# A taxonomy of industry competition

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This report develops a scorecard of 127 narrowly defined industries that compares them according to their degree of competition. Using firm-level data for European countries, several proxies of competition - each capturing different facets of the competition environment - are combined into a composite indicator that ranks industries according to their overall level of competition. This composite competition indicator is further related to competition enforcement interventions by the European Commission, showing that industries with weaker competition are the subject of more frequent interventions. This empirical exercise can serve as a valuable tool for economists and policymakers to understand, screen, and analyse the functioning of markets from a competition perspective.

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## Disclaimers

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# Executive Summary

There is a lively debate on the state of competition in OECD countries. Several empirical studies have found evidence suggesting that competition has become weaker over the past two decades, demonstrated by increases in industrial concentration, markups, entrenchment of market leaders, as well as a surge in merger and acquisition (M&A) activities and an increase in the stability of market shares of top performing firms.

This report provides a classification of narrowly defined industries (covering manufacturing, service, mining, and utility sectors) according to their degree of competition. For this purpose, a scorecard that compares industries along multiple dimensions of competition is developed. Competition is a multifaceted concept and hence, different indicators – each referring to a different facet of competition – are combined to obtain a comprehensive overview of the competition environment. The industry-level indicators included in the scorecard are: industry concentration, entrenchment, market share instability, average firm markups, revenue profitability, asset profitability, average age, and M&A activity of top performing firms. Each indicator is computed from firm-level balance sheet data for 23 European countries over the period 2000-2019 and is then aggregated at the detailed 3-digit (2-digit, when data do not allow) industry-level.

These different measures are then combined into a synthetic composite indicator that ranks industries according to their overall degree of competition. Finally, the ranked industries are further divided into four quartiles, which leads to a classification of industries according to whether they have strong competition, medium-strong competition, medium-weak competition, and weak competition.

While there is variation in the ranking among different indicators for industries with weak to intermediate competition, industries with strong competition tend to rank high on all indicators. Moreover, industries classified as competing at European level (based on their openness to trade) tend to have stronger competition than industries competing either a the domestic or the global level. Extensive robustness checks show that ranking is not driven by any specific assumption made to build the composite indicator (e.g., the adopted weighting scheme, the normalisation procedure, or the definition of indicators).

The level of competition of an industry, as indicated by its position in the scorecard, is positively related to the number of competition enforcement interventions (antitrust and merger interventions) implemented by the European Commission. This suggests that the indicator provides a good measure of the overall degree of competition in an industry, as competition enforcement interventions are based on detailed investigations into the state of competition in a market.

Overall, the scorecard developed in this report can serve as a valuable tool for economists and policy makers to analyse the functioning of narrowly defined industries from a competition perspective in Europe, and possibly to help targeting regulatory and competition policy interventions.

# 1 Introduction

1. Market competition is a continual process of rivalry in which firms use prices, new technologies and new products to gain an edge over their competitors to pursue profits (OECD, 2021[1]). In recent years, numerous studies have argued that market competition in OECD countries has weakened, pointing primarily to increases in concentration levels (e.g., Autor et al. (2020[2]); Bajgar et al. (2023[3])) and markups (e.g., De Loecker, Eeckhout and Unger (2020[4]) Calligaris et a. (2024[5])). The multifaceted nature of market competition makes it necessary to combine evidence from different perspectives to obtain a comprehensive picture of the overall state of competition.

2. This report is an effort to inform this discussion by developing a competition scorecard for European countries that ranks detailed industries along multiple dimensions of competition. It consolidates eight different measures of industry characteristics – each of which reflects specific aspects of the competition environment – into a single harmonised measure of the extent of competition in each industry. These variables are built on extensive work developed in a companion paper, Calligaris et al. (2024[6]).[1] The sample considered in this analysis includes a mix of 127 industries, mainly the 3-digit level (in some cases at the 2- digit level, conditional on data availability). It covers mining, manufacturing, utilities, and non-financial market services for 23 European countries between 2000 and 2019.[2] This empirical exercise can serve economists and policymakers as a valuable tool to understand, screen, and analyse market functioning from a competition perspective.

3. The analysis starts with the selection of indicators aimed at capturing market functioning and explores the pros and cons of each of them in terms of scope, data availability, and the existing literature. Multiple measures related to industry structure, outcomes and dynamics are considered to provide a thorough understanding of market functioning from a competition angle (OECD, 2021[1]). More specifically, narrowly defined industries are ranked according to the degree of industry concentration, entrenchment and market share instability of market leaders, average firm markups, revenue profitability, asset profitability, top performers' age and merger and acquisition (M&A) activity. The different dimensions used to rank industries are reported in a scorecard, using a graphical representation to provide, at a glance, a synthetic picture of the competition level among industries.

4. While none of the indicators provides a complete picture of market competition by itself, taken together, they provide a more comprehensive representation of the state of competition in each industry. Therefore, all indicators are combined into a composite indicator of competition through the following procedure: i) all indicators are normalised to make them comparable; ii) the normalised values are

[1] Calligaris et al. (2024[6]) is a companion report that investigates in detail, using granular cross-country firm-level balance sheet data, the evolution of concentration, measures of market dynamism among market leaders, and markups in OECD countries between the years 2000 and 2019. The datasets developed as part of Calligaris et al. (2024[6]) serve as the basis for the statistics presented here, and the reader is referred to it for additional details omitted here for brevity.

[2] Data used in this report come from firms in Austria, Belgium, Bulgaria, Czechia, Germany, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Italy, Luxembourg, Latvia, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, and the United Kingdom.

combined into an overall composite indicator using a weighting scheme described in detail below; iii) industries are finally ranked according to the value of the composite indicator.

5. Using this composite ranking of the degree of competition, each industry can be classified into four categories according to their degree of competition: strong competition, medium-strong competition, medium-weak competition, and weak competition.

6. When focusing on the different components of the composite indicator, as expected, the ranking of each industry varies depending on the indicator considered, as each indicator captures different facets of the competition environment. On average, there is more variation in the ranking across different indicators for industries with weak to intermediate competition, while industries with strong competition tend to rank high on all the different dimensions considered.

7. The ranking of competition across industries is highly robust to alternative specifications, including the weighting scheme, the indicators' normalisation procedure, the precise indicator definitions, the inclusion of an alternative indicator (Boone indicator), and the time period considered. Overall, the ranking does not seem to be driven by any specific assumption made to build the composite indicator.

8. In a final step, the composite index of competition is linked to antitrust, cartel and merger interventions by the European Commission (EC) using a regression analysis. The results show a statistically significant link between the competition index and EC interventions, confirming that, on average, competition policy interventions occur more frequently in industries with weaker competition. This result suggests that the composite indicator proposed in this report captures the degree of competition across industries as considered in antitrust cases, typically based on a highly detailed analysis of the relevant market.

9. A ranking of competition is very appealing, as it provides a synthesised and easily interpretable snapshot of the differences in the degree of competition among industries. Of course, it necessarily requires a decision on the measures to be included and how they proxy for market competition. Although these choices are justified and grounded in the previous literature, alternative choices could have led to a different industry ranking. It is also important to consider that all the variables included are only imperfect proxies for the state of competition, and their actual implications for competition depend on several industry-specific conditions. As suggested by the existing literature, when looking at each alternative proxy for competition, heterogeneities across industries should also be kept into consideration (Syverson, 2019[7]).[3] The values for each indicator (or a combination of them) are indeed also necessarily related to a number of industry-specific factors that might well go beyond competition, including the importance of fixed costs, the nature of the goods/services produced, the elasticity of both demand and supply, and technological maturity (Klepper, 1997[8]). In addition, the underlying drivers of the observed trends in these indicators relate to structural changes in the economy over the last two decades, making the relationship between the indicators and competition more nuanced. For example, changes in markups and concentration have been related to technological changes and the rise of intangible assets (Berry, Gaynor and Morton, 2019[9]), as well as to globalisation (see Calligaris et al. (2024[6])).

10. The composite indicator should be used while keeping this caveat in mind, and making sure that industry-specific characteristics that might affect the level of each indicator are taken into consideration in the analysis. It is likely that the indicators included in the taxonomy do not only capture dynamics related to competition across industries, since other confounding factors may also affect them. The use of several

[3] Stated differently, the same proxy can assume the same value but have different implications for competition. For example, in industries where firms compete a là Cournot, concentration is positively related to concentration, while in industries with high product substitutability, concentration could be negatively related to competition, such as in the seminal work of Melitz (2003[36]).

indicators – each capturing a specific angle of the competition landscape - aims to address precisely this concern (see also the extensive discussion in Calligaris et al. (2024[6]) on this point).

11. With these caveats in mind, the scorecard developed in this report can serve as a synthesised and easily interpretable tool for economists and policymakers to analyse and monitor the functioning of narrowly defined industries from a competition perspective.

12. The remainder of this report proceeds with the literature review (Section 2), followed by the methodology used to identify the indicators and build the composite indicator (Section 3). Section 4 includes the description and interpretation of the scorecard, as well as robustness checks performed. The results of the link between the composite competition indicator and the frequency of EC interventions are presented in Section 5. Section 6 concludes.

# 2 Literature review

13. Composite indexes have been widely used to classify and rank industries according to, for example, their digital intensity (Calvino et al., 2018[10]), their degree of educational intensity (Peneder, 2007[11]), and the level of integration of automation (Sostero, 2020[12]). Other prominent studies rank countries, such as the former World Bank Ease of Doing Business Index (World Bank, 2020[13]), which includes different aspects of business regulation, or the World Economic Forum's Global Competitiveness Index (Schwab and Zahidi, 2020[14]), where concentrated market power is one of the aspects considered. These indicators do not directly target market competition; nevertheless, they have developed relevant methodologies to build composite indexes that rank either industries or countries and, therefore, represent interesting benchmarks for the exercise carried out in this report.

14. Some studies have considered an array of indicators aimed at capturing different structural characteristics of the market when ranking industries according to the degree to which they are "malfunctioning" (see, for instance, European Commission (2007[15]), European Commission (2007[15])). The papers closest to the present report are those by Mariniello and Antonielli (2014[16]) and Ilzkovitz, Dierx and Sousa (2008[17]). Ilzkovitz, Dierx and Sousa (2008[17]) focus on a sample of 23 2-digit industries belonging to manufacturing and services sectors for 19 EU countries and use a set of indicators related to market regulation, market integration, competition, and innovation. Evaluating different dimensions of market functioning allows the authors to assess the possible causes of poor sectoral performance and provide guidance for market monitoring. While Ilzkovitz, Dierx and Sousa (2008[17]) classify industries into three categories depending on the degree of malfunctioning, they do not present an aggregate ranking of malfunctioning across the different dimensions. Using data on the manufacturing sector for France, Germany, Italy, Spain, and the UK and building on the methodology of Ilzkovitz, Dierx and Sousa (2008[17]), Mariniello and Antonielli (2014[16]) consider several product market indicators, such as industry concentration, entry, market stability, and market symmetry, to provide a descriptive analysis of the risk of collusive behaviour and to determine whether an industry is characterised by strong or weak competition.

15. The previous two papers, when classifying industries, referred to the concepts of "malfunctioning" or "antitrust risk", which are broader than that of competition within an industry (for example, "malfunctioning" includes R&D spending and innovation outputs), even if they also significantly overlap along many dimensions. For example, in these studies a market is said to be malfunctioning or to have a high antitrust risk if concentration levels are high, the likelihood of entry is low, and supply and demand are inelastic. Building on these studies, the present report focuses more strictly on classifying industries according to their level of competition.

16. This report also relies on the methodologies developed by Ilzkovitz, Dierx and Sousa (2008[17]) and Mariniello and Antonielli (2014[16]) but then departs from them in several ways. First, while some of the measures considered to proxy for competition are common among these studies – such as concentration, markups and entrenchment – there are key methodological differences in the way they are built. Heavily relying on Calligaris et al. (2024[6]), this report develops proxies of competition aimed at reflecting markets more accurately. These proxies for competition are defined at a more disaggregated industry level than in previous studies – mainly at the 3-digit level – and, for each industry, the proxies are built at the geographic level at which firms compete, i.e., either domestic, European, or global level. The geographic span at which each industry competes is identified relying on a taxonomy which defines the relevant geographic

dimension of a market (see Calligaris et al. (2024[6]) for further details). Second, the complete set of indicators used in this analysis is computed from cross-country firm-level microdata that have been prepared for this purpose. Third, the geographical and temporal coverage of the analysis is extended. The sample considered in this analysis includes 23 European countries, a mix of 127 industries at 2- and (mainly) 3-digit level covering mining, manufacturing, utilities and non-financial market services, and ranges from 2000 to 2019. Finally, this analysis combines the different proxies of competition into a unique composite indicator aimed at comparing industries according to their degree of competition.

# 3 Indicators included in the scorecard

17. The methodology used to carry out this analysis comprises two steps. The first involves identifying and creating suitable indicators to capture different facets of competition within industries. The second step combines all the relevant indicators from the first step into a composite indicator that ranks industries according to their overall degree of competition.

18. Since competition is a multifaceted concept, different indicators are assessed jointly to provide a more exhaustive overview. Each indicator, if taken in isolation, is an imperfect proxy of competition, but combined, they can provide a more comprehensive picture of the market functioning. The variables considered in this report as proxies of different dimensions of competition are: industry concentration, entrenchment and market share instability of market leaders, firms' average markups, revenue profitability, asset profitability, top-performing firms' average age and M&A activity.

19. This report builds heavily on Calligaris et al. (2024[6]) for both the methodology adopted to build most of the main indicators and the underlying data used. Concentration, entrenchment, market share instability and markups are taken directly from Calligaris et al. (2024[6]). Indicators for M&A activity, revenue and asset profitability, and top-performing firms' age have been added specifically for the present scorecard but still rely on datasets used in Calligaris et al. (2024[6]).[4] Therefore, please refer to Calligaris et al. (2024[6]) for a more detailed description of data and methodology. Note that, given the scope of the scorecard aimed at providing an overall picture of the competition level across industries, the exercise necessarily does not consider the country-year dimension of the indicators, which have been aggregated at the industry level.[5]

## Indicators included

20. Concentration, one of the most used measures to proxy for competition (Autor et al. (2020[2]), Bajgar et al. (2019[18]), OECD (2021[1])), is defined as the share of gross output accounted for by the 4 largest firms in a market. This measure is a key indicator of market functioning, as markets where the market share of the biggest firms is high present a greater potential for anticompetitive practices by dominant firms. While high levels of concentration may also be due to differences in efficiency between firms (Autor et al., 2020[2]), as well as other intrinsic characteristics of industries – such as their maturity (Klepper, 1997[8]) –, this proxy has often been related to market power and anticompetitive behaviours of the top firms (Covarrubias, Gutierrez and Philippon, 2019[19]). Following Calligaris et al. (2024[6]), in this report the concentration ratio is given by:

[4] More specifically, the indicators for revenue and asset profitability and the age of top-performing firms rely on the dataset used for markups. Therefore, for more information, please refer to the description of the dataset used for markups in Calligaris et al. (2024[6]). For the dataset used for the M&A indicator, instead, please refer to the description of the dataset used to build firms' ownership in Calligaris et al. (2024[6]).

[5] The robustness section will also compare results for all years to results for the sub-period 2008-2019 only.

$$CR^{4}_{s,g,t} = \frac{\sum_{f \in Top\ 4} S_{f,s,g,t}}{S_{s,g,t}},$$ Equation 1

where the denominator $S_{s,g,t}$, is defined as the total gross output in an industry *s*, in its relevant geographic market *g*, at time *t*, and the numerator is the sum of sales of top 4 firms *f* operating in the market.[6] Here the "market" identifies the combination of industry *s* (127 industries in total, mainly at the 3-digit level) and geography *g* (domestic, European or global) in which firms operate according to the taxonomy developed in Calligaris et al. (2024[6]).[7] The denominator of the concentration measure is computed from National Accounts (NA) and Eurostat's Structural Business Statistics (SBS) data, while the numerator comes from the Orbis dataset.[8] The indicator of concentration used in the scorecard is computed by averaging all market-year observations in each industry.[9]

21. Markups, defined as the ratio between prices and marginal costs, are a widely used indicator for market power – the ability to set individual prices above the (perfectly) competitive ones. In a perfectly competitive environment, characterised by perfectly elastic demand, firms do not have the ability to charge a price higher than the competitive ones, and, as a consequence, prices equal marginal costs and markups are equal to 1. Even though the estimation of markups relies on multiple assumptions (see Calligaris et al. (2024[6]) for details), markups provide a direct measure of market power at the firm-level and are therefore one of the most wide-spread indicators of market performance (De Loecker, Eeckhout and Unger (2020[20]), Autor et al. (2020[2]), OECD (2021[1])). Building on Calligaris et al. (2024[6]), markups are estimated at the firm-year level using the widely established De Loecker and Warzynski (2012[21]) methodology on Orbis data.[10] According to this methodology, markups correspond to the ratio between the estimated elasticity of output with respect to a flexible input – chosen to be materials in this case – and the cost of the flexible input as a share of the firm's revenue. For the inclusion in the scorecard, the firm-level markups are averaged across all years and countries in each industry.

[6] Note that all over the report, "top 4 firms" refers to the four *business groups* (not firms) with the largest gross output in each market. The term "firm" has been preferred to "business group" for simplicity. See Calligaris et al. (2024[6]) for further details about how the business group structure has been reconstructed in the dataset.

[7] Calligaris et al. (2024[6]) innovates with respect to the existing literature by using more narrowly defined industries than previous cross-country studies, going from the 2-digit to mostly 3-digit level. In addition, it innovates by accounting for the international dimension of competition when defining markets. It constructs a taxonomy of industries that defines whether each industry competes mainly at the domestic, European, or global level. Then, the measure is computed, for each industry, at the corresponding geographical level predicted by the taxonomy The taxonomy is used when calculating the following proxies of competition defined at industry level: concentration, entrenchment, market share instability, age and M&A activity of the top 4 firms. Since most of these indicators come from Calligaris et al. (2024[6]), the industry classification adopted to build the present scorecard follows closely Calligaris et al. (2024[6]), which includes the 127 industries, mainly at the 3-digit level. See further details in Calligaris et al. (2024[6]).

[8] The countries included in the sample are: BEL, DEU, DNK, ESP, FIN, FRA, GBR, GRC, HUN, ITA, NOR, POL, PRT, SVN, and SWE for the domestic and European bucket, while in the global one also JAP, KOR, and USA are included. The period covered is: 2000-2019. This applies not only to concentration, but also to entrenchment, market share instability, top 4 firms' M&A activity and age. See further details in Calligaris et al. (2024[6]).

[9] For industries classified as competing at the European or global level, there is only one market (and, thus, one observation) per year, whereas for industries competing at the domestic level, concentration is measured for each country and year separately.

[10] The countries included in the sample are: AUT, BEL, BGR, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, HUN, IRL, ITA, LUX, LVA, NLD, POL, PRT, ROU, SVK, SVN, SWE. The period covered is: 2000-2019. See further details in Calligaris et al. (2024[6]). This sample is also underlying the revenue and asset profitability indicators, and for the computation of the Boone indicator, used in a robustness exercise of the scorecard in Section 4.

22. Another possible measure of market power, directly observable in the data, is firms' profits (De Loecker, Eeckhout and Unger, 2020[20]). High profits sustained over an extended period of time might also be informative on the intensity of competition. Existing research shows that lack of competition can allow firms to charge higher prices and generate higher profit margins (Cremers, Nair and Peyer, 2008[22]), and that the presence of few firms in an industry – often used as a sign of lack of competition – is likely to translate into higher profitability (Cheng, Man and Yi, 2013[23]). While the pursuit of profits generally drives firms' decisions, persistently high profits at the industry or economy-wide level may point to weak competition that would otherwise erode profit margins (Shapiro, 2018[24]). To the extent that profits are necessary to cover sunk costs (e.g., fixed capital investments such as railroad tracks or mining equipment), they can be an indicator of high entry barriers in an industry (Mcafee, Mialon and Williams, 2004[25]). Therefore, profit margins can be informative on market power (De Loecker, Eeckhout and Unger, 2020[20]) and on the level of competition, especially when interpreted in conjunction with other indicators of market functioning.

23. In this report, profitability is measured using two different variables: turnover (revenue profitability) and assets (asset profitability). The former is the most common way to set a firm's profit in relation to its size, whereas the latter is a measure of relevance from the point of view of investors (Farris et al., 2010[26]). Since structural industry characteristics such as capital intensity can affect these two measures in opposite directions, revenue and asset profitability are often used together to judge firms' performance. In this report, it has therefore been decided to use both indicators. The measure of revenue profitability used is given by the ratio between earnings before income and taxes (EBIT) and revenues (EBIT margin or operating margin), while asset profitability is measured as EBIT divided by total assets (return on assets, ROA), as reported at the firm-level in Orbis. Since the profitability indicators aim at measuring persistent industry differences in profitability, the industry-level profit margins are obtained by taking in each industry the ratio between the sum of the EBIT of all firms across all years and countries and the sum of revenues and assets, respectively.

24. All the measures discussed until now are static, in the sense that they consider the market at one specific point in time without considering firm transitions over time. For example, concentration informs on the shares of gross output accounted for by the leaders of each year but does not track the identity of leading firms over time. However, market dynamism is an important feature of competition in the markets. Very concentrated markets could still be contestable if firms at the top are jostling for market shares, leading to continuous changes in the identity of the market leaders over time. On the contrary, in industries with weaker competition, top firms may be more entrenched. That is, leading firms may be able to remain persistently as market leaders in the long term, with negative consequences for competition. To capture market dynamism, a measure of entrenchment is included among the indicators. Following Calligaris et al. (2024[6]), it is defined as the share of firms in the top 4 in a market that was among the top 4 in the same market in the previous year. Then, as for concentration, the entrenchment indicator used in the scorecard is computed by averaging all market-year observations in each industry.

25. Although entrenchment captures whether the identity of the top firms in a market changes from one year to the next, it does not assess whether the market shares of the top firms fluctuate significantly over time. The idea that stable market shares are both a pre-condition and an outcome of anticompetitive behaviours has a long tradition both in industrial organisation research and in competition enforcement practices (Caves and Porter, 1978[27]). To capture the intensive margin of the stability of market leaders, an indicator of market share instability is also included in the analysis. Following Bajgar, Criscuolo and Timmis (2021[28]), analogously to Calligaris et al. (2024[6]), this indicator is computed as the average of the absolute changes in market shares of the firms in the top 4 in year *t* compared to their market shares in year *t-1*. Similarly to concentration and entrenchment indicators, the measure, which is computed yearly

for the top 4 business groups in each market, is then averaged over the entire time period for each industry.[11]

26. Schumpeterian "creative destruction" and industry dynamism among market leaders can reflect market contestability, even in markets characterised by high concentration levels, and entry and exit dynamics in a market have often been used to proxy for the intensity of competition (Calvino, Criscuolo and Verlhac, 2020[29]). When a direct measure of entry and exit dynamics is not available due to data constraints, the age of firms has been used to try to provide some information on the level of business dynamism (Adelino, Ma and Robinson (2017[30]);OECD (2021[1])). For example, to assess the state of business dynamism in the US it has been highlighted that only 28 of the Fortune 500 companies were born after 1990, and over half of them were registered before the second world war (The Economist, 2023[31]). Hence, in this report, the average firm age of the top 4 firms in a market each year is calculated in an attempt to capture an additional facet of business dynamism among top performers.[12] In doing so, the age of the global ultimate owner of the business groups has been used. The age indicator is built by averaging all market-year observations in each industry.[13]

27. An alternative and complementary perspective on the functioning of competition can be gleaned from M&As activity, which can be used to build and fortify a dominant market position (see Kim and Singal (1993[32]) for a case study of airline mergers). However, the causal link between market competition and M&A activity may go in the opposite direction: the incentives for acquisition are higher in markets with high barriers to entry, since the resulting increase in market power enjoyed by the acquirer is unlikely to be eroded quickly by new entrants (Gort, 1969[33]). Consistent with this view, it has been shown by Grullon et al. (2019[34]) that the increase in market valuation following a merger announcement is higher in more concentrated industries. As proof of the importance of M&A to ensure a level playing field in the market, competition agencies often are called to intervene in M&A deals in order to assess whether the deal would cause significant concerns for consumers and the competition environment.[14] Thus, a high M&A activity by larger firms within the industry could point to the risk of subsequent anticompetitive practices and insufficient market competition. In the scorecard, an indicator of concentration of M&A activity by the top 4 largest firms (in terms of yearly gross output, consistent with the previous measures) in each market is therefore included. The measure is computed as the ratio between the total value of acquisitions made by the top 4 firms (acquirers) in each market-year and the overall value of acquisitions from all firms in the same market. Note that only acquisitions of target firms belonging to the same industry of the acquirer have been considered, with the aim to capture a potential reduction in competition within the same industry.[15] Then, the M&A activity of the top 4 firms used in the scorecard is computed by averaging all market-year observations in each industry.

[11] Specifically, to facilitate the comparison with the other indicators, market share instability is included as its inverse, such that higher values imply lower market share instability (and, therefore, less competition).

[12] Due to data limitations, direct measures of entry and exit are not available: Orbis is not a suitable dataset to look at them. For further details, see (Bajgar et al., 2020[40]).

[13] As a robustness check, the mean age of all subsidiaries (within the same market) of the top 4 business group is used as an alternative definition of firm age.

[14] M&A activity may also be relevant for market competition when dominant players buy emerging competitors in so-called "killer acquisitions" (OECD, 2020[41]). Due to data limitations, in this analysis it is not possible to identify killer acquisitions and to focus on this aspect related to M&A activity.

[15] The measure adopted in the report refers to the value share of majority acquisitions, i.e., acquisitions that allow to control the target by acquiring at least 50% of its stake, as they would imply more market power detained directly by the same owner. As a robustness check, a measure considering the total value of deals (i.e., including also minority stakes) has also been considered in the robustness section.

28. To sum up, Table 3.1 provides a description of the variables used to assemble the scorecard. The eight variables of the scorecard are grouped into three broader categories: "industry structure", "industry outcomes", and "industry dynamics". "Industry structure" comprises an indicator that refers to structural features of the industry, namely the level of concentration; "industry outcomes" includes three variables – market power, revenue profitability, and asset profitability – that are related to firms' performance and their competitive conduct; "industry dynamics" includes indicators aimed at capturing the contestability of markets by looking at their evolution over time, namely entrenchment, market share instability, top firms' M&A activity and age. See Table 3.1 for a more detailed description of these variables.[16] In addition, Table 3.2 provides descriptive statics for the different indicators used.

### Table 3.1. Categories of indicators of the scorecard.

| Industry Structure | Industry Outcomes | Industry Dynamics |
|---|---|---|
| • *Concentration*: share of gross output accounted for by the top 4 largest firms in a market. | • *Markups:* firm-level measure of the ratio between prices and marginal cost.<br>• *Revenue Profitability*: ratio of industry-level gross profits (EBIT) over industry-level gross output.<br>• *Asset Profitability*: ratio of industry-level gross profits (EBIT) over industry-level assets. | • *Entrenchment*: number of firms that were in the top 4 in year *t-1* and remain in the top 4 in *t* in each market.<br>• *M&A activity*: value of acquisitions of top 4 firms within the same industry as a share of total within industry acquisitions value in each market.<br>• *Top 4 Firm age*: average age of top 4 firms in each market.<br>• *Market Share Instability:* average of absolute market share changes of top 4 firms between *t-1* and *t* in each market. |

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.
Source: OECD compilation.

[16] This categorisation is also inspired by (OECD, 2021[1]), which distinguishes between structural and performance indicators, as well as static and dynamic measures of market competition.

### Table 3.2. Industry-level indicators included in the scorecard

| | Mean | Min | P10 | Median | P90 | Max | N |
|---|---|---|---|---|---|---|---|
| Concentration | 0.30 | 0.03 | 0.08 | 0.25 | 0.61 | 1.08 | 127 |
| Markups | 1.23 | 1.02 | 1.09 | 1.18 | 1.40 | 2.09 | 127 |
| Revenue Profitability | 0.05 | -0.01 | 0.02 | 0.05 | 0.09 | 0.16 | 127 |
| Asset Profitability | 0.03 | -0.02 | 0.01 | 0.03 | 0.06 | 0.09 | 127 |
| Entrenchment | 0.83 | 0.68 | 0.76 | 0.83 | 0.91 | 0.98 | 127 |
| M&A Activity | 0.32 | 0.00 | 0.00 | 0.24 | 0.78 | 0.99 | 119 |
| Top 4 Firm Age | 48.60 | 14.44 | 25.11 | 46.15 | 79.26 | 115.19 | 127 |
| Market Share Stability | 0.03 | 0.01 | 0.02 | 0.03 | 0.05 | 0.06 | 127 |

Note: The industries included in the analysis are 2 and 3-digit industries belonging to mining, manufacturing, utilities, and non-financial market services sectors, in line with Calligaris et al. (2024[6]). For markups, revenue and asset profitability the sample of countries includes: AUT, BEL, BGR, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, HUN, IRL, ITA, LUX, LVA, NLD, POL, PRT, ROU, SVK, SVN, SWE. For concentration, entrenchment, M&A activity, firm age and market share instability the sample of countries includes: BEL, DEU, DNK, ESP, FIN, FRA, GBR, GRC, HUN, ITA, NOR, POL, PRT, SVN, and SWE. Period covered: 2000-2019. Variables that are measured at the market-year level (CR4, Entrenchment, M&A Share, Firm Age and Market Share Instability) are aggregated by averaging all market-year observations in each industry. Markups are aggregated by averaging all firm-year observations in each industry. The aggregated revenue profitability is obtained by taking in each industry the ratio between the sum of the EBIT of all firms across all years and countries and the sum of revenues. The aggregated asset profitability is obtained by taking in each industry the ratio between the sum of the EBIT of all firms across all years and countries and the sum of assets.
Source: OECD calculations.

## Harmonisation across indicators and composite aggregate scorecard

29. To build a final aggregate ranking on the state of competition across industries, the values of all indicators, measured in different units, must be normalised before being compared. A simple and intuitive normalisation is the Z-score, which is obtained by subtracting the overall mean of the indicator from each observation and then by dividing it by its standard deviation. For each indicator, both moments are calculated taking into consideration the distribution of values across all industries. Consider an indicator $x_s$ (i.e., concentration, markups, and so on) defined in each industry $s$. Z-scores are then given by:

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

Equation 2

where $\bar{x}$ and $\sigma$ are, respectively, the mean and the standard deviation of $x$ across all industries. The Z-score has been chosen because it preserves the order among industries within each indicator and expresses all indicators in the same unit of measure, making them directly comparable.[17]

30. Subsequently, a unique composite indicator is computed by taking the weighted average of the Z-scores across the different sub-indicators, where each of the three broad categories mentioned before – i.e., industry structure, industry outcome, and industry dynamics – receives a weight of one-third, and each indicator within a category is weighted equally (e.g., entrenchment receives a weight of a quarter in its category, implying that the final weight for entrenchment is one twelfth). As a robustness check, a simple unweighted aggregation, in which all the eight proxies of competition receive equal weights, has been explored (see the robustness section for further details).

[17] Following the normalisation, for each indicator the Z-score gives the number of standard deviations an observation is from the mean of its distribution. Negative z-scores indicate that the value lies below the mean, while positive z-scores indicate the value lies above the mean. As such, it describes the relationship of an observation with respect to the mean of its distribution across industries. Thus, it is possible to compare z-scores across indicators.

31. Finally, to get the final composite indicator, industries are ranked based on the weighted average Z-score. Alternative ways to normalise each indicator, such as the ordering or the Min-Max range normalisations reported in the robustness section, do not significantly alter the ranking of industries.

# 4 The final scorecard

32. Table 4.1 reports the scorecard and the final composite ranking. In the table, the intensity of the colour increases with the underlying normalised value of each cell. In other words, light blue is associated with low values and hence stronger competition in the industry, while deeper blue is associated with higher values and hence weaker competition in the industry. As explained above, the composite indicator column is obtained by taking the weighted average of the normalised values of the eight indicators in each industry and then by ranking industries according to this average value. Finally, the last column splits the ranked industries into quartiles of the composite indicator distribution: industries with strong competition, medium-strong competition, medium-weak competition, and weak competition.

33. The results of Table 4.1 show substantial heterogeneity between the different indicators for each industry (visible in different shades of blue), suggesting that each captures different facets of the competition environment. Notable exceptions are the industries ranked as having strong competition, for which all the indicators seem to point in the same direction. To sum up, the results reported suggest that industries with stronger competition have stronger competition along all the dimensions considered in the report, whereas for industries with medium to weak competition, the analysis provides a more nuanced picture of the level of competition.

## Table 4.1. Scorecard and composite indicator

| Ind. code | Ind. description | Geography | Ind. structure | Ind. outcome | | | Ind. dynamics | | | | Comp. Indic. | Quartile |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CR4 | Markup | EBIT margin | ROA | Entrenchment | Mkt. Sh. Instab. | Top4 firm age | M&A act. | | |
| 132 | Weaving of textiles | European | 5 | 25 | 37 | 11 | 20 | 53 | 12 | 14 | 1 | 1 |
| 131 | Preparation and spinning of textile fibres | European | 15 | 52 | 19 | 8 | 4 | 71 | 41 | 14 | 2 | 1 |
| 139 | Manufacture of other textiles | European | 6 | 33 | 55 | 32 | 10 | 29 | 14 | 14 | 3 | 1 |
| 251 | Manufacture of structural metal products | European | 4 | 28 | 58 | 51 | 10 | 36 | 3 | 14 | 4 | 1 |
| 102 | Processing and preserving of fish, crustaceans and molluscs | European | 29 | 4 | 28 | 41 | 29 | 24 | 10 | 50 | 5 | 1 |
| 310 | Manufacture of furniture | European | 1 | 24 | 44 | 36 | 20 | 80 | 25 | 44 | 6 | 1 |
| 237 | Cutting, shaping and finishing of stone | Global | 2 | 68 | 65 | 10 | 20 | 40 | 55 | | 7 | 1 |
| 162 | Manufacture of products of wood, cork, straw and plaiting materials | European | 8 | 14 | 57 | 31 | 29 | 56 | 44 | 66 | 8 | 1 |
| 321 | Manufacture of jewellery, bijouterie and related articles | Global | 11 | 65 | 67 | 114 | 10 | 19 | 7 | 14 | 9 | 1 |
| 264 | Manufacture of consumer electronics | European | 98 | 76 | 3 | 1 | 14 | 8 | 78 | 14 | 10 | 1 |
| 71 | Architectural and engineering | European | 9 | 116 | 60 | 46 | 29 | 3 | 71 | 14 | 11 | 1 |
| 72 | Scientific R&D | European | 7 | 118 | 54 | 58 | 20 | 6 | 53 | 14 | 12 | 1 |
| 45T47 | Motor vehicles, Wholesale, Retail | European | 33 | 9 | 15 | 84 | 20 | 25 | 84 | 47 | 13 | 1 |
| 284 | Manufacture of metal forming machinery and machine tools | European | 10 | 35 | 68 | 52 | 10 | 37 | 111 | 14 | 14 | 1 |
| 161 | Sawmilling and planning of wood | European | 17 | 19 | 33 | 61 | 20 | 116 | 72 | 53 | 15 | 1 |
| 273 | Manufacture of wiring and wiring devices | European | 45 | 23 | 32 | 28 | 111 | 34 | 4 | 52 | 16 | 1 |
| 292 | Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers | European | 27 | 13 | 42 | 95 | 36 | 20 | 49 | 84 | 17 | 1 |
| 222 | Manufacture of plastic products | European | 3 | 46 | 71 | 79 | 5 | 51 | 109 | 78 | 18 | 1 |
| 494 | Freight transport by road and removal services | European | 24 | 56 | 24 | 75 | 101 | 68 | 37 | 27 | 19 | 1 |
| 73 | Advertising; Market research and public opinion polling | European | 39 | 113 | 41 | 54 | 20 | 16 | 63 | 35 | 20 | 1 |
| 791 | Travel agency and tour operator activities | European | 61 | 7 | 6 | 18 | 29 | 30 | 81 | 104 | 21 | 1 |
| 206 | Manufacture of man-made fibres | European | 83 | 27 | 49 | 19 | 4 | 61 | 54 | 14 | 22 | 1 |

| Ind. code | Ind. description | Geography | Ind. structure | Ind. outcome | | | Ind. dynamics | | | | Comp. Indic. | Quartile |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CR4 | Markup | EBIT margin | ROA | Entrenchment | Mkt. Sh. Instab. | Top4 firm age | M&A act. | | |
| 52 | Warehousing and storage; Support activities for transportation | European | 19 | 102 | 108 | 43 | 20 | 22 | 77 | 30 | 23 | 1 |
| 289 | Manufacture of other special-purpose machinery | European | 13 | 26 | 70 | 66 | 29 | 92 | 98 | 43 | 24 | 1 |
| 293 | Manufacture of parts and accessories for motor vehicles | European | 42 | 29 | 25 | 64 | 59 | 18 | 91 | 54 | 25 | 1 |
| 492 | Freight rail transport | European | 100 | 64 | 2 | 2 | 20 | 31 | 82 | 33 | 26 | 1 |
| 301 | Building of ships and boats | Global | 51 | 75 | 7 | 4 | 105 | 108 | 52 | 42 | 27 | 1 |
| 103 | Processing and preserving of fruit and vegetables | European | 14 | 10 | 51 | 60 | 59 | 99 | 50 | 90 | 28 | 1 |
| 256 | Treatment and coating of metals; machining | Domestic | 28 | 83 | 81 | 77 | 6 | 26 | 32 | 106 | 29 | 1 |
| 331 | Repair of fabricated metal products, machinery and equipment | Domestic | 47 | 82 | 38 | 68 | 15 | 15 | 57 | 87 | 30 | 1 |
| 37T39 | Waste treatment and disposal; Remediation activities and other waste management services; Waste collection; Sewerage; Materials recovery | Domestic | 50 | 86 | 75 | 21 | 64 | 45 | 17 | 49 | 31 | 1 |
| 332 | Installation of industrial machinery and equipment | Domestic | 99 | 39 | 29 | 7 | 7 | 13 | 43 | | 32 | 1 |
| I | Accommodation & food services | Domestic | 12 | 108 | 98 | 42 | 53 | 66 | 26 | 60 | 33 | 2 |
| 803 | Investigation activities | European | 16 | 122 | 83 | 113 | 2 | 17 | 8 | | 34 | 2 |
| 133 | Finishing of textiles | Domestic | 96 | 74 | 12 | 5 | 38 | 47 | 33 | 14 | 35 | 2 |
| 271 | Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus | European | 32 | 40 | 77 | 78 | 36 | 12 | 45 | 118 | 36 | 2 |
| 279 | Manufacture of other electrical equipment | European | 53 | 51 | 96 | 106 | 14 | 5 | 96 | 14 | 37 | 2 |
| 259 | Manufacture of other fabricated metal products | European | 22 | 54 | 85 | 86 | 47 | 65 | 74 | 71 | 38 | 2 |
| 241 | Manufacture of basic iron and steel and of ferro-alloys | European | 66 | 47 | 26 | 16 | 95 | 23 | 68 | 89 | 39 | 2 |
| 107 | Manufacture of bakery and farinaceous products | Domestic | 63 | 80 | 53 | 50 | 66 | 73 | 34 | 34 | 40 | 2 |
| 323 | Manufacture of sports goods | European | 82 | 17 | 74 | 104 | 29 | 21 | 31 | 29 | 41 | 2 |
| 257 | Manufacture of cutlery, tools and general hardware | European | 21 | 70 | 95 | 81 | 47 | 48 | 117 | 14 | 42 | 2 |
| 252 | Manufacture of tanks, reservoirs and containers of metal | European | 35 | 42 | 99 | 98 | 75 | 52 | 80 | 14 | 43 | 2 |
| 244 | Manufacture of basic precious and other non-ferrous metals | European | 41 | 18 | 43 | 65 | 47 | 89 | 73 | 83 | 44 | 2 |
| 329 | Manufacturing n.e.c. | European | 84 | 61 | 92 | 108 | 1 | 4 | 58 | 86 | 45 | 2 |

| Ind. code | Ind. description | Geography | Ind. structure | Ind. outcome | | | Ind. dynamics | | | | Comp. Indic. | Quartile |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CR4 | Markup | EBIT margin | ROA | Entrenchment | Mkt. Sh. Instab. | Top4 firm age | M&A act. | | |
| 799 | Other reservation service and related activities | European | 75 | 94 | 27 | 27 | 59 | 46 | 51 | 14 | 46 | 2 |
| 181 | Printing and service activities related to printing | Domestic | 60 | 78 | 61 | 22 | 40 | 59 | 27 | 92 | 47 | 2 |
| 182 | Reproduction of recorded media | European | 97 | 88 | 91 | 15 | 47 | 9 | 13 | 14 | 48 | 2 |
| 106 | Manufacture of grain mill products, starches and starch products | European | 40 | 3 | 45 | 45 | 59 | 100 | 103 | 81 | 49 | 2 |
| 309 | Manufacture of transport equipment n.e.c. | European | 89 | 16 | 8 | 14 | 85 | 10 | 62 | 116 | 50 | 2 |
| 233 | Manufacture of clay building materials | European | 31 | 79 | 103 | 25 | 59 | 109 | 110 | 14 | 51 | 2 |
| 263 | Manufacture of communication equipment | Global | 91 | 84 | 20 | 9 | 75 | 32 | 76 | 63 | 52 | 2 |
| 243 | Manufacture of other products of first processing of steel | European | 43 | 21 | 52 | 49 | 47 | 115 | 67 | 93 | 53 | 2 |
| 101 | Processing and preserving of meat and production of meat products | Domestic | 87 | 1 | 11 | 40 | 68 | 74 | 21 | 103 | 54 | 2 |
| 781 | Activities of employment placement agencies | European | 57 | 123 | 21 | 107 | 10 | 41 | 6 | 28 | 55 | 2 |
| 089 | Mining and quarrying n.e.c. | Global | 26 | 93 | 113 | 96 | 59 | 44 | 87 | 14 | 56 | 2 |
| 283 | Manufacture of agricultural and forestry machinery | European | 56 | 37 | 35 | 56 | 105 | 86 | 59 | 72 | 57 | 2 |
| 77 | Rental and leasing | European | 18 | 114 | 104 | 30 | 75 | 88 | 97 | 37 | 58 | 2 |
| 236 | Manufacture of articles of concrete, cement and plaster | Domestic | 70 | 58 | 80 | 67 | 70 | 64 | 83 | 31 | 59 | 2 |
| 201 | Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms | European | 30 | 30 | 63 | 82 | 47 | 60 | 121 | 98 | 60 | 2 |
| 245 | Casting of metals | European | 81 | 81 | 79 | 74 | 59 | 75 | 56 | 14 | 61 | 2 |
| 275 | Manufacture of domestic appliances | European | 88 | 34 | 56 | 90 | 75 | 14 | 89 | 74 | 62 | 2 |
| 51 | Freight air transport and space transport; Passenger air transport | Global | 73 | 43 | 88 | 17 | 111 | 96 | 66 | 56 | 63 | 2 |
| 282 | Manufacture of other general-purpose machinery | European | 48 | 20 | 82 | 94 | 95 | 125 | 75 | 39 | 64 | 2 |
| 254 | Manufacture of weapons and ammunition | Global | 44 | 110 | 114 | 101 | 39 | 69 | 19 | 62 | 65 | 3 |
| 261 | Manufacture of electronic components and boards | Global | 79 | 85 | 34 | 33 | 101 | 98 | 86 | 46 | 66 | 3 |
| 104 | Manufacture of vegetable and animal oils and fats | European | 90 | 5 | 9 | 34 | 101 | 49 | 125 | 59 | 67 | 3 |
| 255 | Forging, pressing, stamping and roll-forming of metal; powder metallurgy | Domestic | 111 | 48 | 46 | 39 | 65 | 38 | 23 | 14 | 68 | 3 |

| Ind. code | Ind. description | Geography | Ind. structure | Ind. outcome | | | Ind. dynamics | | | | Comp. Indic. | Quartile |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CR4 | Markup | EBIT margin | ROA | Entrenchment | Mkt. Sh. Instab. | Top4 firm age | M&A act. | | |
| 081 | Quarrying of stone, sand and clay | European | 69 | 66 | 100 | 12 | 120 | 67 | 113 | 14 | 69 | 3 |
| 274 | Manufacture of electric lighting equipment | European | 67 | 22 | 72 | 97 | 47 | 106 | 123 | 14 | 70 | 3 |
| 152 | Manufacture of footwear | European | 38 | 45 | 64 | 103 | 123 | 83 | 2 | 114 | 71 | 3 |
| 272 | Manufacture of batteries and accumulators | European | 107 | 49 | 22 | 26 | 85 | 28 | 35 | 70 | 72 | 3 |
| 59T60 | Motion picture & broadcasting | Domestic | 94 | 106 | 86 | 20 | 81 | 58 | 20 | 68 | 73 | 3 |
| 172 | Manufacture of articles of paper and paperboard | European | 62 | 12 | 84 | 91 | 116 | 103 | 105 | 38 | 74 | 3 |
| 812 | Cleaning activities | Domestic | 46 | 126 | 30 | 70 | 69 | 72 | 9 | 67 | 75 | 3 |
| 62T63 | Computer programming & information | European | 20 | 120 | 59 | 87 | 101 | 112 | 101 | 36 | 76 | 3 |
| 325 | Manufacture of medical and dental instruments and supplies | Global | 25 | 69 | 116 | 119 | 47 | 43 | 94 | 91 | 77 | 3 |
| 493 | Other passenger land transport | Domestic | 93 | 117 | 1 | 3 | 98 | 101 | 64 | 110 | 78 | 3 |
| 171 | Manufacture of pulp, paper and paperboard | European | 72 | 11 | 97 | 71 | 118 | 113 | 47 | 79 | 79 | 3 |
| 581 | Publishing of books, periodicals and other publishing activities | Domestic | 78 | 72 | 111 | 80 | 52 | 62 | 48 | 95 | 80 | 3 |
| 502 | Sea and coastal freight water transport | Global | 55 | 105 | 17 | 59 | 111 | 107 | 107 | 80 | 81 | 3 |
| 203 | Manufacture of paints, varnishes and similar coatings, printing ink and mastics | European | 71 | 8 | 76 | 76 | 123 | 70 | 124 | 32 | 82 | 3 |
| 322 | Manufacture of musical instruments | Global | 23 | 107 | 62 | 48 | 123 | 126 | 90 | 97 | 83 | 3 |
| 234 | Manufacture of other porcelain and ceramic products | European | 68 | 98 | 48 | 23 | 59 | 104 | 127 | 73 | 84 | 3 |
| 19 | Manufacture of coke oven products; Manufacture of refined petroleum products | European | 105 | 59 | 14 | 93 | 85 | 11 | 100 | 82 | 85 | 3 |
| 239 | Manufacture of abrasive products and non-metallic mineral products n.e.c. | European | 36 | 60 | 106 | 99 | 85 | 111 | 93 | 119 | 86 | 3 |
| 324 | Manufacture of games and toys | European | 64 | 62 | 122 | 125 | 36 | 33 | 15 | 76 | 87 | 3 |
| 504 | Inland freight water transport | European | 116 | 77 | 50 | 55 | 36 | 57 | 24 | | 88 | 3 |
| 105 | Manufacture of dairy products | Domestic | 109 | 6 | 18 | 73 | 90 | 91 | 39 | 109 | 89 | 3 |
| 202 | Manufacture of pesticides and other agrochemical products | European | 95 | 32 | 101 | 112 | 29 | 90 | 122 | 14 | 90 | 3 |
| 221 | Manufacture of rubber products | European | 76 | 53 | 102 | 111 | 85 | 87 | 118 | 55 | 91 | 3 |

| Ind. code | Ind. description | Geography | Ind. structure | Ind. outcome | | | Ind. dynamics | | | | Comp. Indic. | Quartile |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CR4 | Markup | EBIT margin | ROA | Entrenchment | Mkt. Sh. Instab. | Top4 firm age | M&A act. | | |
| 108 | Manufacture of other food products | European | 59 | 41 | 117 | 121 | 59 | 118 | 108 | 41 | 92 | 3 |
| 232 | Manufacture of refractory products | European | 114 | 63 | 78 | 57 | 95 | 55 | 42 | | 93 | 3 |
| 231 | Manufacture of glass and glass products | European | 74 | 73 | 89 | 69 | 116 | 110 | 116 | 75 | 94 | 3 |
| 801 | Private security activities | European | 37 | 125 | 39 | 83 | 118 | 120 | 5 | 100 | 95 | 3 |
| 212 | Manufacture of pharmaceutical preparations | Global | 54 | 99 | 118 | 116 | 59 | 63 | 115 | 58 | 96 | 3 |
| 302 | Manufacture of railway locomotives and rolling stock | European | 115 | 71 | 10 | 13 | 85 | 102 | 104 | 48 | 97 | 4 |
| 109 | Manufacture of prepared animal feeds | Domestic | 112 | 2 | 31 | 105 | 80 | 93 | 61 | 88 | 98 | 4 |
| 281 | Manufacture of general-purpose machinery | European | 85 | 44 | 66 | 102 | 75 | 119 | 126 | 77 | 99 | 4 |
| 151 | Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur | Global | 58 | 55 | 110 | 124 | 111 | 81 | 11 | 117 | 100 | 4 |
| 265 | Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks | Global | 77 | 92 | 112 | 110 | 95 | 117 | 88 | 61 | 101 | 4 |
| 360 | Water collection, treatment and supply | Domestic | 86 | 96 | 127 | 24 | 92 | 78 | 29 | 69 | 102 | 4 |
| 802 | Security systems service activities | European | 110 | 115 | 90 | 92 | 75 | 7 | 16 | 107 | 103 | 4 |
| 242 | Manufacture of tubes, pipes, hollow profiles and related fittings, of steel | European | 108 | 50 | 87 | 47 | 95 | 95 | 65 | 99 | 104 | 4 |
| 53 | Postal activities under universal service obligation; Other postal and courier activities | European | 103 | 97 | 36 | 62 | 111 | 123 | 1 | 112 | 105 | 4 |
| 099 | Support activities for other mining and quarrying | Domestic | 123 | 87 | 94 | 88 | 41 | 1 | 28 | | 106 | 4 |
| 782 | Temporary employment agency activities | European | 65 | 127 | 16 | 109 | 111 | 121 | 22 | 14 | 107 | 4 |
| 783 | Other human resources provision | European | 102 | 124 | 13 | 120 | 29 | 54 | 79 | | 108 | 4 |
| 110 | Manufacture of beverages | Domestic | 101 | 36 | 119 | 115 | 89 | 84 | 92 | 65 | 109 | 4 |
| 291 | Manufacture of motor vehicles | European | 113 | 15 | 4 | 29 | 127 | 127 | 102 | 105 | 110 | 4 |
| 582 | Software publishing | Global | 49 | 121 | 120 | 122 | 111 | 42 | 99 | 51 | 111 | 4 |
| 14 | Manufacture of apparel | Global | 34 | 109 | 115 | 127 | 123 | 122 | 70 | 64 | 112 | 4 |
| 491 | Passenger rail transport, interurban | Domestic | 122 | 90 | 5 | 6 | 91 | 77 | 60 | 113 | 113 | 4 |

| Ind. code | Ind. description | Geography | Ind. structure | Ind. outcome | | | Ind. dynamics | | | | Comp. Indic. | Quartile |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CR4 | Markup | EBIT margin | ROA | Entrenchment | Mkt. Sh. Instab. | Top4 firm age | M&A act. | | |
| 266 | Manufacture of irradiation, electromedical and electrotherapeutic equipment | Global | 52 | 57 | 126 | 123 | 85 | 97 | 112 | 85 | 114 | 4 |
| 353 | Steam and air conditioning supply | Domestic | 119 | 67 | 73 | 35 | 67 | 50 | 40 | 111 | 115 | 4 |
| 211 | Manufacture of basic pharmaceutical products | Global | 106 | 95 | 123 | 117 | 111 | 76 | 18 | 14 | 116 | 4 |
| 235 | Manufacture of cement, lime and plaster | European | 92 | 89 | 124 | 44 | 118 | 79 | 119 | 94 | 117 | 4 |
| 267 | Manufacture of optical instruments and photographic equipment | Global | 104 | 103 | 121 | 118 | 101 | 39 | 114 | 40 | 118 | 4 |
| 303 | Manufacture of air and spacecraft and related machinery | Global | 118 | 100 | 23 | 38 | 126 | 114 | 85 | 57 | 119 | 4 |
| 262 | Manufacture of computers and peripheral equipment | European | 124 | 101 | 47 | 85 | 47 | 85 | 95 | 14 | 120 | 4 |
| 204 | Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations | European | 80 | 38 | 105 | 126 | 123 | 124 | 106 | 101 | 121 | 4 |
| 501 | Sea and coastal passenger water transport | Domestic | 120 | 104 | 109 | 72 | 79 | 35 | 38 | 108 | 122 | 4 |
| 205 | Manufacture of other chemical products | European | 121 | 31 | 69 | 100 | 105 | 105 | 120 | 45 | 123 | 4 |
| 503 | Inland passenger water transport | Domestic | 125 | 119 | 40 | 53 | 71 | 94 | 36 | | 124 | 4 |
| 091 | Support activities for petroleum and natural gas extraction | Domestic | 126 | 112 | 107 | 89 | 42 | 2 | 69 | 96 | 125 | 4 |
| 61 | Satellite telecommunications activities; Wireless telecommunications activities; Other telecommunications activities; Wired telecommunications activities | Domestic | 117 | 111 | 125 | 37 | 78 | 82 | 30 | 102 | 126 | 4 |
| 352 | Manufacture of gas; distribution of gaseous fuels through mains | Domestic | 127 | 91 | 93 | 63 | 33 | 27 | 46 | 115 | 127 | 4 |

Note: The industries included in the analysis are 2 and 3-digit industries belonging to mining, manufacturing, utilities, and non-financial market services sectors, in line with Calligaris et al. (2024[6]). For markups, revenue profitability (EBIT margin) and asset profitability (ROA) the sample of countries includes: AUT, BEL, BGR, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, HUN, IRL, ITA, LUX, LVA, NLD, POL, PRT, ROU, SVK, SVN, SWE. For the concentration, entrenchment, M&A activity, market share instability and firm age the sample of countries includes: BEL, DEU, DNK, ESP, FIN, FRA, GBR, GRC, HUN, ITA, NOR, POL, PRT, SVN, and SWE. Period covered: 2000-2019. Variables that are measured at the market-year level (CR4, Entrenchment, M&A Share, Market Share Stability and Age) are aggregated by averaging all market-year observations in each industry. Markups are aggregated by averaging all firm-year observations in each industry. Since there are 26 industries with a top 4 M&A share of zero, the rank corresponding to this value is repeated for these industries. The aggregate EBIT margin and the ROA is obtained by taking in each industry the ratio between the sum of the EBIT of all firms across all years and countries and the sum of revenues and assets, respectively. The composite indicator is the weighted average of the Z-score of all indicators for each industry. In the table, the intensity of the colour increases with the underlying normalised value of each cell, so that light blue is associated with low indicator values, while deeper blue is associated with higher indicator values. The number within each cells represents the ranking position of the industry for the corresponding indicator. In the last column, the ranking of the composite indicator is split into quartiles.
Source: OECD calculations.

## Link between the composite indicator and the geographical level at which competition takes place

34. The last two decades have seen the rise of globalisation and interconnections of supply chains across countries, which have likely had substantial and nuanced impact on the competition environment. While some argue that the rise of globalisation has increased competition pressures (Amiti and Heise, 2021[35]), others highlight that higher globalisation can also lead to higher exit and entry barriers and, thus, advantage the biggest firms (Melitz, 2003[36]).

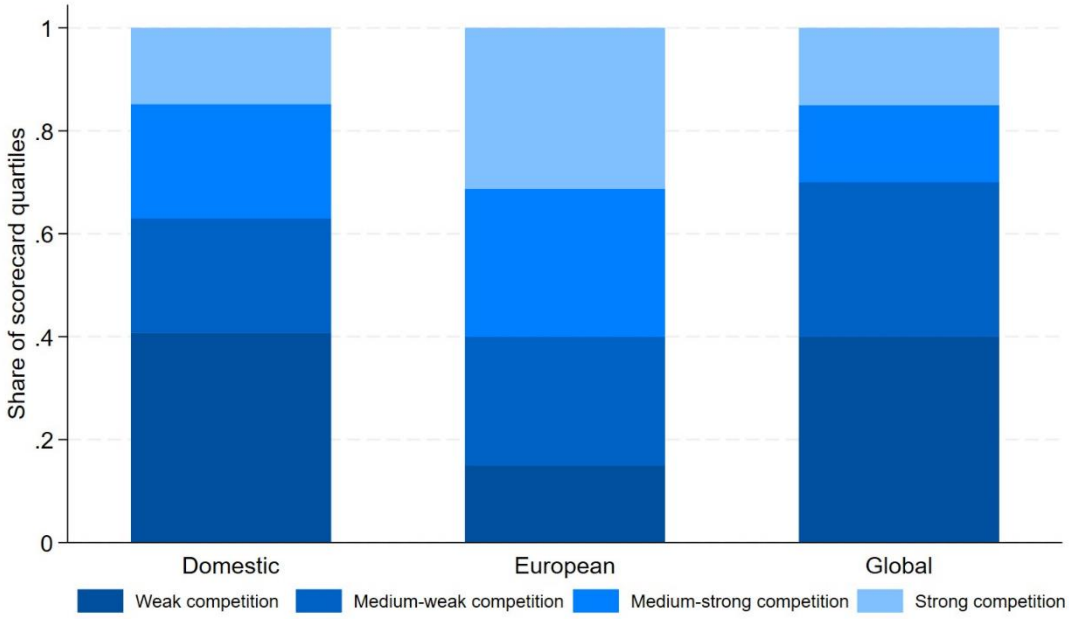
35. Different industries may compete at different geographic dimensions, determined by their tradeability, market access, and other characteristics. Accordingly, in Calligaris et al. (2024[6]), a methodology is developed to classify industries as competing either at the domestic, European, or global level.[18] To check for systematic patterns in the position of industries in the scorecard related to the geographic dimension of competition, the relation between the composite indicator and the different geographic markets is analysed.

36. Figure 4.1 presents the share of industries in the weak, medium-weak, medium-strong, and strong competition groups of industries according to the composite indicator for each geographic level of competition. Looking at industries competing at domestic and global level, 40% of industries fall into the least competitive category of the scorecard whereas 15% fall into the most competitive. Conversely, for industries competing at the European level, 31% of industries are ranked as having strong competition, while only 15% are categorised in the weakest competition group. In addition, focusing on industries with medium-strong competition across geographic markets, it is possible to see how industries competing at European level have a larger proportion of industries placed in this category (29%) than either globally or domestically competing industries.

37. Overall, this relationship suggests that, on average, industries competing at the European level have the strongest competition. The recent process of economic and political integration across European countries, which promotes free trade and a level playing field among member countries, may have contributed to create a stronger competition environment. Nevertheless, given that the number of industries categorised as competing at European level is higher than in the other geographical two buckets, the number of industries competing at European level falling into the “weak competition” category of the scorecard is 12. This number is higher than the total number of industries competing at domestic and global level and characterised by weak competition, respectively 11 and 8. This suggests that for industries competing at European level, that in relative terms have relatively strong competition, there is still a significant number of industries characterised by low competition. Therefore, it is important to keep monitoring the whole economy, including industries competing at European level.

[18] As mentioned in Section 3, concentration, entrenchment, market share instability, age and M&A activity of the top 4 firms are calculated at the market level, where the market is defined based on the geographical level at which competition takes place

### Figure 4.1. Industry position in scorecard and geographic extent of competition




Note: Number of industries by quartile of the composite competition indicator in Table 4.1 and geographic level of competition. The "weak competition" group corresponds to the 4th quartile of the indicator, the "medium-weak competition" group to the 3rd quartile, the "medium-strong competition" group to the 2nd quartile and the "strong competition" group to the 1st quartile of the composite indicator. There are 27 industries competing at domestic level, of which 4 are in the first quartile of the scorecard, 6 in the second quartile, 6 in the third quartile and 11 in the fourth quartile. There are 80 industries competing at European level, of which 25 are in the first quartile of the scorecard, 23 in the second quartile, 20 in the third quartile and 12 in the fourth quartile. There are 20 industries competing at global level, of which 3 are in the first quartile of the scorecard, 3 in the second quartile, 6 in the third quartile and 8 in the fourth quartile.
Source: OECD calculations.

## Robustness checks

38. The construction of the composite indicator involves a choice of the relevant indicators to be included, and several methodological choices to get a synthesised indicator, including the weighting scheme and the normalisation procedure. This section tests the robustness of the composite indicator: first, concerning the weighting scheme; second, with respect to the normalisation procedure; finally, with respect to the choice of the indicators included. The Appendix further discusses an additional robustness check that refers to the time period considered in the analysis.

### *Alternative weighting*

39. The first robustness check is to assess whether the baseline composite indicator is robust to an unweighted alternative in which all indicators receive equal weights. Compared to the baseline, the unweighted indicator gives less weight to the concentration indicator and more weight to entrenchment, market share instability, top firms' M&A activity and age. Figure 4.2 presents industries ranked by the baseline version of the composite indicator – as presented in Table 4.1– and the alternative ranking obtained using an unweighted average across the different indicators. Specifically, the figure reports, for each industry, the ranking obtained both in the baseline methodology (dark blue dots), according to which industries are ordered in the figure, and in the unweighted specification (light blue dots). Industries move, on average, 12 positions. Reassuringly, deviations from the baseline ranking do not exhibit a systematic

skew in any part of the rank distribution. Importantly, the first 15 ranked industries under the baseline weighting scheme appear mostly in the same places in the unweighted measure.

### Figure 4.2. Robustness of composite indicator: weighting


Note: Ranking of industries implied by the baseline composite indicator and by an alternative composite indicator. The baseline composite indicator (dark blue dots) is the weighted average of the Z-score normalised sub-indicators, where the weights are given by the categories in Table 3.1. The alternative composite indicator considered here (light blue dots) is the simple average where each Z-score normalised sub-indicator is assigned an equal weight irrespective of its category.
Source: OECD calculations.

### *Alternative normalisation*

40. Subsequently, the robustness of the baseline ranking to two alternative normalisation procedures is assessed. First, the Min-Max range normalisation is considered. For each indicator, in each industry this normalisation subtracts from the observed value the minimum value of the indicator across industries and then divides it by the difference between the maximum and the minimum value of the indicator across industries.[19] Following the notation adopted before, the Min-Max range transformation is given by:

$$MM_s = \frac{x_s - \min(x)}{\max(x) - \min(x)},$$

Equation 3

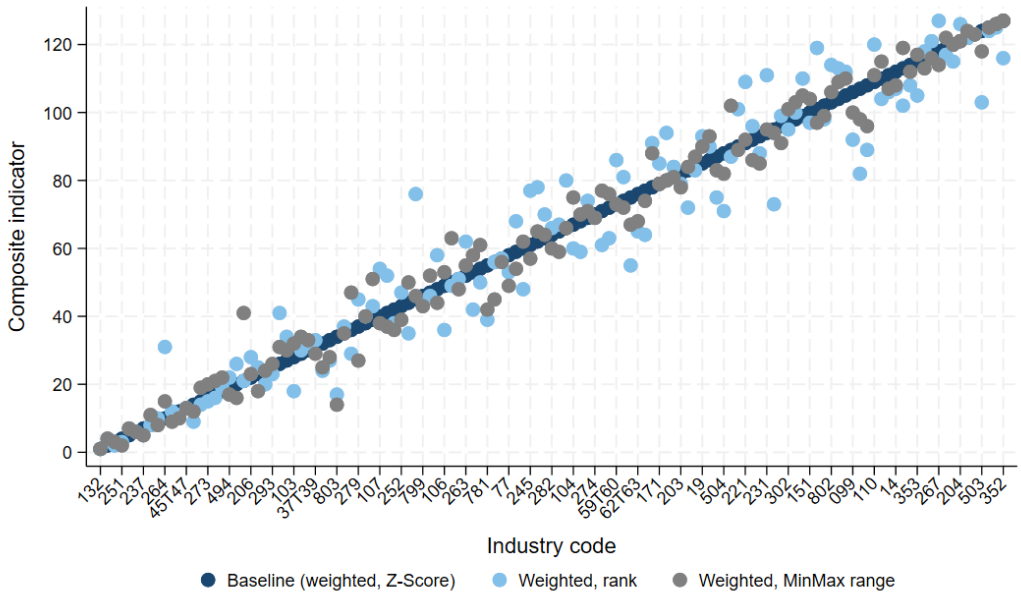
where $x_s$ represents an indicator (i.e., concentration, markups, and so on) in industry $s$, whereas $\max(x)$ and $\min(x)$ are, respectively, the maximum and the minimum value of $x$ across all industries.

41. Second, the ordering normalisation is considered as an additional alternative normalisation procedure. In this case, for each sub-indicator, industries are simply ranked and then average of the rank values among the different indicators is taken to get the composite indicator.

[19] This alternative is similar in spirit to the Z-score since it subtracts to each observation a measure of the location of the distribution and divides by a measure of its spread. After the normalisation, each indicator ranges between 0 and 1.

42. Similar to Figure 4.2, Figure 4.3 shows the robustness of the baseline composite (dark blue dots) indicator to these alternative normalisation procedures. Compared to the baseline composite indicator, both the Min-Max range normalisation (grey dots) and the ordering normalisation (light blue dots) generally yield a very similar ranking. Therefore, they confirm the robustness of the baseline ranking to different normalisation procedures. Notably, the ranking of the distribution tails (i.e., the top and bottom 15 industries) see only slight changes, suggesting that industries classified as having either weak or strong competition robustly belong to their respective group independently of the assumptions made.

## Figure 4.3. Robustness of composite indicator: normalisation




Note: Ranking of industries implied by the baseline composite indicator and by two alternative composite indicators. The baseline composite indicator (dark blue dots) is the weighted average of the Z-score normalised sub-indicators. The alternative composite indicators considered here are weighted averages of the rank across sub-indicators (light blue dots) and the Min-Max range transformation (grey dots), respectively. The weighting scheme applied to the alternative normalisation exercises follows the methodology used for the baseline indicator, with weights described in Table 3.1.
Source: OECD calculations.

43. Overall, comparing these alternative robustness exercises related to the methodological choices made to build the composite indicator, the procedure adopted seems to be rather robust to different weighting and normalisation procedures. This becomes more evident when looking at the quartiles of the composite indicator, which, as mentioned, classify industries as having strong competition (first quartile), medium-strong competition (second quartile), medium-weak competition (third quartile) and weak competition (fourth quartile). To this end, Table A B.1, Table A B.2 and Table A B.3 provide details on the movements of the industries across quartiles in the different robustness checks compared to the baseline methodology. For each robustness check, the tables describe the number of industries that move from a given quartile (specified by rows) to a different one (specified by columns) when using an alternative method to construct the composite indicator. On average, for all three alternative exercises, fewer industries move out of the first or the fourth quartile than from the second and the third quartile. Put differently, industries seem to exhibit a relatively higher persistency in the tails of the composite indicator distribution, suggesting that, as expected, industries with very strong or very weak competition are clearly identified irrespective of the methodology used. In addition, the few industries that change quartiles move only by one quartile (except for one industry when employing equal weighting), suggesting that there are

no dramatic changes in the ranking across methodologies. Based on these exercises, the composite indicator seems to be robust to the choice of weights and normalisations.

### *Alternative definitions of the indicator*

44. The robustness of the ranking is further checked by using alternative definitions of the different indicators or alternative indicators. For instance, the indicator for top performers' age can be alternatively defined as the mean age of the subsidiaries belonging to the top 4 firms rather than the age of the global ultimate owner (GUO), and the indicator for M&A activity can also refer to minority stake deals of the top 4 firms rather than just acquisitions.[20] Figure A A.1 shows that when these alternative indicators are employed the top and bottom ranks remain largely unchanged. The average absolute rank difference with the baseline composite indicator ranking is 4.8 for both the alternative definition of the M&A indicator and for the alternative definition of the top performers' age indicator.

45. An additional indicator used in the literature to capture the intensity of competition in a market is the Boone indicator. This indicator aims to capture the difference in profits between firms with different levels of efficiency based on the idea that a close link between efficiency and profit indicates stronger competition (Boone, 2008[37]). Empirically, the variable is estimated as the within-industry correlation between average variable costs and gross profits across firms (Griffith, Boone and Harrison, 2005[38]).[21] In order to check whether the addition of the Boone indicator to the scorecard changes the ranking of industries, the baseline composite indicator is compared to an alternative version where the Boone indicator has been added to the "industry outcomes" category (Table 3.1). The comparison between the ranking in Figure A A.2 shows that adding the Boone indicator does not lead to substantive changes in the composite indicator. The differences in rank are usually small (6.2 rank difference on average) and the positions of the industries with the most and least competition barely change. Given the data available for the analysis, the Boone can only be computed using average costs as a proxy for marginal costs, and so it cannot be estimated precisely. Therefore, due to this approximation, it has been chosen to omit this variable from the baseline indicator and use it only in a robustness exercise.

46. Lastly, the influence of the underlying time period chosen on the composite competition indicator is examined. While the baseline composite indicator is computed over the period 2000-2019, Figure A A.3 shows an alternative version of the indicator computed from data for the period 2008-2019 (Post), which relies only on the post-2008 period, for which the reliability of the data is stronger (see the Annex for further details). Again, as for the sensitivity analyses presented above, the position of industries at the very top and bottom of the ranking largely remains in place and, overall, the ranking seems in line with the baseline scorecard.

[20] Other robustness test with alternative definitions of the other variables included in the composite indicator are available on request. These two robustness checks have been reported since these two variables have less well-established definitions in the literature and so seemed more discretionary.

[21] Following Griffith, Boone and Harrison (2005[38]), the Boone indicator corresponds to the $\beta$ coefficient obtained from the firm-level regression, run separately for each industry *s*, $\ln(y_{f,s,t} - TVC_{f,s,t}) = \alpha_t + \beta(TVC_{f,s,t}/y_{f,s,t}) + \epsilon_{f,s,t}$, where $y_{f,s,t}$ represents total sales and $TVC_{f,s,t}$ is total variable costs of each firm *f*. The regression is estimated on the same sample of firm-level Orbis data for the years 2000 to 2019 used to estimate markups (see Section 3). Across the 127 industries considered in the report, $\beta$ ranges from 2.97 to -5.99 with a mean of -0.60 and a median of -0.40. As the other indicators, it is included in the composite indicator with its industry-specific Z-score.

# 5 Relating the composite indicator to competition policy interventions

47. As in Mariniello and Antonielli (2014[16]) and Koltay, Lorincz and Valletti (2023[39]), this section relates competition enforcement actions by the EC to the competition indicators presented in the scorecard. The measures of competition enforcement used here are the number of EC competition enforcement interventions in each industry disaggregated by their type, i.e., antitrust, cartel, and mergers interventions. If EC competition enforcement interventions were well targeted to industries that exhibit competition deficiencies and if the position in the scorecard is a good approximation of competition in the industry, then interventions should be positively related to an industry's position in the scorecard (where higher ranks imply weaker competition).

48. Comprehensive data on competition interventions were obtained directly from the EC and can be grouped into antitrust interventions, cartel interventions, and merger interventions.[22] Antitrust interventions are either cases of abuse of a dominant position (Article 102 of Regulation 1/2003) or non-cartel violations (Article 101 of Regulation 1/2003) such as price discrimination between customers from different countries. Cartel interventions concern agreements between competitors to restrict competition such as price fixing or market sharing (Article 101 of Regulation 1/2003). Merger interventions correspond to merger projects notified to the EC that were either prohibited outright (Art. 8(3) of Council Regulation (EC) No 139/2004), permitted only under conditions (Art. 6(1)(b) or Art. 8(2) of Council Regulation (EC) No 139/2004) like the sale of certain business units or withdrawn during an in-depth investigation. The number of interventions per industry was counted, and intervention cases related to multiple industries were spanned towards all industries affected by the intervention and therefore counted multiple times.[23]

49. Table 5.1 presents descriptive statistics on the number of competition interventions over the time period covered by the data, which is 2004-2019.[24] It is important to note that 30 of the 127 industries (24%) were never subject to an intervention of any type over the time period studied, and over two-thirds of industries never received any cartel and antitrust interventions. Some industries, however, are regular targets of interventions, such as the industry group 45 to 47 (motor vehicle, wholesale and retail), which experienced 20 antitrust, 7 cartel, and 29 merger interventions.

[22] This data has been prepared by DG Competition staff based on internal research.

[23] A limited number of merger interventions that are defined at a more aggregated industry classification in the case data than that adopted in this report was not used.

[24] Since antitrust and cartel interventions are available only from 2004, the time period used for all types of intervention is 2004 to 2019.

### Table 5.1. Industry-level competition interventions

| | Mean | Min | P10 | Median | P90 | Max | Share 0 | N |
|---|---|---|---|---|---|---|---|---|
| Antitrust Interventions | 0.69 | 0 | 0 | 0 | 2 | 20 | 0.78 | 127 |
| Cartel Interventions | 0.69 | 0 | 0 | 0 | 2 | 12 | 0.69 | 127 |
| Merger Interventions | 3.24 | 0 | 0 | 1 | 8 | 29 | 0.31 | 127 |

Note: Distribution of EC intervention counts by intervention type for the 127 industries included in the scorecard. The time used for all three types of interventions is 2004-2019.
Source: EC Data and OECD calculations.

50. To investigate the association between competition interventions and the variables of the scorecard, a Poisson model is estimated. The Poisson model was chosen since the outcome variables are counts of competition interventions in each industry, and so takes only zero or positive integer values.[25] The model takes the form:

$$I_s = P_s e^{\beta_0 + \beta_1 X_s},$$

Equation 4

where $I_s$ is the intervention count of industry $s$ considered (antitrust interventions, cartel interventions, or merger interventions). $P_s$ is the aggregate production value of the industry and $X_s$ refers either to the weighted average Z-score used to build the composite competition indicator (where higher ranks correspond to weaker competition) or to each sub-indicator.[26] The composite competition indicator is included as the weighted average Z-score of the sub-indicators, whereas the sub-indicators are included in the form of Z-scores, and so with a mean of zero and a standard deviation of one.[27] $P_s$ is included to control for the fact that larger industries are more likely to be the target of an intervention. In the estimation of the equation, $P_s$ is included constraining the coefficient to one, which implies that the outcome variable must be interpreted as the rate of interventions per production value (million Euros of gross industry output).[28] Importantly, note that each variable considered – either the composite indicator or any subcomponent – is included only one at the time in a univariate setting.

51. The results of the Poisson estimations are presented in Table 5.2. The reported coefficient of this estimation model represents the incidence rate ratios (IRR), which should be interpreted as the factor by which the outcome variable is multiplied for each increase in the independent variable by 1.[29] The first row

[25] Data on interventions are used also in Calligaris et al. (2024[6]). In that setting, these variables are built at the industry-year level, whereas in this analysis the variables are industry-specific. Aggregating the interventions over years to the industry level gives more variation in the number of interventions per industry, while in Calligaris et al. (2024[6]) most of the industry-year observations had either no or at maximum one intervention. Therefore, in this setting, the baseline is chosen to be a Poisson estimator, as it accounts for the fact that the outcome variable is a positive integer. Note also that the results of Calligaris et al. (2024[6]) are robust to using a Poisson estimator.

[26] The variable $P_s$ is derived from Eurostat National Accounts (together with Eurostat's Structural Business Statistics) and refers to gross output in millions of euros. The total cumulative value over the period 2000-2019 is used as a measure of industry size. For further details on the construction of this variable, please refer to the description in Calligaris et al. (2024[6]).

[27] For the regressions, the weighted average Z-score that underlies the ranking in the composite indicator has been used (rather than the rank itself), to exploit the magnitude of the differences among industries.

[28] To see this, note that the estimation equation can be transformed into $\ln\left(\frac{I_s}{P_s}\right) = \beta_0 + \beta_1 X_s$ .

[29] Technically, in this equation, the coefficient $\beta_1$ corresponds to the increase in log points in the rate of competition interventions per production value for an increase in $X_s$ by one unit. Since this has no intuitive interpretation, IRRs are

reports the relationship between the composite indicator and the three different intervention types considered. In column (1), an increase by 1 of the weighted average Z-score underlying the composite competition indicator is associated with a 2.15 times (115%) increase in the rate of antitrust cases per million Euros of gross industry output.[30] Similarly, the positive and significant estimate in column (3) implies that such an increase is associated with an 1.72-fold (72%) increase in the rate of merger interventions. The cartel intervention count, however, is not statistically associated with the level in competition of the industry.[31]

### Table 5.2. Competition and competition intervention cases

| | (1)<br>Antitrust | (2)<br>Cartel | (3)<br>Merger |
|---|---|---|---|
| Comp. Indicator | 2.152***<br>(0.000) | 0.690<br>(0.103) | 1.717***<br>(0.000) |
| Concentration | 1.828***<br>(0.000) | 0.981<br>(0.872) | 1.345***<br>(0.000) |
| Markup | 1.052<br>(0.629) | 0.469***<br>(0.000) | 1.014<br>(0.779) |
| EBIT margin | 1.042<br>(0.681) | 0.718***<br>(0.009) | 1.273***<br>(0.000) |
| ROA | 0.795<br>(0.097) | 0.768<br>(0.058) | 0.869**<br>(0.022) |
| Entrenchment | 0.770**<br>(0.025) | 0.811*<br>(0.066) | 1.053<br>(0.290) |
| Mkt. Sh. Instab. | 0.762**<br>(0.011) | 0.806**<br>(0.042) | 1.058<br>(0.250) |
| Top 4 Firm Age | 0.817<br>(0.132) | 1.744***<br>(0.000) | 1.019<br>(0.757) |
| M&A Act. | 1.300**<br>(0.019) | 1.302**<br>(0.019) | 1.181***<br>(0.002) |

Note: Poisson regressions of the count of antitrust interventions (column 1), cartel interventions (column 2) and merger interventions (column 3) on composite competition indicator and sub-indicators. IRRs are reported instead of regression coefficients. Note that the coefficients are obtained from univariate regressions run separately for each variable specified in column 1. The number of observations is 127 in all regressions, except for M&A Activity where the number reduces to 119. The constant and the log of total production value (with a coefficient of one) are omitted for brevity. In parenthesis, p-values are reported. * stands for a coefficient that is significant at the 10% confidence level, ** for significance at the 5% level and *** for significance at the 1% level.
Source: OECD calculations.

52. In the remaining rows, each of the different variables specified in column 1 is related – one at a time in a univariate regression – to the enforcement actions. The results show that overall concentration, M&A Activity of top performers and the EBIT margin seem to be positively associated with competition

reported instead of regression coefficients (see below). IRRs above one implies a positive association, whereas IRRs below one implies a negative association.

[30] The weighted average competition indicator has a minimum of -0.94, a maximum of 1.24, a median of -0.04 and a range of 2.18. This means that an increase of 1 roughly corresponds to a step from the industry with the most competition to the median industry or from the median industry to the industry with the least competition.

[31] The coefficient of the composite competition indicator and antitrust cases is partly driven the industry “Gas” (352) which is placed lowest in the composite indicator and receives a large number of antitrust interventions. Since these extreme values are not the result of a data error and are real cases, it was chosen to report results including these observations. The results for the cartel intervention and merger intervention outcomes are robust to the exclusion of outliers. Results are available on request.

policy interventions. For example, in column (6), a one standard deviation increase in the level of concentration in an industry is significantly associated with a 1.35-fold (35%) increase in the merger intervention rate of the industry. Asset profitability, entrenchment, and market share instability, on the other hand, are not significantly associated with any of the competition policy interventions in the sample considered.

53. This exercise has shown that weak competition in a European industry is overall associated with more competition policy interventions, and especially so for antitrust and merger interventions. While the findings do not allow to make any causal statements, they support the idea that the composite competition indicator built in the report and EC competition interventions are positively correlated. This result suggests that, overall, the composite indicator proposed in this report captures well the degree of competition across industries. This correlation may inspire further in-depth investigations.

# 6 Conclusion

54. During times of rising market power (see Calligaris et al. (2024[6])), the functioning of competition in different industries and the efficacy of competition policies in safeguarding a level playing field comes to the fore in policy discussions. This report presents a classification of industries according to their degree of competition. Using microdata from firm balance sheets, this report builds a competition scorecard which compares narrowly defined industries belonging to manufacturing, service, mining, and utility sectors between 2000 and 2019 along multiple dimensions: industry concentration, entrenchment, market share instability, average firms' markups, revenue profitability and asset profitability, top performers' age and M&A activity. Industries are then ranked according to a composite competition indicator that combines all these proxies of industry competition. Lastly, the relationship of the composite competition indicator with antitrust, cartel, and merger interventions by the EC is examined empirically.

55. The main outcome of the report is a scorecard ranking industries according to different proxies of competition, as well as a composite competition indicator which summarises all of them. While there is variation in the ranking across different indicators for industries with weak to intermediate competition, industries with strong competition tend to rank high on all dimensions. Extensive robustness checks show that these results are robust to possible alternative assumptions in the construction of the composite indicator (weighting scheme and normalisation procedure) as well as the choice of indicators (precise indicator definition and addition of the Boone indicator).

56. Regression analysis further suggests that EC's competition policy interventions are more frequent in industries with weaker competition. This correlation suggests that the proposed scorecard captures the degree of competition across industries well.

57. The composite indicator must be interpreted and used cautiously: competition is a multifaceted phenomenon with no univocal empirical representation. As such, the choice of indicators included in this scorecard is open to discussion. Although this report has been as broad and transparent as possible about the indicators' choice, it is possible that an alternative set of indicators could have led to a different ranking. Furthermore, even though the choice of the indicators to be included is grounded in the previous literature, each indicator might also be capturing a number of additional industry-specific factors that might well go beyond competition (Berry, Gaynor and Morton, 2019[9]), including the importance of fixed cost, the nature of the goods/services produced in the industry, as well as technological maturity (Klepper, 1997[8]). As such, the composite indicator should be used keeping in mind that the variables considered may also capture industry-specific characteristics not necessarily related to competition.

58. With these caveats in mind, the scorecard developed in this report can serve as a synthesised and easily interpretable tool for economists and policymakers to analyse and monitor the functioning of narrowly defined industries from a competition perspective.

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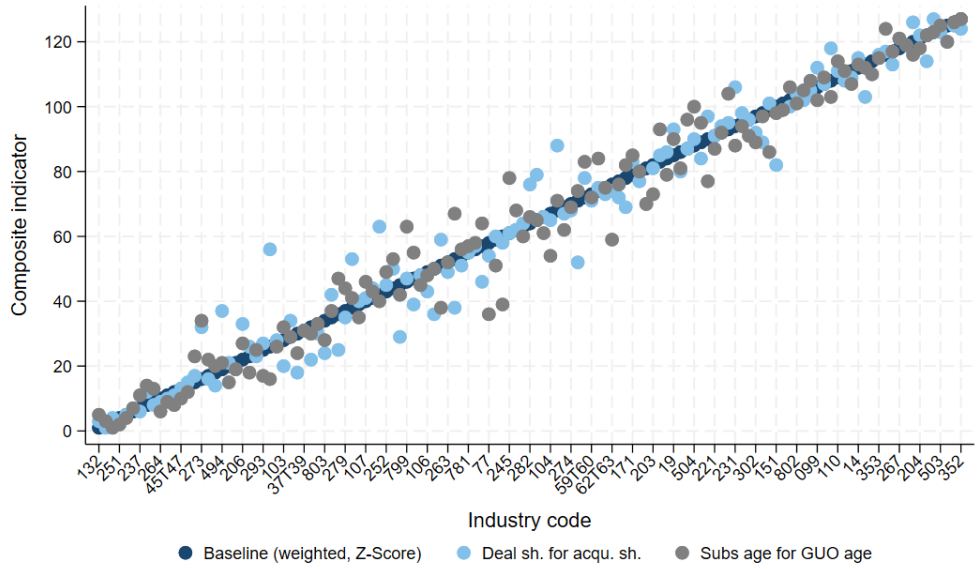
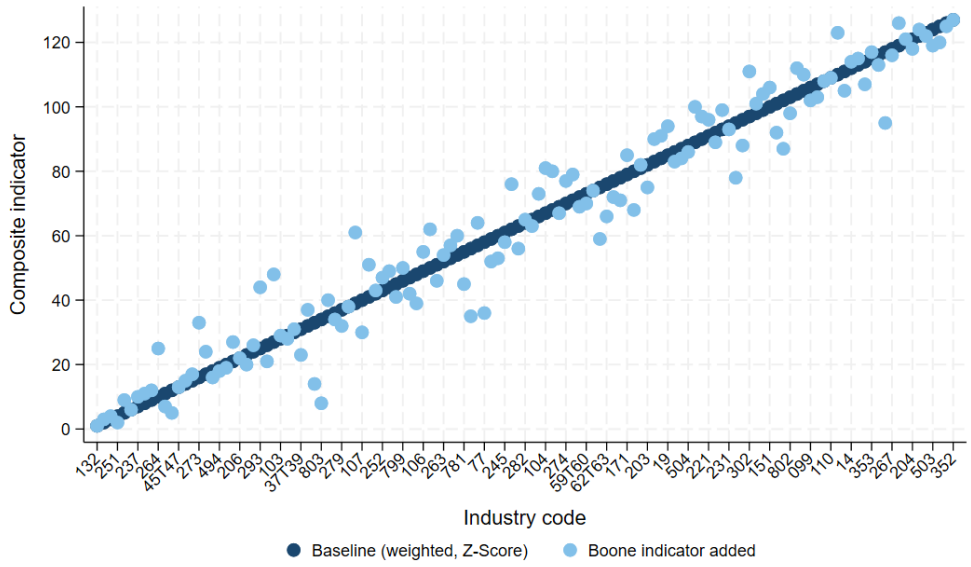
# Annex A. Figures

## Figure A A.1. Robustness of composite indicator: alternative indicator definitions




Note: Ranking of industries implied by the baseline composite indicator and by alternative composite indicators. The baseline composite indicator is the weighted average of the Z-score normalised sub-indicators where the weights are given by Table 3.1. The alternative composite indicators considered here are indicators where i) the top 4 share in M&A acquisition activity has been replaced by the top 4 share in M&A deal activity and ii) where the mean age of the top 4 business groups has been replaced by the mean age of the top 4 business group's subsidiaries.
Source: OECD calculations.

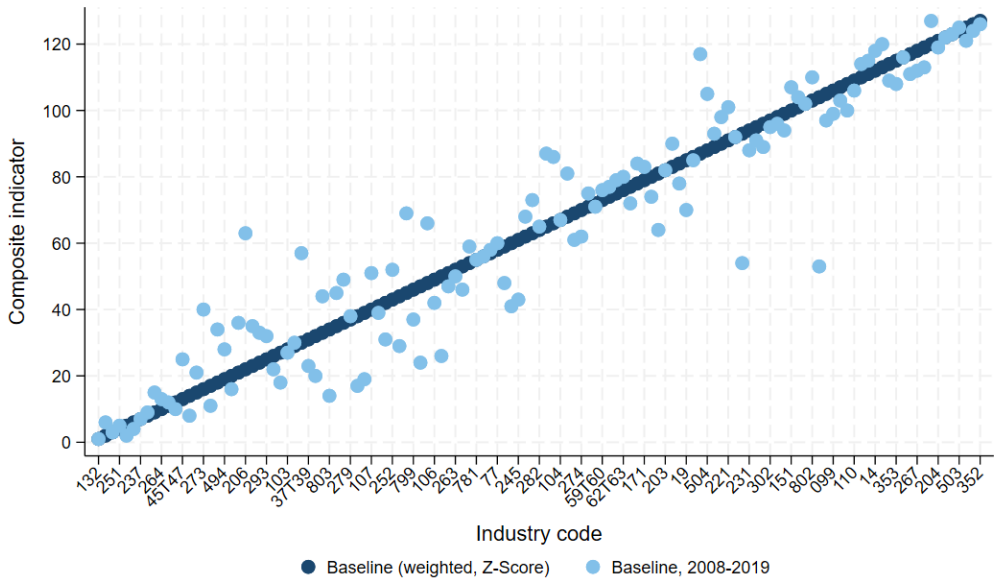
## Figure A A.2. Robustness of composite indicator: adding Boone indicator




Note: Ranking of industries implied by the baseline composite indicator and by an alternative composite indicator. The baseline composite indicator is the weighted average of the Z-score normalised sub-indicators where the weights are given by Table 3.1 and calculated over the time period 2000-2019. The alternative composite indicator includes the Z-score of the Boone indicator in the "industry outcomes" category, giving each of the four variables in that category an equal weight.
Source: OECD calculations.

As an additional robustness check, the influence of the time period used to build the underlying indicators can be examined. While the baseline composite indicator is built over the period 2000-2019, Figure A A.3 shows an alternative version of the indicator computed using only data for the period 2008-2019. This exercise is implemented since data post-2008 are considered more reliable than for previous years for several reasons, such as the fact that the indicators included are not affected by issues related to the change in classification from NACE 1 to NACE 2, and the data sources used to build the indicators have better coverage of the economic activity of firms across countries (for further details see Calligaris et al. (2024[6])). The average absolute rank difference with the baseline composite ranking is 8.2 for the post-2008 period, in line with previous robustness analyses. While some industries experience significant differences in ranking (e.g., "Steel Tubes" (242) is ranked 104th overall but 53rd for the Post period), it still holds that industries at the very top and bottom of the ranking largely remain in place, irrespective of the time period considered.

## Figure A A.3. Robustness of composite indicator: alternative time period




Note: Ranking of industries implied by the baseline composite indicator and by an alternative composite indicator. The baseline composite indicator is the weighted average of the Z-score normalised sub-indicators where the weights are given by Table 3.1 and calculated over the time period 2000-2019. The alternative composite indicator is an indicator computed for 2008-2019 data only ("Post").
Source: OECD calculations.

# Annex B. Tables

## Table A B.1. Movements of industries by quartiles – baseline versus ordering normalisation

| Baseline/robustness | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **1** | 29 | 3 | 0 | 0 |
| **2** | 3 | 23 | 6 | 0 |
| **3** | 0 | 6 | 22 | 4 |
| **4** | 0 | 0 | 4 | 27 |

Note: The table shows, for each quartile of the baseline ranking, the number of industries by quartiles obtained using the ordering normalisation. The row represents the quartiles of the baseline ranking, while the column the quartiles of the ordering normalisation.
Source: OECD calculations.

## Table A B.2. Movements of industries by quartiles – baseline versus Min-Max range normalisation

| Baseline/robustness | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **1** | 29 | 3 | 0 | 0 |
| **2** | 3 | 28 | 1 | 0 |
| **3** | 0 | 1 | 30 | 1 |
| **4** | 0 | 0 | 1 | 30 |

Note: The table shows, for each quartile of the baseline ranking, the number of industries by quartiles obtained using the Min-Max range normalisation. The row represents the quartiles of the baseline ranking, while the column the quartiles of the Min-Max range normalisation.
Source: OECD calculations.

## Table A B.3. Movements of industries by quartiles – baseline versus unweighted

| Baseline/robustness | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **1** | 25 | 7 | 0 | 0 |
| **2** | 7 | 20 | 5 | 0 |
| **3** | 0 | 4 | 19 | 9 |
| **4** | 0 | 1 | 8 | 22 |

Note: The table shows, for each quartile of the baseline ranking, the number of industries by quartiles obtained using no weighting to when computing the average Z-score across different indicators. The row represents the quartiles of the baseline ranking, while the column the quartiles of the unweighted ranking.
Source: OECD calculations.