAM COMPETITION

The results of the survey further shed some light on the mechanism how upstream competition can promote the competitiveness of downstream companies. To investigate the impact of upstream competition for physical goods, companies contacted were asked to identify the main input of the company, i.e., the input that would have the biggest impact on the competitiveness of the final product. While the specific goods – of course – differ across companies and sectors, 84% of all respondents indicate to purchase their main input good within the EU (and most often even within their own country)[264]. This is relevant because if upstream competition has a positive impact on the ability to export successfully, it is indeed competition in domestic markets (EU-wide or national) that matters.

Companies then were asked to identify the one most important aspect of their main input that would have the strongest relevance for their export success. As indicated in Figure 70 below, most companies state that product quality would be the most important feature (59%), followed by some distance by the price of the input product (30%). Other aspects, particularly innovation (8%) and product variety (2%), were reported to have an overall smaller impact on companies' export performance. However, it has to be noted that the emphasis of the four aspects differs across sectors (e.g., transportation, chemicals & pharma, foodstuffs, etc.).

Figure 70: Most important aspects of the main input for success in global export markets

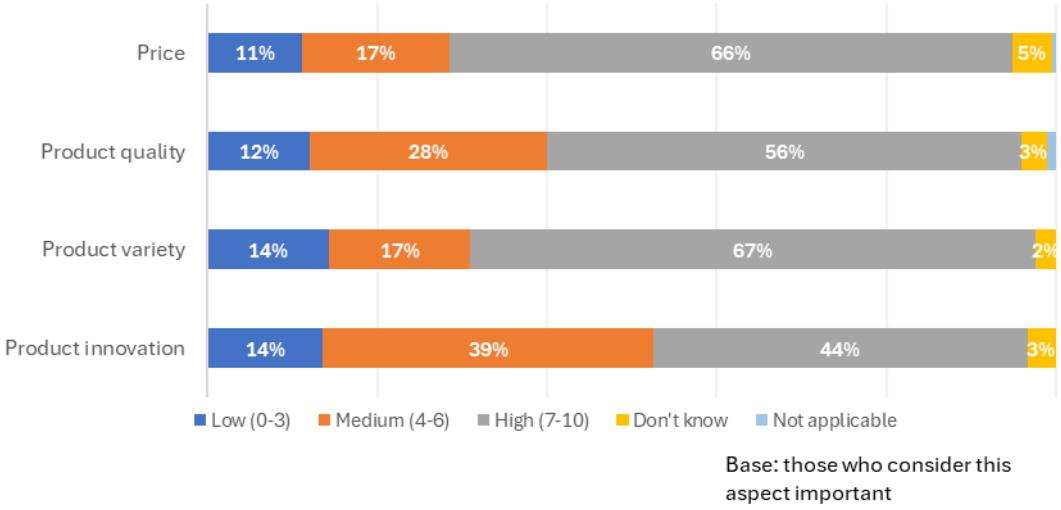


Source: Lear et al. (2024)

[264] Lear at al. (2024), Figure 4.7.

Lastly, results of the survey suggest that EU companies currently perceive an actual benefit of upstream competition when purchasing physical inputs, allowing companies to purchase input products of high quality at low prices. As further detailed in Figure 71 below, of all responding companies that purchase inputs in the EU, 56% report a high intensity of competition in terms of product quality, and 66% see a high intensity of price competition in the EU input market for their main input. The majority of respondents considered the perceived intensity of competition to have increased over the last 10 years for price, product variety and innovation, and has remained stable or rather increased for product quality[265].

Figure 71: Competition in input markets for goods, intensity of competition on different aspects

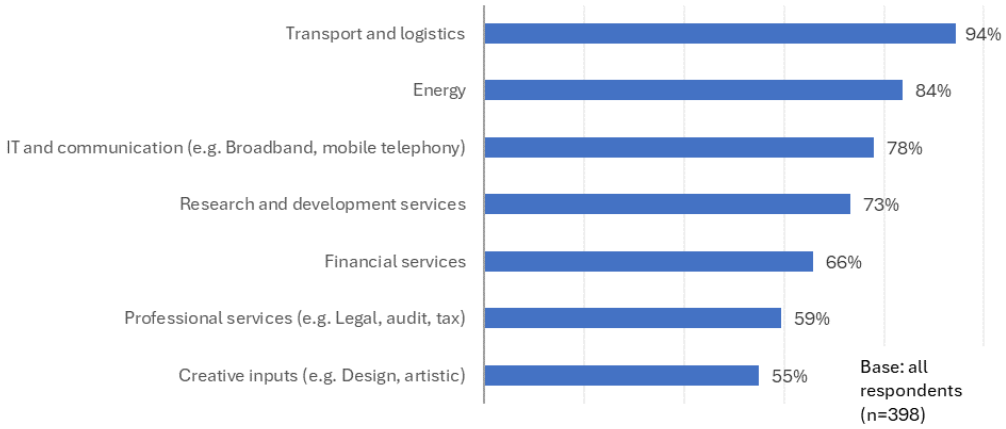


Source: Lear et al. (2024)

Results show a similar picture with respect to upstream markets for services. Companies also attribute a significant importance to competitive service markets for their export success. Across sectors, respondents attribute the biggest importance to transport and logistic services, followed by energy, IT and communication services and R&D services (see Figure 72 below). For all services, most respondents indicate that the price and the quality of the service would have a very important or important impact on their export performance[266].

[265] Lear et al. (2024), Figure 4.25.
[266] Lear et al. (2024), Figures 4.11 and 4.12.

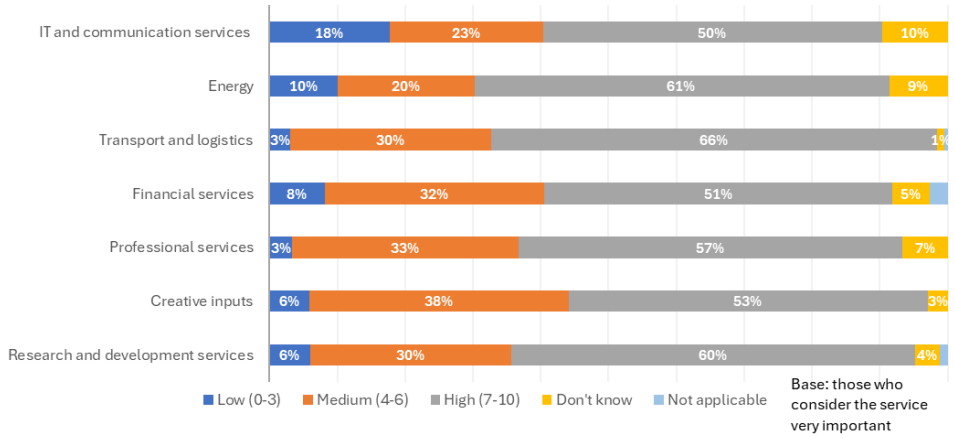
Figure 72: Perceived importance of upstream services, total importance



Source: Lear et al. (2024)

Similar to input markets for physical goods, respondents also perceive an actual high degree of competition in the various input service markets in the EU, as further detailed in Figure 73 below. Again, only a small share of respondents indicates a low level of competition. Furthermore, companies state that the level of competition among suppliers of very important services for their companies have increased in the last 10 years or have at least remained stable[267].

Figure 73: Competition in input markets for services, intensity of competition in markets for upstream services



Source: Lear et al. (2024)

[267] Lear et al. (2024), Figure 4.26.

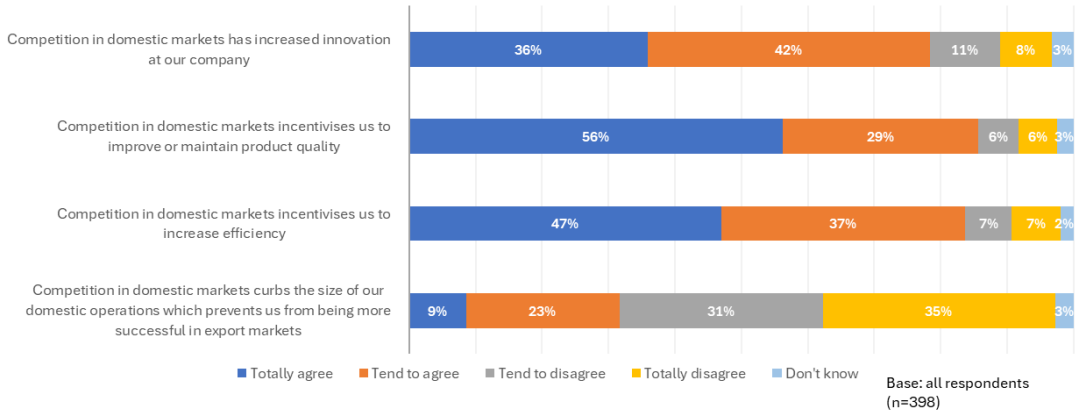
II.2.2.2.2 SURVEY RESULTS ON DIRECT COMPETITION

As explained above, most companies responding to the survey attribute significant importance to direct competition in their domestic market to their export success. In line with that, a large majority of responding companies either fully or at least in tendency agree that domestic competition incentivises them to improve or maintain the quality of the products (85% of respondents), to improve their efficiency (84% of respondents) and to increase the innovativeness of the company (78% of respondents). This is further detailed in Figure 74 below.

The results of the survey confirm and supplement the prior findings of Porter set out above that direct competition 'at home' makes companies strong for the competition they face at global level.

Likewise, a clear majority of respondents (66% of respondents) to the survey explicitly rejects the argument that competition in domestic markets curbs the size of the company, which prevents them from being more successful in export markets. As also found by Porter most responding companies do thus not consider that direct domestic competition may limit the company's export prospects because it would prevent them from reaching a certain size, and therefore sufficient economies of scale and scope. It has also to be acknowledged that a minority of respondents tended to agree to the statement (23%), while an even smaller share (9%) indicated strong agreement[268].

Figure 74: Impact of direct domestic competition on performance: innovation, quality, efficiency and scale of operations

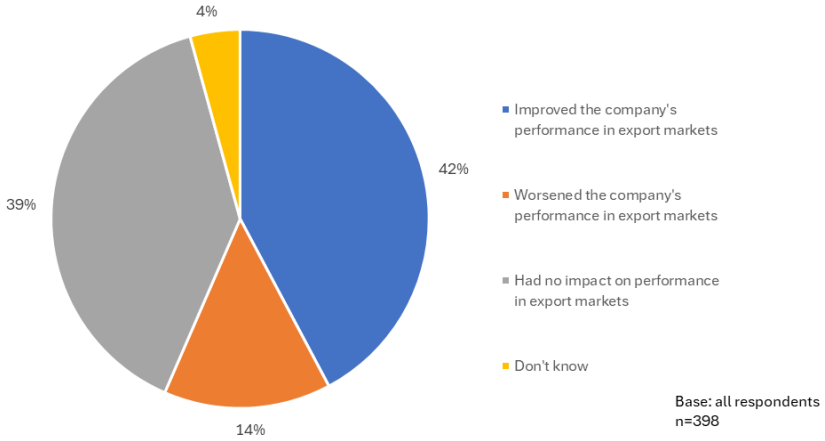


Source: Lear et al. (2024)

[268] Indeed, responding export companies describe the perceived level of competition on their home market as generally high. This is especially true for price competition and – to a lesser degree – competition on product quality (while respondents also report a high level of competition on product innovation and product variety); Lear et al. (2024), Figure 4.16.

A relative majority of companies responding to the survey also explicitly confirms that their export performance benefits from direct competition at home. A large share of respondents (42%) indicate that domestic competitive pressure has improved the company's performance in export markets, while only a relatively small share (14%) of export companies expresses the view that direct competition has worsened their ability to export successfully on global markets. A relatively important proportion (39%) states that direct competition had no impact on their export performance. This is illustrated in Figure 75 below.

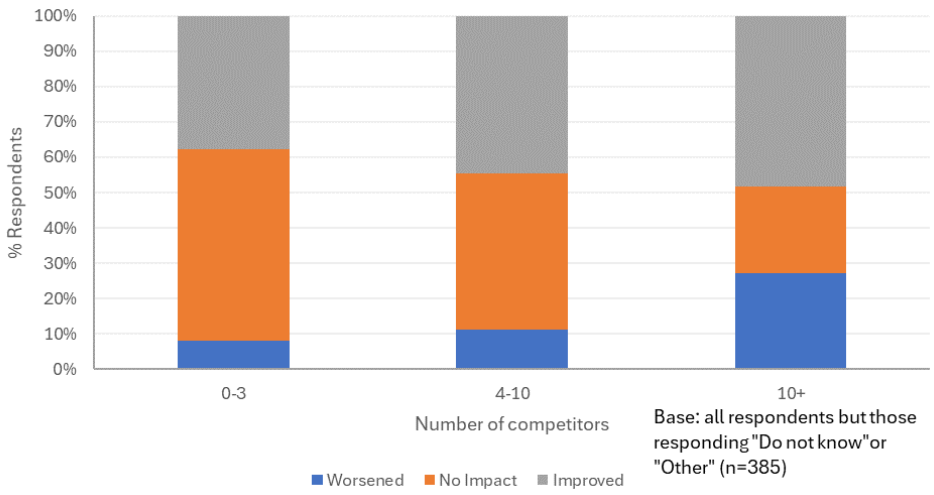
Figure 75: Impact of direct domestic competition on performance: effect of competitive pressure on performance in export markets



Source: Lear et al. (2024)

The above results differ between firms that operate in reportedly concentrated versus less concentrated markets. In particular, the proportion of respondents that thinks that competition had an impact on export performance increases with the perceived number of competitors in the domestic market. These results illustrate that the less markets are concentrated, the more firms feel that competition has an impact on export performance (independent of the direction of that impact). Instead, when markets are perceived to be concentrated, firms rather tend to believe that competition has no impact on their export performance, as shown in Figure 76 below. This finding can therefore at least partly explain the relatively high share of answers claiming that competition has no impact on export performance: firms operating in very concentrated markets do not perceive competition as a driver of their export performance.

Figure 76: Firms' beliefs regarding the impact of direct competition on export performance



Source: Lear et al. (2024)

In summary, export companies responding to the survey perceive both competition in input markets as well as direct competition in their domestic markets as beneficial for their export performance. Therefore, the survey results confirm and supplement prior research by authors such as Porter and Simon that competition at home helps companies to also be successful when selling products on global markets. In turn, a majority of respondents to this survey explicitly rejected the argument that competition would limit their possibility to reach a certain size of business operations, which in turn would limit their possibility to successfully export globally.

II.3. COMPETITION AND GROWTH IN THE EUROPEAN UNION

The aim of this section is to quantify the benefits of greater competition for the EU economy and explain why the weakening of competition across EU markets should be a source of concern also from a macroeconomic perspective. The process of competition, in which firms vie for market demand, usually leads to better outcomes for customers. Market competition facilitates a selection process that rewards those firms capable of meeting market demand, leading to a more efficient allocation of resources. Moreover, a greater level of competitive intensity in a market compels firms to compete more fiercely for customers: this can be manifested in various ways depending on the market's characteristics, including price reductions, enhanced product quality, an increased variety of products better suited to meet the needs of customers, and greater innovation. These microeconomic effects of competition on firms' performances are translated into positive effects on macroeconomic variables such as consumption, investment, innovation, productivity and ultimately growth (see Section II.3.1).

This section provides original evidence based on macroeconomic model simulations to estimate the benefits of competition, in terms of GDP, investment, employment and inflation. Our estimates of the benefits of competition emerge from comparing a scenario which reflects the current state of competition in the EU (estimated by an average level of markup, i.e. the difference between price and marginal cost) with two forward-looking benchmark scenarios in which policy measures are taken to address the increase in markups observed over the past two decades: a markup trimming scenario and a country convergence scenario. Since macroeconomic models provide a schematic description of the reality, the simulations are based on simplifying assumptions which do not refer directly nor indirectly to any specific reform measures. The purpose of the simulations is merely to obtain estimates of the order of magnitude of the macro-economic impact that potential pro-competitive reforms could bring, not to present or analyse specific policy initiatives or how to implement them. Such simulations cannot take into account impacts on factors such as enforcement resources, compliance burden or business predictability that would be weighed up in the event of a specific initiative being considered. In particular, the simulations do not assume or point towards any specific initiative in the field of competition policy as such, as opposed to sectoral or other possible reforms. A backward-looking scenario illustrating the negative consequences of the increase in markups observed over the past two decades is also considered to illustrate the potential costs of non-competition in the EU.

Macroeconomic model simulations are methods usually employed to better understand the past and predict the future of an economy under alternative scenarios. They aim at helping policy makers to gain insights into complex economic systems and make more informed decisions. However, models are simplifications of the real world and are based on a set of assumptions. Therefore, it is important to point out the main limitations of the present exercise.

One such limitation is that competition is proxied by a single measure, which is the markup, and an increase in the markup is associated with a reduction in product market competition leading to an increase in prices. This assumption is consistent with what is often done in the literature analysing the macro impact of competition[269]. However, a firm's markup can increase not only due to weaker competition but can also reflect: (i) an increase in the fixed cost of investment, which needs to be recovered to keep the firm viable in the long term, and (ii) a decrease in marginal costs reflecting an increase in efficiency, which can be due to the firm's capacity to better capture the benefits of technological changes and globalisation. De Loecker et al. (2020) show that the welfare impact of an increase in markup in reality depends on the mechanism leading to this increase: while higher markups reflecting a reallocation of resources towards more efficient firms are associated with welfare gains, higher markups purely corresponding to changes in market structure are associated with welfare losses.

[269] See Section II.3.2 for further details.

II.3.1 CHANNELS THROUGH WHICH COMPETITION AFFECTS EU GROWTH PERFORMANCE

There are various channels through which changes in competition affect economic performance, both at the micro- and the macro-economic level. At the microeconomic level, competition can affect business performance through its impact on: (i) allocative efficiency, (ii) productive efficiency, and (iii) dynamic efficiency[270].

First, competition will lead to an improvement in the allocative efficiency of the business sector via the entry and expansion of new firms and the exit or reduction in scale of the least efficient firms from the market (between-firm effects). This will also reduce the market power of incumbent firms and incite them to set prices closer to marginal costs. Consequently, markups tend to decline while the allocation of labour and capital inputs becomes more efficient, leading to higher productivity.

Second, competition will increase the productive efficiency of firms via the introduction of better production methods within firms (within-firm effects). This includes organisational changes as managers and workers have greater incentives to structure the workplace more efficiently.

Third, competition will increase the dynamic efficiency of firms by pushing them to innovate. However, the link between competition and innovation is more debated, with some economists arguing that companies are not encouraged to innovate if there is not sufficient reward in terms of profits. Others argue that on the contrary competitive pressures remain essential to create the incentives for innovation as this can help firms to better differentiate their products, gaining an advantage over their competitors and benefiting from temporarily escaping competition[271]. These two views are encapsuled in the 'inverted U-shaped' relationship between competition and innovation proposed by Aghion et al. (2005; 2009), with too little or too much competition reducing innovation. However, the review of the literature by Lear et al. (2024) suggests that, overall, effective competition will spur innovation.

To sum up, economic theory suggests that competition pushes firms to become more efficient, both from a static and dynamic perspective. In a situation of healthy competition, these increased efficiencies (reflected in lower markups and higher productivity) are associated with better outcomes for consumers, in that they are passed on by firms to their customers (other firms or final consumers) through lower prices, better quality and more innovative products. Moreover, by stimulating productivity and improving firm performance, competition can also foster export competitiveness: firms subject to effective competition in their domestic markets are also better equipped to successfully compete against their rivals in international markets.

[270] See e.g. Nicodème and Sauner-Leroy (2007).
[271] For an overview of the literature, see OECD (2023).

The positive impact of competition at the microeconomic level in terms of lower mark-ups, higher productivity, and lower prices, is an important driver of welfare and growth at the macroeconomic level. In the model simulations considered here, there are two main channels through which an increase in competition is supposed to positively affect the macroeconomic performance. First, the reduction in mark-ups and the associated decline in price levels stimulates consumer demand. To satisfy this greater demand, firms invest in production capacity and hire more workers leading to an increase in private investment and employment. Second, the reallocation of resources towards more productive firms and the increase in innovation stimulates business dynamism and productivity and thus longer-term GDP growth.

II.3.2 EVIDENCE FROM NATURAL EXPERIMENTS AND PAST MODELLING EFFORTS

Historical events and past modelling effort have been made to estimate the impact of competition in the EU. This section provides a short summary of studies focusing on the EU or more advanced economies with a view to put into perspective the estimates of the macroeconomic impact of competition in the EU described in Section II.3.4.

Historical events can serve as natural experiments, allowing for the assessment of the impact of competition on market outcomes. Historically, economic recessions were commonly accompanied by a relaxation or abandonment of competition policy[272]. The suspension of antitrust law during the Great Depression has been found to have led to lower levels of output, higher prices (Taylor, 2002; 2010) and a weaker recovery (Cole and Ohanian, 2004). In the same vein, for several decades after the second world war, cartels were legal in Finland. As a result, most manufacturing industries were cartelised, contributing to higher markups and prices (Hyytinen et al., 2018). In Sweden, a combination of regulation and lax competition enforcement allowing the formation of cartels led to higher prices and lower sales in markets affected by horizontal collusion (Ciarreta, 2012).

Over the recent period, macroeconomic models have been used to estimate the macroeconomic impact of competition. A distinction can be made between studies analysing the effects of a change in market power without identifying the source of this change and studies investigating the impact of pro-competitive reforms (such as lowering entry barriers or strengthening competition policy enforcement).

The first category of studies is backward-looking and aims at estimating the effects of the increase in market power observed in the EU since the beginning of the 1980s. The markup shocks applied to the econometric model simulate the historical changes in competition observed in the EU and other advanced economies. These studies[273] illustrate that

[272] Ying (2013).

[273] In this section, we focus on studies focusing on the EU and other advanced economies and ignore studies focusing on the U.S. The studies considered include Akcigit et al. (2021), Bighelli et al. (2023), De Loecker et al. (2021), Díez et al. (2018), European Commission (2023), Forni et al. (2010).

competition affects business dynamism, investment, R&D, productivity, labour share and ultimately GDP growth. The estimated negative impact on GDP resulting from an increase in market power depends on the magnitude of the markup shock applied to the model but also on the type of model used and its underlying assumptions. It ranges between 2 and 10%.

The second category of studies is forward-looking and aims at estimating the positive effects of reforms improving the conditions of competition in the EU. The pro-competitive market reforms considered are measures to liberalise the services sector, incentivise business formation and innovation and increase courts' efficiency in Italy (Ciapanna et al., 2022); reforms leading to a reduction in the markups in services in Italy to the levels prevailing in the rest of the euro area (Forni et al., 2010); removal of entry barriers in the services sector in the EU (Barbero et al., 2022); competition policy interventions at the EU level (antitrust, cartel and merger interventions) (European Commission, 2023); stronger antitrust enforcement (Gutierrez and Philippon, 2023); tackling cartelisation in France (Moreau and Panon, 2022); regulatory reforms leading to a convergence in the conditions of competition in the EU towards the most competitive EU countries (Pfeiffer et al., 2024). These papers illustrate the positive impact on GDP of various pro-competitive reforms, ranging between 1% and more than 10%, depending on the magnitude of the reforms and the time horizon considered.

II.3.3 Modelling the macroeconomic impact of changes in competition in the EU

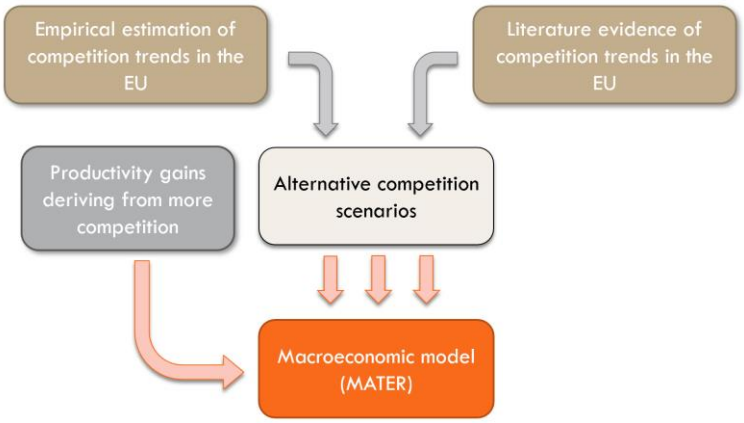
This section describes the methodological approach in Lear et al. (2024), which has been used to estimate the macroeconomic impact of changes in competition in the EU. This approach combines micro- and macro-economic analysis by using micro-estimates of competition, as measured by firm-level markups, and productivity to conduct macroeconomic model simulations. The quantification of the macro-economic effects of changes in the conditions of competition observed at the micro-level is no easy task. A distinction can be made between two categories of models: (i) traditional general equilibrium models that provide a relatively simple description of the interactions between market players at the micro-level but explore the various macro-economic consequences of the micro-economic shocks in greater detail; (ii) more recent models, such as De Loecker et al. (2021), which provide a richer description of the micro-economic interactions between market players but do not offer a full analysis of macro-economic interactions.

The model simulations described below are based on the first category of models. Changes in the conditions of competition are reflected in markup fluctuations, which in turn determine the markup shock applied to the MATER general equilibrium model (Catalano, 2023). The simulations consider the three alternative competition scenarios defined above.

Figure 77 illustrates the three main steps in the modelling process. The first step is the estimation of firm-level markups, which are used later on to define the markup shocks applied in the two forward-looking scenarios. The second step consists in defining the

productivity shocks that are consistent with the markup shocks estimated in step 1. These productivity shocks permit the integration of the indirect positive effects of competition on productivity in the model simulations. This reflects the observation that competition pushes firms to become more efficient. The third step consists in defining the scenarios and in implementing macroeconomic simulations with the MATER model. These three steps are considered further in the following subsections, to be followed by a short description of the main characteristics of the MATER model.

Figure 77: Methodological approach



Source: Lear et al. (2024)

II.3.3.1 ESTIMATES OF FIRM LEVEL MARK-UPS

In this study, markups and their evolution over time are used to assess changes in the competitive environment, an approach that has already been widely adopted in the literature. However, results obtained vary widely, reflecting the fact that markups can only be measured indirectly[274]. A further explanation is that researchers have used different estimation methods and data sources, and that the studies vary in geographical scope and temporal horizon.

For studies focusing on the EU, one can find large discrepancies regarding the evolution of markups. On the one extreme, Weche and Wambach (2021) find that markups in EU countries fell over the period 2007-2015, with a sharp drop during the crisis years 2008 and 2009, and a moderate recovery afterwards. Cavalleri et al. (2019) find that the aggregate euro area markup has been fairly stable between 1980 and 2015. Bighelli et al. (2023) report a 1 percentage point increase in markups in Europe between 2009 to 2016.

[274] This indicator is however the preferred measure of competition used in macro-models for four main reasons: (i) the connection between markup and market power, (ii) the lower sensitivity of markups to the definition of the relevant market, (iii) the wide use of this indicator in the existing literature, and (iv) the change in markup is the channel through which the impact of competition is assessed in most models (including MATER model).

On the other extreme, there are De Loecker and Eeckhout (2018), who use data on publicly traded firms to arrive at a 66% increase in markups in Europe for the period 1980-2016.

However, three studies analysing markup changes in the wider country group of advanced economies provide results that are of the same order of magnitude regarding the increase in markups since the start of the years 2000. Calligaris et al. (2018) report an increase in markups of about 8% over the period 2001-2014 based on their analysis of ORBIS data for 25 high-income economies. A similar result is reported by the IMF (2019), which estimates a 7.7% increase in markups in advanced economies between 2000 and 2015. Díez et al. (2021) estimate firm-level markups in a sample of 19 advanced economies over the 2000-2015 period. They find that average markups increased by 5.7% during that 15-year period.

The markup estimations conducted for the present report by Lear et al. (2024) are in line with those of these three studies as they use similar techniques to estimate markups and have a comparable geographical coverage and temporal scope. The markup estimates presented here are based on firm-level data from ORBIS, covering approximately 117 000 firms from 23 EU Member States over the period 2012-2019[275]. Figure 78 summarizes the outcome of the markup estimations carried out. The EU-aggregate markup increases by 6.4% between 2012 and 2019, with an average annual level of 1.42 and an average annual growth rate of 0.8%. This growing trend is in line with the findings of the three studies described above, which report an annual markup growth rate of 0.5% on average[276].

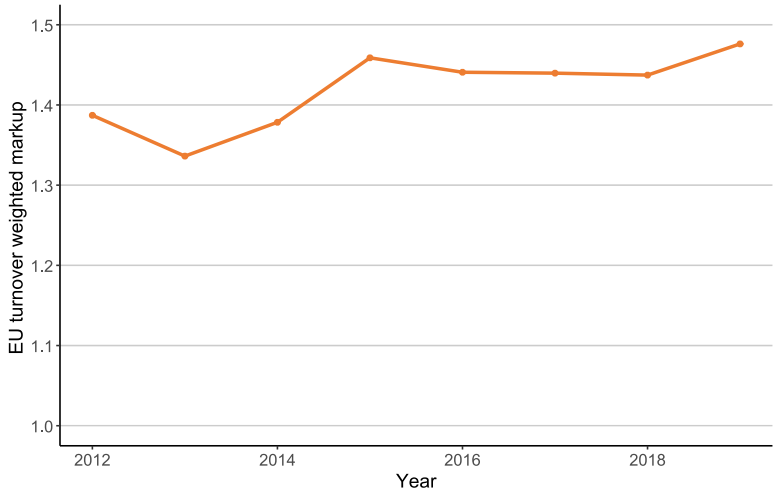
As explained above, an increase in markup does not necessarily correspond to a weakening in the conditions of competition as it may also reflect *inter alia* the need for firms to recoup the fixed costs of their investments. To rule out this possibility, correlations between the estimated markups and measures of profitability have been calculated. The results confirm a significant positive relationship between markups and profitability[277].

[275] The estimation method used is a production function approach, with materials used as the fully flexible input. As Raval (2019) highlighted that the markup results can vary depending on the choice of the variable input, a robustness analysis has been made using COGS (materials and labour) as flexible inputs (see Annex E in Lear et al., 2024).

[276] More precisely, we calculate the average of the annual growth rates in markup based on historical developments in the three studies: a 7.7% increase between 2000 and 2015 in IMF (2019), a 5.7% increase between 2000 and 2015 in Díez et al. (2021), and an 8% increase between 2001 and 2014 in Calligaris et al. (2018).

[277] See Table E.2 of annex E in Lear et al. (2024).

Figure 78: EU turnover weighted markup evolution



Source: Prometeia based on ORBIS and Eurostat data

II.3.3.2 MODELLING THE LINK BETWEEN MARKUP AND PRODUCTIVITY

The second step of the analysis is to establish a link between markups and productivity allowing to construct total factor productivity (TFP) shocks consistent with the simulated changes in markups in the three scenarios considered. Several studies have investigated this link, and the literature overwhelmingly finds a negative relationship between markups and productivity. In a seminal paper, Haskel (1991) uses panel data on UK firms from 1980 to 1986 to show a negative effect of market concentration (another proxy for competition) on productivity. Subsequent studies documenting a positive impact of competition on firm productivity in different countries include Nickell (1996), Ospina and Schiffbauer (2010), Carvalho (2018), Opoku et al. (2020), and Ganglmair et al. (2020). However, the quantification of the link between markup and productivity is not straightforward, because existing studies are quite heterogeneous in terms of geography, timespan, level of aggregation considered, methodology, and results.

As MATER does not explicitly model the link between competition and TFP, this link has been estimated outside the model, allowing to anchor the TFP shock to any given markup shock[278]. According to this estimation, a 1% increase in markup would lead to 0.13% decrease in TFP. In the macroeconomic model simulations, the TFP shock will be calibrated

[278] More precisely, firm-level TFP has been retrieved by the same econometric estimation as the one used to calculate firm-level markups, ensuring methodological consistency between the two measures. Then, aggregating firm-level markups within sectors, the elasticity of firm-level productivity to this sector aggregate has been estimated (as -0.13), Reverse causality may arise between markup and productivity: while higher markups might influence productivity, the productivity of a firm can also affect the competitive environment in its market. However, as this analysis focuses on the link between productivity at firm level and sector-wide markups, this concern is mitigated: productivity of a single firm would likely have a marginal impact on a markup measure that covers an entire sector.

using this estimation, allowing to capture the effects of changes in competition on GDP growth more fully.

II.3.3.3 DEFINITION OF ALTERNATIVE SCENARIOS

The definition of the alternative scenarios relies on two different approaches[279]. In the first, backward-looking approach adopted for scenario 1, results from the literature on historical developments in markups are used to construct a counterfactual competition scenario. In the second approach adopted for scenarios 2 and 3, markup developments are affected by pro-competitive measures, without prejudging the policy interventions to be made, and describe the potential benefits of the resulting improved conditions of competition in the EU.

Scenario 1: Backward-looking, historical scenario.

This literature-based scenario aims at evaluating how the EU economy would have performed if the increase in markups observed since the year 2000 had not occurred. This increase in markups is set at 7.54%, which corresponds to the average of the increases in markups reported by Calligaris et al. (2018), the IMF (2019), and Díez et al. (2021). This choice was made, because these studies are closely aligned with the work presented here, both in terms of methods used and in terms of geographical and temporal scope. This 7.54% increase in mark-ups is introduced in the model under the assumption, usually made in the literature, that it fully reflects a deterioration in the conditions of competition in the EU which is translated into an increase in prices. However, in reality, the observed change in markup is not only due to a weakening of competition but also due to a combination of factors working in different directions, such as increases in fixed costs, efficiency gains and the impact of various measures taken to promote healthy competition in the EU such as the enforcement of EU competition policy.

Scenario 2: Markup trimming scenario.

This scenario aims at evaluating what would be the impact of further actions taken to tackle the anticompetitive behaviour of high-markup companies. This is done by confronting the estimated empirical distribution of firm-level markups with a counterfactual distribution. In this counterfactual distribution, all markups above the 97th percentile (i.e., the firms with the highest market power) are reduced to the markup level of companies at the 97th percentile in the markup distribution. The percentage difference between the average markup in the estimated empirical distribution and in the counterfactual distribution corresponds to a reduction in the average level of markup by 8.45%.

[279] As set out in the introduction to this section, the simulation exercise does not imply (neither directly nor indirectly) any assumptions on any specific reform measures. The purpose of the simulated scenarios is merely to obtain estimates of the order of magnitude of the macro-economic impact that potential pro-competitive reforms could bring, not to analyse specific policies or how to implement them.

Scenario 3: Country convergence scenario.

This scenario has been constructed in the spirit of Pfeiffer et al. (2024), allowing for a partial convergence in markups across European countries. Under this hypothesis, countries with markup higher than the EU average are assumed to introduce procompetitive reforms aimed at reducing their country-level markups[280], which yields a markup reduction of 8.38% at the EU level. Like scenario 2, this scenario considers the potential benefits of improving the conditions of competition in the EU.

Possible TFP shocks to be applied in addition to the markup shocks.

In the three scenarios defined above, the markup shock can be coupled with a TFP shock, reflecting the negative impact of an increase in markup on TFP as described in Section II.3.3.2 (see Table 5). The tables with the simulation results described in Section II.3.4 below present the additional effects of the productivity shock only for scenario 1.

Table 5: Markup and TFP shocks applied in the three scenarios

		Markup shock (in %)	TFP shock (in %)
Scenario 1	• Historic change in markups	+7.54	-0.98
Scenario 2	• Markup trimming	-8.45	+1.10
Scenario 3	• Country convergence	-8.38	+1.09

II.3.3.4 MACRO MODELS USED TO RUN THE SIMULATIONS

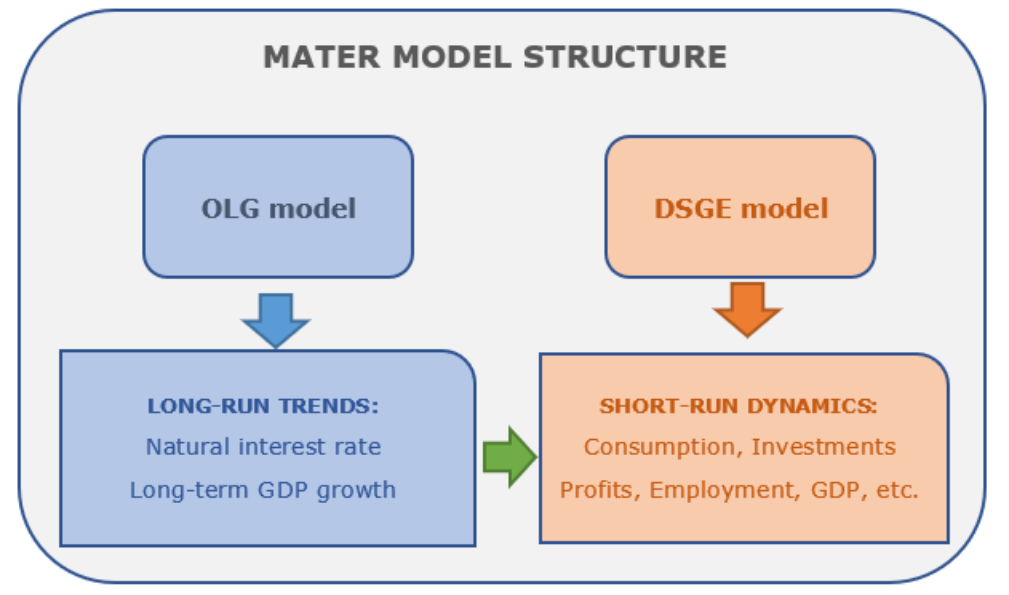
Two models have been used to run the simulations, the MATER model, and the QUEST model. This report focuses on the results of the MATER model, which was constructed by Prometeia both to conduct public policy evaluations and to service private sector clients in the financial industry. The European Commission's QUEST model (Ratto et al., 2009) has been used to test the robustness of the results obtained. Detailed simulation results of QUEST are provided in European Commission (2024). Box 1 provides a non-technical description of the MATER model.

[280] Specifically, under Scenario 3, countries with aggregate markup levels above the EU average are assumed to reduce their markup by 1/3 of that difference. This scenario assesses the impact of decreasing competition disparity across EU nations.

BOX 1: Non-technical description of the MATER model

MATER is a multi-country, general equilibrium model, designed for macroeconomic scenario analysis. It integrates two large-scale models, an Overlapping Generation Model (OLG) and a Dynamic Stochastic General Equilibrium Model (DSGE). The OLG and DSGE models are complementary in that the OLG model deals with long-term intertemporal decision making, while the DSGE model addresses short and medium-term choices by companies, households, and public authorities. The MATER model relies on rigorous microeconomic foundations derived from utility and profit optimisation and includes frictions in goods, labour, and financial markets as well as market imperfections. The factors disrupting the equilibrium from natural levels can be policy shocks and supply and demand shocks. Hence, MATER's structure allows for a comprehensive analysis of both short-term fluctuations and long-term trends of the economy. A schematic representation of the structure of MATER is presented in Figure 78. The QUEST model (Ratto et al., 2009) used for the robustness check is a pure DSGE model.

Figure 78: Schematic representation of the structure of MATER



Source: Lear et al. (2024)

In MATER, wholesalers producing intermediate goods operate in a perfect competition regime and retailers (which produce multiple final goods) in a monopolistic competition regime. Competition in the final sector is measured directly by the level of markups, which reflects how readily consumers switch between different product varieties. Markups that companies can charge on the products are inversely related to the elasticity of substitution: thus, a higher markup suggests that products are less substitutable, indicating greater market power for companies and consequently higher price levels.

In the MATER model, the firms that operate in monopolistic competition and that can charge a markup are the final goods producers, which satisfy domestic and foreign consumption as well as investment demand. Prices equal markup times marginal costs. This means that prices decrease with a reduction in markup. There are three main channels through which a reduction in markups and the resulting reduction in prices affect macroeconomic performance:

- An income channel: the reduction in prices leads to higher disposable income originating from positive expected labour and capital incomes and stimulates aggregate demand.
- An interest rate channel: the anticipation of higher real interest rates leads to higher current consumption, but the effects depend on whether the agents are savers or borrowers.
- A countervailing asset effect: the positive expansionary effects of the reduction in prices are slightly limited by an expected negative wealth effect due to the expected reduction in the net present value of asset holdings.

In line with the reduced form approach developed in Section II.3.3.2, the reduction in markups may in addition lead to an increase in TFP. The deflationary effect of this increase in TFP amplifies the macroeconomic impact of the three transmission channels.

II.3.4 RESULTS OBTAINED

II.3.4.1 OBJECTIVE

The simulations aim to illustrate how GDP growth, price levels, profits, investment, and labour productivity may have been negatively impacted by the increase in markups observed over the past twenty years (abstracting away from other developments in the economy, such as changes in technology, which may also have had an impact on observed markups). They also consider the potential impact on the EU economy of improvements in the conditions of competition, without prejudging the type of measures to be taken to that end.

For the simulations, the three scenarios defined in Section II.3.3.3 are compared to the initial steady state of the EU economy. The main assumption of this type of simulation exercise is that the elements that drive the economy away from its initial steady state are a mark-up shock and, possibly, the associated TFP shock. Markup shocks are applied gradually, considering the gradual and persistent change in the level of competition that has taken place historically. From a more forward-looking perspective, this approach reflects the fact that policy changes often include a phase-in period to allow a gradual implementation by those affected by the new requirements. The TFP shock has been activated with a delay with respect to the markup shock, to reflect the fact that it takes time for the production sector to modify production technologies and processes.

II.3.4.2 MAIN FINDINGS

Scenario 1: Backward-looking, historical scenario.

Table 6 reports estimates based on model simulations showing that the historical 7.54% increase in markup since 2000 may have contributed to a reduction in GDP of 5.7% in comparison with the (hypothetical) counterfactual in which markups had remained unchanged. The underlying assumption is that this increase in markup fully corresponds to a weakening in competition leading to price increases (even if, as already observed in the introductory section, the observed change in markup can, in reality, also be due to a combination of factors working in different directions such as changes in technology). The increase in market power and the associated reduction in the level of competition has encouraged companies to raise prices, contributing to a 5.2% increase in price levels (as measured by the GDP deflator). As a result, profits appear to have risen substantially, but consumption and export demand have come down. Investment has declined as well (by a projected 1.1%) in spite of the increased profitability of companies, as there has been a lack of market demand. The shortfall of investments in turn has had a negative impact on labour productivity. The estimated negative effects on GDP of the increase in market power observed since 2000 are further exacerbated (decrease in GDP by 7.5% after 20 years) if we consider in addition the negative effects of the increase in markups on total factor productivity (TFP)[281].

To test the robustness of the MATER model simulation results presented here, the same markup shocks have been applied to the QUEST model developed by the Directorate-General for Economic and Financial Affairs. The European Commission (2024) report estimates that the increase in market power observed since 2000 has had a negative effect on GDP of 5.1% if the TFP effect is not considered, and of 5.8% if the TFP effect is added. These figures are to be compared with the negative GDP effects of 5.7% and 7.5% reported in Table 6 below using the MATER model. If one takes into consideration that the MATER and QUEST macro-models have been developed independently, these differences are rather small. The conclusion is that the 5-7% estimate of the cost of non-competition on European product markets is rather robust.

As the QUEST model is also used to assess the benefits of competition policy interventions (key antitrust, cartel and merger decisions) made at the EU level over the period 2012-2022 (European Commission, 2023), one can assess the counterbalancing positive effects of the competition policy interventions made over the past decade. QUEST simulations show that EU competition policy led to an increase in GDP of 0.75% after 10 years. This has to be compared with the 3.43% negative effect on GDP of the historical increase in markups after 10 years in QUEST (not including TFP effects). This would seem to imply that without the EU competition policy interventions the negative GDP growth effect of the

[281] For the two other scenarios, the GDP impact of the simulations coupling markup and TFP is described in footnotes.

increase in markups in the EU would have been almost one quarter higher (adding up to a negative GDP growth effect of 4.18%).

Table 6: The estimated costs of the observed increase in market power

Increase in markup	**Scenario 1 (+7.54%)**	**Scenario 1 + productivity shock (-0,89%)**
Impact of increase	over the past 20 years	
GDP	-5.7%	-7.5%
GDP deflator (= Δ price levels)	+5.2%	+4.4%
Profits	+16.0%	+16.0%
Investment	-1.1%	-3.6%
Labour productivity	-1.0%	-3.0%
Exports	-5.1%	-6.2%

Source: Lear et al.(2024)

From a more forward-looking perspective, one could consider what it would take to undo the negative effects of the net increase in markups observed. One 'straightforward' step to consider would be to bring back the levels of markups to those observed around the turn of the century. If one were to do so, the MATER model would predict that in another 20 years the economy would be back to the steady state where it started in the year 2000. In practice though, it is impossible to go back in time. Instead, policy makers need to consider what measures could be taken at the present time to reduce market power and consult with modelers what the medium-term effects of such measures could be. This is where the two following scenarios come in. These scenarios do not aim at evaluating the impact of any specific policy proposals but rather at assessing the potential benefits of improvements in the conditions of competition in the EU.

Scenario 2: Markup trimming scenario.

Under the second scenario, we consider what would happen if further measures were taken to reduce the market power of high-markup companies. Under this counterfactual scenario, the average markup would be 8.45% lower than the average markup observed in the data. In the present modelling exercise, this mark-up reduction has been phased in over a period of five years, to illustrate the fact that the implementation of measures aimed at topping off the markups of the most profitable companies takes time.

Table 7 suggests that an 8.45% decrease in markups generates an increase in real GDP of 2.0% after five years and 4.0% after ten years[282]. The reduction in market power of the most profitable companies also brings about a 3.0% drop in price levels (as measured by the 'GDP deflator') after five years and 4.9% after ten years. Not surprisingly, a reduction in market power negatively affects profits (-6.2% after five years and -11.4% after ten years). In spite of this reduction in profits, investment increases by 2.1% after five years and 1.7% after ten years, the reason being that businesses (in spite of lower profit rates) need to respond to the increase in demand associated with the drop in price levels. The rise in investment, in turn, contributes to the 0.5% and 0.8% increases in labour productivity after five and ten years, respectively. The improved export performance (+1.8% after five years and +3.7% after ten years) can be explained by the increase in competitiveness due to the reduction in price levels and the greater productivity. Altogether, measures to reduce market power appear to have significant positive effects on economic performance.

Scenario 3: Country convergence scenario.

Under the third scenario, an alternative approach to tackle the lack of competition is adopted. This scenario, inspired by Pfeiffer et al. (2024) allows for partial convergence in markups across EU countries: countries with markups higher than the EU average are assumed to introduce pro-competitive market reforms aimed at reducing their country level markups (computed as country-level turnover-weighted averages of markups estimated (see Section II.3.3.1)) towards the average EU level[283]. The implementation of such measures by countries with an above-average level of markups, would reduce that average EU markup by 8.38%, which is not all that different from the mark-up shock associated with the reduction in market power of the most profitable firms. Similarly, to the approach adopted under scenario 2, we consider that the procompetitive reforms at the country level are introduced gradually, with a phase-in period of five years.

The right-hand side column of Table 7 illustrates that the 8.38% decrease in markups under the third scenario triggers an increase of real GDP equal to 1.9% after five years and 3.9% after ten years[284]. The increase in competition also brings about a price decline as measured by the GDP deflator. This price reduction stimulates aggregate demand, including consumption, investment, and export demand. Investment and labour productivity increase to meet this increase in demand. Overall, the model simulation results under scenarios 2 and 3 are rather similar, which makes senses as the mark-up shocks applied to the MATER model are of the same order of magnitude (-8.45% under scenario 2 and -8.38% under scenario 3).

[282] In the simulations including the TFP shock, the GDP effect would be +2.28% after 5 years and +5.35% after 10 years (See annex E, table E.6 in Lear et al. (2024)).
[283] For details, see Section III.3.3.3.
[284] In the simulations including the TFP shock, the GDP effect would be +2.21% after 5 years and +5.21% after 10 years (See annex E, table E.7 in Lear et al. (2024)).

Table 7: The potential benefits of reducing markup

Reduction in markup	**Scenario 2 (-8.45%)**		**Scenario 3 (-8.38%)**	
Impact after	*5 years*	*10 years*	*5 years*	*10 years*
GDP	+2.0%	+4.0%	+1.9%	+3.9%
GDP deflator (= Δ price levels)	-3.0%	-4.9%	-2.9%	-4.8%
Profits	-6.2%	-11.4%	-6.0%	-10.7%
Investment	+2.1%	+1.7%	+2.0%	+1.6%
Labour productivity	+0.5%	+0.8%	+0.4%	+0.8%
Exports	+1.8%	+3.7%	+1.7%	+3.6%

Source: Lear et al. (2024)

The deterioration in the conditions of competition in the EU (as identified here by the increase in markups) has come at a cost, even if other factors (e.g., technological progress) will have had benign effects. In either case, favouring a more competitive landscape, one with lower markups, promises to bring substantial economic benefits. This section has tried to quantify the magnitude of both the 'historical loss' and the 'potential gains' for the EU economy, employing a comprehensive scenario-based methodology and relying on the results of macroeconomic model simulations. While some caution is necessary in the interpretation of these results as competition is a complex and multi-faceted process and macroeconomic models have some limitations, one can conclude with confidence that there are significant gains to be expected from an improvement in the conditions of competition in the EU for citizens, companies and more generally the competitiveness of the EU economy.

Under the presumption that the observed increase in markups since 2000 fully reflects a deterioration in the conditions of competition[285], the macroeconomic simulations reported here suggest that this development has had a significant negative impact on EU GDP (minus 5-7%), price levels (plus 4-5%) and labour productivity (minus 1-3%). As a point of comparison, the regulatory reforms removing barriers in the European Single Market for services between 2006 and 2017 would result in a GDP gain by 2.1% by the year 2027 (Barbero et al., (2022)). Another study (Baba et al. (2023)) shows that a reduction in the internal barriers still fragmenting the European Single Market by 10% could lead to long term real income gains of 7% taking into account he positive effects of further integration on innovation.

[285] In reality, as explained in Section II.3.3.3 above, the observed increase in mark-ups is due to a combination of factors working in different directions.

This simulated negative impact on EU GDP would have been even larger (by almost one quarter) without EU competition policy interventions taken over the last 10 years. However, measures aimed at limiting the market power of the most profitable companies and at tackling the lack of competition in lagging countries each promise to increase GDP by around 4% after ten years. While each set of measures on its own would be insufficient to offset the 5-7% GDP loss suffered as a result of the observed increases in mark-ups since 2000, a combination of both types of measures would be more than sufficient to compensate for the costs of observed deterioration in the conditions of competition.

These results have to be considered with caution because (i) competition is a complex and multi-faceted process that cannot be fully approximated by the evolution of markups and (ii) simulations based on macroeconomic models such as the ones used in the present simulations do have limitations and are based on a number of simplifying assumptions. Without prejudice to the feasibility and proportionality of designing any policy initiative that could pursue the simulated outcomes, the results of the simulations illustrate, however, that more effective competition, as proxied by lower markups, could offer substantial benefits in terms of a reduction in price levels, increased household consumption and private investment, and a strengthening of productivity and overall economic growth.

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ANNEXES

Annex 1: Advantages and disadvantages of possible competition indicators

Static structural measures			
Indicator		**Advantages**	**Limitations**
Concentration Ratio (CR)	*Market level*	Ease of calculation Under certain assumptions, related to market power	Insufficiently considering market share distribution Assuming higher concentration implies lower competition Complexity of relevant market definition Availability of data at relevant market level
	Industry level	Ease of calculation Data availability Relevant market definition not required	Assuming higher concentration implies lower competition Insufficiently considering market share distribution Industries often do not reflect the boundaries of competition
Dynamic structural measures			
Indicator		**Advantages**	**Limitations**
Entry/Exit		Complementing static measures by providing a dynamic assessment of industries'/markets' conditions	Market mechanism might be at work even without entry and/or when there is strong competition between incumbent firms

Market share stability, rank stability	Complementing static measures by providing a dynamic assessment of industries'/markets' conditions	Different dynamic measures can give contradicting results Not informative by themselves – need to be complemented by concentration measures
Performance measures		
Indicator	**Advantages**	**Limitations**
Profits	Persistent high profits among a limited number of firms can signal weak competition	High (low) profits may result from higher (lower) efficiency, not necessarily from weak (intense) competition Measures derived from accounting data which do not always align with economic principles Accounting principles change over time/across countries
Markup	Providing a direct measure of market power Providing relevant information on the evolution of competition over time	Difficult to distinguish the effect of competition from a change in fixed costs Requires estimation Rises in markups may indicate a shift towards a type of competition centred on quality and differentiation rather than price Increases in markups can reflect the rising shares of the most efficient firms (selection effect)

Source: Lear et al. (2024) Project Team based on Nielsen et al. (2007) and OECD (2021)

Annex 2: Further details on the indicators of competition

Rank Persistence

For a given country with n markets, we issue a rank r_{ijt} to each firm i based on its market share in market j at time t. The firm with the highest market share at time t receives rank one, the second highest rank two, etc. Next, a dummy $d_{ijt} \in \{0,1\}$ is assigned which is governed by the following rule

$$d_{ijt} = \begin{cases} 0 \; if \; r_{ijt} = r_{ijt-1}, \\ 1 \; otherwise, \end{cases}$$

and checks whether a firm has changed rank between time *t* and $t-1$. This can be either a decrease or an increase in rank. For each country-year-market triplet, it is possible to calculate the fraction of firms which changed its rank from year $t - 1$ to *t*.

As the aim is to examine rank persistence at the top, attention is restricted to rank changes within the top $k = 4, 8$ of a market. One approach is to take the sum of d_{ijt} of firms for which $r_{ijt} \geq k$, which yields the number of rank changes within the top *k* of market *j* at time *t*, denoted $C_{kjt} \in [0, k]$. This accounts for both movements within the top *k*, as well as outsider entry into the top *k*. The rate of rank changes in market *j* at time *t* equals

$$P_{jt}^{k}(d = 1) = \frac{C_{jt}^{k}}{k}.$$

Taking the average over all markets yields the aggregate probability that a top k firm changed its rank between $t - 1$ and *t*

$$P_{t}^{k}(d = 1) = \frac{\sum^{n} P_{jt}^{k}}{n},$$

with a low probability of rank changes reflecting increased entrenchment.

Market share instability

Let the market share of a firm with rank *r* on market *i* at time *t* be s_{irt}. Following Bajgar et al. (2021), market share instability on market *i* at time *t* within the top 4, MSI_{it},can then be defined as

$$MSI_{it} = \frac{1}{4}\sum_{i=1}^{4} | \, s_{irt} \, / \, \sum_{r=1}^{4} s_{irt} - s_{irt-1} / \sum_{r=1}^{4} s_{irt-1} |$$

which captures relative variation in the market share of top 4 firms.

Annex 3: Sector scorecard

Sector scorecard ranking sectors according to their competition risk, from relatively low (1) to relatively high (127) according to OECD (Abele et al., 2024):

NACE Code	Geographic Bucket	NACE Description	Rank
132	European	Weaving of textiles	1
131	European	Preparation and spinning of textile fibres	2
139	European	Manufacture of other textiles	3
251	European	Manufacture of structural metal products	4
102	European	Processing and preserving of fish, crustaceans and molluscs	5
310	European	Manufacture of furniture	6
237	Global	Cutting, shaping and finishing of stone	7
162	European	Manufacture of products of wood, cork, straw and plaiting materials	8
321	Global	Manufacture of jewellery, bijouterie and related articles	9
264	European	Manufacture of consumer electronics	10
71	European	Architectural and engineering activities and related technical consultancy; Technical testing and analysis	11
72	European	Research and experimental development on natural sciences and engineering; Research and experimental development on social sciences and humanities	12
45T47	European	Retail sale in non-specialised stores; Maintenance and repair of motor vehicles; Other specialised wholesale; Sale of motor vehicle parts and accessories; Wholesale of food, beverages and tobacco; Wholesale on a fee or contract basis; Retail sale of cultural and recreation goods in specialised stores; Wholesale of other machinery, equipment and supplies; Retail sale of information and communication equipment in specialised stores; Retail sale of other goods in specialised stores; Retail sale of automotive fuel in specialised stores; Sale, maintenance and repair of motorcycles and related parts and accessories; Wholesale of household goods; Non-specialised wholesale trade; Retail sale via stalls and markets; Retail sale of food, beverages and tobacco in specialised stores; Wholesale of agricultural raw materials and live animals; Retail sale of other household equipment in specialised stores; Retail trade not in stores, stalls or markets; Sale of motor vehicles; Wholesale of information and communication equipment	13
284	European	Manufacture of metal forming machinery and machine tools	14
161	European	Sawmilling and planing of wood	15
273	European	Manufacture of wiring and wiring devices	16
292	European	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	17
222	European	Manufacture of plastic products	18
494	European	Freight transport by road and removal services	19
73	European	Advertising; Market research and public opinion polling	20
791	European	Travel agency and tour operator activities	21
206	European	Manufacture of man-made fibres	22
52	European	Warehousing and storage; Support activities for transportation	23
289	European	Manufacture of other special-purpose machinery	24
293	European	Manufacture of parts and accessories for motor vehicles	25
492	European	Freight rail transport	26
301	Global	Building of ships and boats	27
103	European	Processing and preserving of fruit and vegetables	28
256	Domestic	Treatment and coating of metals; machining	29

331	Domestic	Repair of fabricated metal products, machinery and equipment	30
37T39	Domestic	Waste treatment and disposal; Remediation activities and other waste management services; Waste collection; Sewerage; Materials recovery	31
332	Domestic	Installation of industrial machinery and equipment	32
I	Domestic	Hotels and similar accommodation; Restaurants and mobile food service activities; Event catering and other food service activities; Camping grounds, recreational vehicle parks and trailer parks; Beverage serving activities; Holiday and other short-stay accommodation; Other accommodation	33
803	European	Investigation activities	34
133	Domestic	Finishing of textiles	35
271	European	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	36
279	European	Manufacture of other electrical equipment	37
259	European	Manufacture of other fabricated metal products	38
241	European	Manufacture of basic iron and steel and of ferro-alloys	39
107	Domestic	Manufacture of bakery and farinaceous products	40
323	European	Manufacture of sports goods	41
257	European	Manufacture of cutlery, tools and general hardware	42
252	European	Manufacture of tanks, reservoirs and containers of metal	43
244	European	Manufacture of basic precious and other non-ferrous metals	44
329	European	Manufacturing n.e.c.	45
799	European	Other reservation service and related activities	46
181	Domestic	Printing and service activities related to printing	47
182	European	Reproduction of recorded media	48
106	European	Manufacture of grain mill products, starches and starch products	49
309	European	Manufacture of transport equipment n.e.c.	50
233	European	Manufacture of clay building materials	51
263	Global	Manufacture of communication equipment	52
243	European	Manufacture of other products of first processing of steel	53
101	Domestic	Processing and preserving of meat and production of meat products	54
781	European	Activities of employment placement agencies	55
089	Global	Mining and quarrying n.e.c.	56
283	European	Manufacture of agricultural and forestry machinery	57
77	European	Rental and leasing of personal and household goods; Rental and leasing of other machinery, equipment and tangible goods; Rental and leasing of motor vehicles; Leasing of intellectual property and similar products, except copyrighted works	58
236	Domestic	Manufacture of articles of concrete, cement and plaster	59
201	European	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	60
245	European	Casting of metals	61
275	European	Manufacture of domestic appliances	62
51	Global	Freight air transport and space transport; Passenger air transport	63
282	European	Manufacture of other general-purpose machinery	64
254	Global	Manufacture of weapons and ammunition	65
261	Global	Manufacture of electronic components and boards	66
104	European	Manufacture of vegetable and animal oils and fats	67
255	Domestic	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	68
081	European	Quarrying of stone, sand and clay	69
274	European	Manufacture of electric lighting equipment	70
152	European	Manufacture of footwear	71

272	European	Manufacture of batteries and accumulators	72
59T60	Domestic	Motion picture, video and television programme activities; Television programming and broadcasting activities; Sound recording and music publishing activities; Radio broadcasting	73
172	European	Manufacture of articles of paper and paperboard	74
812	Domestic	Cleaning activities	75
62T63	European	Other information service activities; Data processing, hosting and related activities; web portals; Computer programming, consultancy and related activities	76
325	Global	Manufacture of medical and dental instruments and supplies	77
493	Domestic	Other passenger land transport	78
171	European	Manufacture of pulp, paper and paperboard	79
581	Domestic	Publishing of books, periodicals and other publishing activities	80
502	Global	Sea and coastal freight water transport	81
203	European	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	82
322	Global	Manufacture of musical instruments	83
234	European	Manufacture of other porcelain and ceramic products	84
19	European	Manufacture of coke oven products; Manufacture of refined petroleum products	85
239	European	Manufacture of abrasive products and non-metallic mineral products n.e.c.	86
324	European	Manufacture of games and toys	87
504	European	Inland freight water transport	88
105	Domestic	Manufacture of dairy products	89
202	European	Manufacture of pesticides and other agrochemical products	90
221	European	Manufacture of rubber products	91
108	European	Manufacture of other food products	92
232	European	Manufacture of refractory products	93
231	European	Manufacture of glass and glass products	94
801	European	Private security activities	95
212	Global	Manufacture of pharmaceutical preparations	96
302	European	Manufacture of railway locomotives and rolling stock	97
109	Domestic	Manufacture of prepared animal feeds	98
281	European	Manufacture of general-purpose machinery	99
151	Global	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	100
265	Global	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	101
360	Domestic	Water collection, treatment and supply	102
802	European	Security systems service activities	103
242	European	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	104
53	European	Postal activities under universal service obligation; Other postal and courier activities	105
099	Domestic	Support activities for other mining and quarrying	106
782	European	Temporary employment agency activities	107
783	European	Other human resources provision	108
110	Domestic	Manufacture of beverages	109
291	European	Manufacture of motor vehicles	110
582	Global	Software publishing	111
14	Global	Manufacture of wearing apparel, except fur apparel; Manufacture of articles of fur; Manufacture of knitted and crocheted apparel	112
491	Domestic	Passenger rail transport, interurban	113
266	Global	Manufacture of irradiation, electromedical and electrotherapeutic equipment	114
353	Domestic	Steam and air conditioning supply	115

211	Global	Manufacture of basic pharmaceutical products	116
235	European	Manufacture of cement, lime and plaster	117
267	Global	Manufacture of optical instruments and photographic equipment	118
303	Global	Manufacture of air and spacecraft and related machinery	119
262	European	Manufacture of computers and peripheral equipment	120
204	European	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	121
501	Domestic	Sea and coastal passenger water transport	122
205	European	Manufacture of other chemical products	123
503	Domestic	Inland passenger water transport	124
091	Domestic	Support activities for petroleum and natural gas extraction	125
61	Domestic	Satellite telecommunications activities; Wireless telecommunications activities; Other telecommunications activities; Wired telecommunications activities	126
352	Domestic	Manufacture of gas; distribution of gaseous fuels through mains	127

Source: OECD (Abele et al., 2024). For details on the geographic buckets, see OECD (Calligaris et al., 2024).

KD-09-24-494-EN-N

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Publications Office
of the European Union

ISBN: 978-92-68-18107-2