An assessment of companies' competitiveness in Portugal and in some European countries

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April 2022

Abstract

This article analyses the competitiveness of companies from five Euro area countries (Portugal, Spain, France, Italy and Belgium) in the period 2008-2018, using a composite Enterprise Competitiveness Indicator (ECI) obtained from the individual financial statements. The ECI aggregates six relevant dimensions for the analysis of competitiveness: return, production costs, productivity, access to resources, risk and quality orientation. Based on the median value of the ECI, the analysis of this article suggests that, in this period, the competitiveness of Portuguese companies was always below the one observed in the remaining countries under analysis, despite the favorable evolution registered in recent years. The difference between the competitiveness of Portuguese companies and that of the remaining countries results, to a large extent, from their performance in terms of productivity and access to resources. In general terms, this behavior is registered across different size classes and sectors of activity. (JEL: D22, D40, L11)

1. Introduction

This article presents an assessment of firms' competitiveness in Portugal and a number of Euro area countries between 2008 and 2018. The analysis is based on the performance of the Enterprise Competitiveness Indicator (ECI), a composite

Acknowledgements: The analysis developed in this article is based on the performance of the Enterprise Competitiveness Indicator (ECI). The ECI was produced within the scope of the Working Group on Indicators of Competitiveness and Productivity of the Portuguese Economy, created in 2018 by the Portuguese Statistical Council. The structure of the ECI and the methodology underlying its calculation are presented in detail in the recently released report (Lourenço *et al.* 2022). Involved in this work were not only the authors of this article but also Ana Martins and Eva Pereira, from the Office for Strategy and Studies of the Ministry of Economy and Digital Transition, and Rita Ponte, from Statistics Portugal. The production of the ECI also benefited from comments by several Working Group members. The authors would particularly like to thank João Amador, Carlos Coimbra, Isabel Francisco, Catarina Morais and Francesco Franco. The analyses, opinions and conclusions expressed herein are the sole responsibility of the authors and do not necessarily reflect the opinions of Banco de Portugal or the Eurosystem. Contact person: Fernando Martins; fmartins@bportugal.pt

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indicator which aggregates six dimensions considered relevant for competitiveness analyses: return, production costs, productivity, access to resources, risk and quality orientation. The calculation of an indicator with these characteristics was only possible due to the recent availability of a harmonised microeconomic database for a group of Euro area countries, consisting of information obtained from firms' financial statements.

The production of the ECI resulted from a joint effort carried out within the framework of the Working Group on Indicators of Competitiveness and Productivity for the Portuguese Economy, created in 2018 by the Portuguese Statistical Council. In particular, the ECI was discussed and produced in the context of a more restricted group, with a specific mandate to explore microeconomic databases in order to build a composite indicator of competitiveness. Involved in this work were not only the authors of this article, but also economists from Statistics Portugal and the Office for Strategy and Studies of the Ministry of Economy and Digital Transition.¹

It is not particularly challenging to justify the importance of analyzing competitiveness at the microeconomic level. The international context of increasing integration of economies, together with the strong pace of technological progress, namely with greater automation and digitalization of production processes, has posed renewed challenges to companies, making the environment in which they operate increasingly competitive.

Competitiveness is the concept that emerges in this framework. It is a multidimensional concept, which seeks to capture the way in which companies adjust to a constantly changing economic environment. It can be analysed at different levels. At the macroeconomic level, competitiveness mainly concerns the ability of economies to increase the wealth and level of well-being of their citizens in a sustained manner; at the microeconomic level, the competitiveness of companies can be understood as the current and future capacity of these to produce attractive goods and services, through quality and/or price, to compete domestically and internationally and to generate returns.

However, the debate on competitiveness tends to give greater prominence to the macroeconomic analysis. The lack of databases with harmonised microeconomic information covering a relatively wide range of countries certainly contributes to this fact. This information is essential because it reveals factors that, not being observable at the aggregate level, influence the global performance of economies. For example, it is now relatively consensual in the literature that many of the variables related to the concept of competitiveness, such as productivity, have distributions with significant asymmetry (Banco de Portugal 2021). These results, which are fundamental for a full assessment of competitiveness, can only be obtained with microeconomic information, having in mind that macroeconomic analysis typically place emphasis on measures of central tendency. Finally, it must be emphasised that companies, not countries, are the ones that produce, trade and, ultimately, face competition.

^{1.} Specifically, for the production of the ECI contributed Ana Martins and Eva Pereira from the Office for Strategy and Studies of the Ministry of Economy and Digital Transition, and Rita Ponte from Statistics Portugal.

In this context, it seems essential to complement the typical toolkit of analysis of competitiveness with instruments that allow this assessment to be carried out at the microeconomic level. These instruments would make it possible to assess not only the average performance but also heterogeneity by analyzing other moments of the distribution. Unlike macroeconomic analysis, which seeks to measure dimensions such as sectoral structure, technological level or the existence and quality of infrastructures, at the company level the focus is on factors such as the quality of goods and services, profitability, access to finance, price competitiveness or the internal management practices (productivity, innovation, production costs, resource management and human capital).

This multidimensionality of competitiveness made the production of a synthetic indicator particularly challenging. The incorporation of some of these dimensions into a tangible metric required a selection of indicators that was anchored in the literature and conditional on the availability of information. These considerations were duly considered in the production of the ECI.

The article is structured as follows. Section 2 presents a number of arguments that support the importance of company-level competitiveness indicators. It also presents the database and methodology, with particular emphasis on the structure and calculation of the ECI. Section 3 presents the main results, while section 4 concludes.

2. Methodology

2.1. Framework

The discussion on how to define, measure and evaluate the concept of competitiveness has received important contributions from the empirical literature, namely from the areas of international trade and industrial organization. This literature has shown that aggregate economic performance, both at the sector and country level, strongly depends on company-level factors, such as the size of companies, organizational aspects, technological capacity, access to finance, as well as other conditions that companies face in the specific environment in which they operate.

In this article, we propose to analyse competitiveness on a microeconomic level, using a database with harmonised company-level information for some Euro area countries. We seek to underline the importance of this level of approach as a complement to the usual macroeconomic analyses, suggesting that indicators at the company level can be added to the usual macroeconomic tools for assessing competitiveness. This is the case with the ECI that is used in this article. This would make it possible to broaden the scope of approaches to competitiveness carried out with microeconomic data, currently used almost exclusively for the production of research papers, aiming at their more systematic use in the formulation of economic policies. Recognition of the importance of this level of analysis should also be a catalyst for the production and wider dissemination of harmonised microeconomic databases in this field.

Assessing country competitiveness with microeconomic data inevitably requires some degree of aggregation. However, in doing so, and in order to exploit in full the richness of the available information, we should not only focus on measures of central tendency, such as the mean or median, but analyse the whole distribution. Empirical evidence based on microeconomic information for Portugal (Banco de Portugal 2021), but also for the United States (Bernard *et al.* 2012) and the European Union (Mayer and Ottaviano 2007), has shown that, contrary to the what it is often assumed, many relevant indicators for measuring competitiveness, such as productivity, do not typically follow symmetrical distributions. In fact, performance indicators calculated with microeconomic data are not characterised by the concentration of observations around a central average value, but by large company heterogeneity, with a very high number of companies. This result translates into distributions with strong asymmetry. In particular, in the case of the ECI, it is possible to assess in full its distribution, as well as of all its dimensions and variables, including not only the central and non-central tendency, but also dispersion, asymmetry and kurtosis. Additionally, the longitudinal nature of the database allows the evaluation to be both cross-sectional and longitudinal.

2.2. Methodology description

The composite indicator for enterprise competitiveness proposed in this work follows the approach initiated by Buckley *et al.* (1988) and found in later works (e.g. Laureti and Viviani 2011), according to which the competitiveness of companies is a multidimensional phenomenon, which reflects both factors intrinsic to the company and the ability of companies to compete in national and international markets, generate returns for their stakeholders and sustain the competitive potential in the future.

The base indicators included in the ECI were selected among those available in the database and for which there is empirical evidence on their ability to measure or explain business competitiveness (Lourenço *et al.* 2022). These were aggregated into six dimensions of firm-level competitiveness: return, production costs, productivity, access to resources, risk and quality orientation. As the database contains individual accounting information, some aspects of firm competitiveness are insufficiently covered, such as international trade, the quality of management or the characteristics of human capital, which could be improved in the future by gathering information from other complementary databases.

2.3. Database

The ECI was obtained through iBACH - microdata of the Bank for the Account of Companies Harmonized, a database developed under the aegis of the European Committee of Central Balance Sheet Data Offices (ECCBSO²) that includes harmonised

^{2.} ECCBSO is a consultive body that gathers analysts from the Central Balance Sheet Data Offices of National Central Banks (or associated entities) from 28 European countries and the European Central Bank (ECB). The BACH (Bank for the Accounts of Companies Harmonized) database provides aggregated economic and financial information on non-financial companies in 12 European countries. This information follows a harmonised financial statement model, allowing the establishment of comparable data from

individual information on non-financial corporations³ from six European countries: Belgium, Spain, France, Italy, Portugal and Slovakia. Despite the small number of countries included in iBACH, access to individual observations has the advantage of allowing greater flexibility in the sample selection and in the calculation of indicators based on the firms' relative performance.

The database used in this study corresponds to the March 2021 version. Some exclusion criteria were defined to ensure the comparability of the samples across countries. Observations relating to Slovakia were excluded as the number of employees is unavailable until 2018, and therefore is not possible to calculate some of the selected indicators. The selection criteria applied on the legal form, sector of economic activity, state of activity, type of data and number of employees intend to harmonise the samples by excluding groups of firms that are underrepresented in some countries, and therefore avoid conclusions led by the sample bias. In particular, firms with less than 10 employees, which correspond in general to micro-enterprises, were excluded. These correspond to a very significant proportion of the observations and show different coverage rates across the countries⁴. For firms with 10 or more employees, the coverage rate of the samples is more homogeneous between countries and always above 60%.

The selection criteria excludes a substantial number of observations. Nevertheless, the selected sample maintains a high representativeness of non-financial corporations when evaluated by assets, number of employees or EBITDA⁵. The sample selected for calculating the ECI includes around 3.8 million records, relatively well balanced through the 2008-2018 period (Table 1). France and Italy represent the highest proportion of the observations (30% for both countries), followed by Spain (21%), Portugal (12%) and Belgium (6%).

The distribution by economic activity is similar across countries and shows no bias towards certain economic sectors (Table A.1, in Appendix). Construction, wholesale and retail trade, and technical and administrative activities, are the activities that represent more observations in the sample. Industries (sections B and C of NACE Rev.2) account for between 20% (Belgium) and 41% (Italy) in the total sample, while Trade (section G) accounts for between 19% (Italy) and 28% (Belgium) of observations.

information obtained from national accounting standards. With the growing importance of microdata, the ECB and the BACH Working Group made the BACH microdata available to internal users from the ECB and the National Central Banks of the six countries involved in the project, including Banco de Portugal.

^{3.} The iBACH database covers firms belonging to the non-financial corporations (NFC) sector. The terms 'firm', 'company' or 'enterprise' are used indistinctively in this study, and refer to the NFC sector, which excludes sole proprietorships (integrated in the institutional sector of Households).

^{4.} Considering the Structural Business Statistics (Eurostat) as the reference population of non-financial companies operating in each country, the iBACH samples show an overall coverage of between 9.6% for France and 63.2% for Belgium. Firms with less than 10 employees are the most underrepresented (coverage rates between 5% in the case of France and 46.7% in the case of Portugal).

^{5.} The sample selected for Portugal represents 11% of active firms, 55% of assets, 68% of EBITDA and 72% of the employees observed for the population of resident companies. For the samples relating to Belgium and Italy (which are collected, as in the case of Portugal, from censitary sources) the representativeness of the samples show similar figures.

	Belgium	Spain	France	Italy	Portugal	Total
2008	19 622	60 975	86 658	83 612	46 749	297 616
2009	20 123	73 228	88 930	86 316	45 017	313 614
2010	20 436	73 106	91 985	91 740	46 494	323 761
2011	21 754	$74\ 400$	97 102	97 267	45 117	335 640
2012	22 295	70 537	101 521	100 941	41 690	336 984
2013	22 836	69 247	104 603	103 534	39 729	339 949
2014	23 263	$74\ 186$	108 628	107 037	39 902	353 016
2015	23 672	$76\ 407$	112 483	111 029	41 734	365 325
2016	24 384	80 748	117 752	121 134	43 243	387 261
2017	24 918	82 909	123 463	133 192	45 074	409 556
2018	24 761	73 148	128 504	140 938	47 302	414 653
Total	248 064	808 891	1 161 629	1 176 740	482 051	3 877 375
%	6%	21%	30%	30%	12%	100%

TABLE 1. Number of enterprises | Sample used for ECI calculation Source: iBACH (micro Bank of Account of Companies Harmonized), ECCBSO (European Committee of Central Balance Sheet Data Offices) and **?**.

The assets' median value in the sample is between 979 thousand euros (Portugal) and 2.7 million euros (Belgium) (Table 2). Concerning EBITDA, the median value is between 71 thousand euros (Portugal) and 315 thousand euros (Belgium). With regard to the number of employees, the samples show more similarities across countries, the median value standing between 17 (Spain and Italy) and 22 (France). As firms with less than 10 employees were excluded (which correspond mainly to micro-enterprises), the sample is mainly composed of small, medium and large companies.

	Assets	EBITDA	Employees
Belgium	2 756	315	20
Spain	1 390	85	17
France	2 209	216	22
Italy	2 674	204	17
Portugal	979	71	18

TABLE 2. Assets, EBITDA and Employees median values | Sample used for ECI calculation (2008-2018)

Source: iBACH (micro Bank of Account of Companies Harmonized), ECCBSO (European Committee of Central Balance Sheet Data Offices) and Lourenço *et al.* (2022). Notes: Assets and EBITDA in thousands of euros. Median values for the total set of observations (2008-

2018).

2.4. Dimensions of analysis and respective basic indicators

This section describes the dimensions on which the ECI is based and summarises the reasons for choosing the indicators underlying such dimensions. A more detailed explanation of the selection of the different indicators, including references to empirical literature in this area, can be found in **?**.

Dimension 1 – Return. This dimension aggregates two return ratios, namely, return on assets and return on equity (Table 3). Return on assets assesses the return and efficiency

in the use of resources. Return on equity represents a measure of return on investment on the company. Although correlated, these two indicators reflect, respectively, the return obtained and the profit orientation of firms.

Indicator	Formula	Impact
Return on Assets (ROA)	EBITDA/Assets	+
Return on Equity (ROE)	Net income/Equity	+

TABLE 3. Indicators of return

In a comparative analysis, these measures have the limitation of focusing on the short-term. Indeed, investment decisions or the margin to be applied in the goods and services produced may determine lower levels of profitability over a certain period of time, with a view to developing a comparative advantage in the longer term. The creation of a firm-level variable covering several years presupposes, however, a restriction of the sample to the companies active over the years considered. Furthermore, defining the number of years to be included in this indicator would be difficult, as what short-term is differs depending on, among other factors, the age of the company.

It is also important to take into account that the return on equity reflects the financing decisions of companies. Companies with higher levels of indebtedness (through recourse, for example, to bank loans) may have a higher return on equity given the lower preponderance of equity. On the other hand, such financing channel is likely to lead to lower profits due to the impact of financing costs. These dynamics must be considered in the evaluation of this indicator, particularly taking into account the existence of structural differences in the financing decisions of companies from different countries.

Dimension 2 – Production Costs. The concept of cost competitiveness is often discussed at the micro and macroeconomic levels. The principle underlying the use of cost indicators is that the higher the coverage of production costs (either by cost reduction or by increasing the obtained return), the higher the firm's competitiveness. The assessment of the production costs dimension as a determinant of firm competitiveness is carried out using the indicators of coverage of production factors' cost presented on Table 4.

Indicator	Formula	Impact
Gross margin	GVA/Assets	+
Coverage of personnel expenses by GVA	GVA/Personnel expenses	+

TABLE 4. Indicators of production costs

It should be noted that the production of appealing goods and services is also based on factors such as quality, product differentiation, relationship with the consumer (among others), which influence total production costs, but can be decisive for the company's success in the market (Artto 1987). In fact, costs are a determinant of competitiveness especially in the sectors with homogeneous products (Depperu et al (2005)). Thus, an assessment of cost-competitiveness should take into account product homogeneity, which is not possible within the scope of the indicator used in this article (although such limitation may be partially overcome by the presentation of results by sectors of activity and size cohorts).

Dimension 3 – Productivity. The third dimension of the composite indicator is the efficiency of production factors, through measures of labour and capital productivity. This dimension consists of three indicators: labour productivity, capital intensity (fixed assets per employee) and weight of fixed assets on total assets, as shown on Table 5. The use of labour productivity, calculated on the basis of the number of employees, reflects the unavailability in the database of information about hours worked.⁶

Indicator	Formula	Impact
Labour productivity	GVA/Number of employees	+
Capital intensity	Fixed assets/Number of employees	+
Weight of fixed assets on total assets	Fixed assets/Assets	+

TABLE 5. Indicators of productivity

A positive correlation between productivity and competitiveness is a consensual result in the literature. However, the causal relationship suggested by the construction of the composite indicator, with productivity as an input variable for firms' competitive potential, does not have empirical support. In fact competitiveness and productivity are essentially interdependent phenomena.

Dimension 4 – Access to Resources. Access to production resources – physical capital, labour and human capital, technology and raw materials – is a determinant of competitiveness. The information in the database allows the calculation of indicators for access to capital and an indicator for access to the labour, used as an approximation to human capital. The indicators that make up this dimension are detailed in Table 6.

With regard to capital, the empirical evidence related to the importance of diversifying funding sources, namely through alternatives to bank financing, justifies the inclusion of the indicator of access to other types of debt. It is expected that a greater access to non-bank financing will lead to a higher value of the composite indicator, keeping everything else constant.⁷

^{6.} This indicator should be analysed with special care when applied to the years affected by the pandemic, since the employment protection measures implemented in several countries (as is the case of simplified layoff) give rise to different results depending on whether labour productivity is based on the number of employees or hours worked.

^{7.} The diversification of financing sources has been promoted by public policies in recent years, taking into account the excessive dependence of European companies on bank loans, with an emphasis on Portuguese companies in this regard.

Indicator	Formula	Impact
Weight of non-bank financing	Non-bank Financing / Liabilities	+
Weight of permanent funds on assets	Long-term liabilities plus equity/Assets	+
Cost of debt	Financing costs/Debt	-
Wage premium	Average personnel expenses of firm as a proportion of the median average personnel expenses of sector	+

TABLE 6. Indicators of access to resources

Note: Non-bank financing corresponds to firm's liabilities deducted from loans from credit institutions and financial companies, including debt securities, inter-company financing and trade credits.

The weight of permanent capital in assets reflects the companies' access to «patient» capital, more suited to the financing of long-term investment projects.

With regard to labour, the wage premium was included in the construction of the composite indicator as an approximation to human capital – considered as a determinant of productivity and competitiveness. The inclusion of this indicator assumes that the existence of a wage premium may indicate the hiring of workers with relatively higher qualifications. Notwithstanding its limitations in assessing the role of human capital in firms' performance, there is empirical evidence in the literature of a positive causal relationship between the wage premium and firms' export activity.

Dimension 5 – Risk. This dimension includes, as a way of measuring companies' risk, indicators that relate debt of firms to their ability to pay it, as well as solvency and liquidity indicators (Table 7). In particular, the relationship between the amount of debt and the financial capacity of the company to pay principal and interest translates into a measure of the risk of bankruptcy.

Indicator	Formula	Impact
Coverage of financing costs by EBITDA	EBITDA/Financing costs	+
Solvency ratio	Equity/Liabilities	+
Liquidity	Current assets/Current liabilities	+

TABLE 7. Indicators of risk

Such risks can affect competitiveness, namely through the effect they can have on costs, the quality of goods and services produced or financial health. Several studies have analysed the relationship between company risk and productivity dynamics, concluding that the internal unavailability of funds and indebtedness have negative effects on that dynamics.

Dimension 6 – Orientation for quality. Such dimension identifies the process of developing competitive advantages, through differentiation or quality of the goods and services produced. It is evaluated through two indicators (Table 8). The weight of intangible assets on total assets reflects the relevance of assets associated with

Indicator	Formula	Impact
Weight of intangible assets on fixed assets Investiment rate	Intangible assets /Fixed assets Change in fixed assets/ Fixed assets (t-1)	+ +

intellectual property rights, among others, on the assets used in productive activities. The investment rate reflects the annual growth of fixed assets.

TABLE 8. Indicators of orientation for quality

The first measure intends to assess the technological sophistication of the production process as an approximation to orientation towards quality. This indicator therefore has a positive impact on the total composite indicator, which is supported by empirical evidence. In general, a greater weight of intangible assets is associated with a larger total factor productivity, both contemporaneously and in the immediate future. The investment rate is intended to assess the future development of competitive capacity through innovation, production sophistication or restructuring of the production process, with a view to increasing productivity. Despite the consensual importance of investment for productivity, this indicator has some measurement limitations, which can originate the somewhat ambiguous effects found in the literature. The difficulty in establishing a causal link may also be due to a lag between the moment of investment and the moment of impact.⁸

2.5. Composite indicator calculation

As described in the previous section, the composite indicator of firm-level competitiveness is composed of six dimensions comprising 16 indicators in total. In order to aggregate the different indicators within the corresponding dimensions, they are previously subject to a normalization procedure known as «min-max». For each of the indicators, this procedure places the performance of a company within the respective sector in a normalised scale that varies between 0 and 1, which is constructed as follows:

(i) for each indicator X, with a positive relationship with competitiveness (a higher value has a positive impact on competitiveness), the value for company j, in sector s and in year t on the normalised scale is obtained as⁹

$$0 \le (X_{j,s,t} - MinX_{s,t}) / (MaxX_{s,t} - MinX_{s,t}) \le 1;$$

(ii) for indicators with a negative relationship with competitiveness (in this exercise, only the cost of debt), the value for company *j*, in year *t* and in sector *s* on the normalised scale is calculated as

^{8.} Measurement of orientation for quality could benefit from information on investment in Research & Development, which is not available in the database.

^{9.} Prior to this calculation and in order to eliminate possible reporting errors, values below the 1st percentile and above the 99th are eliminated for each indicator.

$$0 \le (MaxX_{s,t} - X_{j,s,t})/(MaxX_{s,t} - MinX_{s,t}) \le 1.$$

Thus, the value 0 in the normalised scale for a given year corresponds to the firm that had the worst performance in its sector for a given indicator, while the value 1 corresponds to the firm that had the best performance. This procedure is applied pooling all firms in the set of countries in the database, for each of the abovementioned indicators.

The calculation of the composite indicator for each company and a given year is based on an uniform weighting structure both for each of the six dimensions, and for each of the different standardised indicators associated with each dimension. The granularity of the information thus obtained – a value of the composite indicator of competitiveness for each company and year – allows the aggregation to be carried out both at the level of the sector or size class, as well as at the level of the country, in any percentile of the distribution. Thus, both the transversal analysis and the longitudinal analysis of the composite indicator can be based on the median of the distribution, but also, for example, on the least (most) competitive companies, by looking at the lower (upper) percentiles of the distribution. Due to the way it is constructed, the value of the composite indicator is not susceptible of being interpreted in absolute terms, allowing only to assess the relative competitiveness performance of each country, sector or size class, globally or in each of the dimensions of analysis and indicators.

3. Results

Results indicate that Portuguese companies registered, in the analysed period, levels of competitiveness systematically lower than those observed by companies of the remaining analysed countries. In the opposite situation, French companies presented consistently the highest levels of competitiveness given the comparison between the ECI medians for each country (Figure 1).

Between 2008 and 2012, the competitiveness of the median Portuguese company registered an increase, although on a smaller scale than what was observed in the remaining analysed countries. Between 2013 and 2015, there was a broad decrease in the competitiveness of the median company in the various countries.

In the most recent period (2015-2018), Portugal recorded the highest growth of the median value of the ECI among the countries considered. In a framework of relative stability of this indicator in the remaining countries, there was a reduction in the difference between the Portugal's median ECI and the one observed by the best performer country, in this case France. In fact, the reduction of this differential is registered since 2013, after the increase observed between 2009 and 2012.

Between 2013 and 2015, the approximation of the Portugal's median ECI in relation to the value of the best performer country resulted essentially from the generalised reduction of the median value of the ECI, which was more significant in the remaining countries. This evolution was not due to the worse performance of these countries median companies, but to the recovery of the performance levels of companies with



FIGURE 1: ECI | Median of the distributions by country

Source: iBACH (micro Bank of Account of Companies Harmonized), ECCBSO (European Committee of Central Balance Sheet Data Offices) and Lourenço *et al.* (2022).

Notes: The ECI corresponds, for each company, in each year, to its average position vis-à-vis companies with the worst and the best performances in their sector of activity in relation to each indicator, weighted having into account the procedure described in the previous section. The ECI has a value between 0 (worst performer) and 1 (best performer). The ECI has no absolute meaning and must be interpreted as a relative positioning of the companies in the set of countries presented. The figure shows the median values for the ECI for companies located in each country.

the worst performance during this period (which recorded historically low performance levels for some indicators in the years after the 2008 financial crisis), which brought the worst performer closer to the median company in all countries.

As of 2016, the median value associated with Portuguese companies registered an increase higher than that recorded in the remaining countries, suggesting an effective recovery Portuguese companies' competitiveness.

This evolution is relatively broad across the set of national companies, with a clear shift of the ECI's estimated distributions for Portugal towards the right between 2008 and 2018 (i.e., towards higher ECI levels), despite its relative stability (Figure 2). This situation contrasts with that evidenced in the cases of Belgian and Spanish companies, where slight shifts to the left of the respective distributions are observed. It is important to note, in any case, the smaller dispersion of the distributions estimated for 2018, which indicates greater homogeneity, among the various countries, of the relative competitiveness indicator.

The relative position of the countries under analysis does not change when companies with the worst or best competitive performance considering the ECI are considered. Portuguese companies show, in any case, values lower than the ones observed in the remaining countries analysed. Even so, Portugal's distancing is higher when considering companies with the worst performance (10th percentile of the distribution). However, these companies are the ones that since 2012 have most converged compared to the companies of the best performing country.

In the case of companies with the best performance (90th percentile), there is also a convergence of Portuguese companies vis-à-vis those of the best performing country



FIGURE 2: Portugal | ECI estimated Kernel density in 2008 and 2018

Notes: The ECI corresponds, for each company, in each year, to its average position vis-à-vis companies with the worst and the best performances in their sector of activity in relation to each indicator, weighted having into account the procedure described in the previous section. The ECI has a value between 0 (worst performer) and 1 (best performer). The ECI has no absolute meaning and must be interpreted as a relative positioning of the companies in the set of countries presented. The figure shows the ECI distributions of Portuguese companies in 2008 and 2018.

since 2012, albeit on a smaller scale. However, in this case the convergence was linked in particular to the worst performance of companies in the best performing country (Figure 3).

These results indicate that the reduction of the competitiveness differential of Portugal relative to the country with the best performance reflects, to a greater extent, the catching up of Portugal's less competitive companies to the performance levels of the least competitive companies in the remaining countries.

The lower competitiveness of Portuguese companies largely reflects the evolution of the dimensions associated with productivity and access to resources, where the performance of the median Portuguese company has been considerably lower than that of the remaining countries considered (Figure 4). Although with a lower contribution, the lower competitiveness of Portuguese companies also reflects the performance recorded in the dimension relating to quality orientation.



FIGURE 3: ECI | 10th and 90th percentiles of distributions by country

Notes: The ECI corresponds, for each company, in each year, to its average position vis-à-vis companies with the worst and the best performances in their sector of activity in relation to each indicator, weighted having into account the procedure described in the previous section. The ECI has a value between 0 (worst performer) and 1 (best performer). The ECI has no absolute meaning and must be interpreted as a relative positioning of the companies in the set of countries presented. The figure shows the 10th and 90th percentiles for the ECI for companies located in each country. The 10th percentile is the value below which 10% of companies are situated, thus representing the upper limit for the 10% of companies with the worst performance for the competitiveness indicator. Likewise, the 90th percentile is the value below which 90% of companies are situated, which corresponds to the lower limit for 10% of companies with the best performance for this indicator.



FIGURE 4: ECI dimensions | Median of the distributions by country

Notes: Notes: The ECI dimensions correspond, for each company, in each year, to its average position vis-à-vis companies with the worst and the best performances in their sector of activity in relation to each indicator, weighted having into account the procedure described in the previous section. The ECI dimensions have a value between 0 (worst performer) and 1 (best performer). The ECI dimensions have a value between 0 (worst performer). The ECI dimensions have no absolute meaning and must be interpreted as a relative positioning of the companies in the set of countries presented. The figure shows the median values for the ECI dimensions of companies located in each country. Lourenço *et al.* (2022) presents detailed results taking into account each of the indicators that contribute to the dimensions considered in the analysis (after the respective standardization).

The lower performance of Portuguese companies in the dimension associated with productivity reflects, in particular, the evolution of the components "Labour productivity" and "Capital intensity", with Portugal presenting values which tend to be lower than those observed in the remaining analysed countries. Conversely, in the "Weight of fixed assets on assets" component (third variable considered in this dimension), Portugal has the second best performance¹⁰.

In terms of access to resources, the results of Portuguese companies derive from the "Wage premium" and "Access to non-bank financing" components, cases in which Portugal presents a relatively unfavorable position. "Wage premium" (proxy for human capital), calculated as the difference between the average salary of each company and the median salary of the respective sector, indicates that the less favorable performance of Portuguese companies may be linked to lower human capital qualifications or structural differences in the labor market. Conversely, the recent evolution of indicators such as "Weight of permanent funds on assets", "Cost of debt" and "Access to non-bank financing" (in the last two cases, in particular, from 2010-2012 onwards) have allowed Portuguese companies to get closer to the remaining countries regarding the dimension that takes into account the access to resources.

The worse performance of Portuguese companies in the quality orientation dimension stems from the fact that a greater proportion of Portuguese companies does not have intangible assets associated with its activity, determining a unfavorable positioning in the indicator "Weight of intangible assets on fixed assets".

Portugal assumes intermediate positions in the remaining dimensions, with emphasis on the positioning in some indicators linked to the return and production costs dimensions (namely in terms of "Return on Assets (ROA)" and "Coverage of personnel expenses by GVA"). In these cases, the performance of the Portuguese companies determines a relative position on the podium of the countries with the best median results at this level.

Results obtained indicate that the relative positioning of Portuguese companies compared to companies from the remaining analysed countries does not change substantially when the analysis is carried out by sector of activity or by company size. This situation points to a competitive differential of Portuguese companies visà-vis companies from the remaining countries, which results mainly from Portuguese companies' intrinsic characteristics, more than from differences in the business composition, both by sector and size.

Portugal shows lower levels of competitiveness than the remaining analysed countries in most sectors of activity, with electricity, gas and water being the only exception. In the most recent period, the difference between Portugal and the country with the level of competitiveness immediately above (taking into account the respective median of the ECI) was lower in trade, accommodation and food services. This was, with the exception of electricity, gas and water, the sector whose competitiveness has increased the most in the period under analysis (Figure 5).

^{10.} Lourenço et al. (2022) presents additional details on the distributions associated with each indicator.

These analyses are equally valid when considering additional sectoral breakdowns¹¹. It is possible to point out, regarding the primary and secondary sectors, a convergence in terms of the competitiveness of Portuguese companies in the mining industry or in the manufacturing of electrical and optical equipment, among other examples. Also in construction and retail trade (within the tertiary sector) it is possible to highlight the convergence of Portugal with the countries with the best performance. However, besides electricity, gas and water, the results obtained with a higher level of disaggregation indicate that Portugal did not register the lowest levels of competitiveness only in postal and telecommunications services. Nonetheless, in any of these cases, only sporadically throughout the analysed period.

The relative positioning of Portuguese companies vis-à-vis the European peers analysed is confirmed when considering a breakdown by size class¹². Also at this level, Portugal systematically presented, over the analysed period, medians of the distributions of individual values of the ECI lower than those of the remaining countries, regardless of the size class (Figure 6).

The lower competitiveness of Portuguese companies is more evident in smaller sized companies (with less than 50 employees), although this was the set of companies whose median ECI most increased (in a scale similar to that observed in companies with 250 or more employees). The smaller Portuguese companies even registered the greatest convergence vis-à-vis the country with the best results.

4. Final remarks

This paper sought to characterise the evolution of enterprises' competitiveness in Portugal, and in other four European countries, in the period 2008-2018. The analysis is based on the evolution of a new composite indicator of enterprises' competitiveness (ECI), which aggregates six important dimensions: return, production costs, productivity, resources availability, risk, and quality orientation. A striking feature in the Portuguese economy is that enterprises' competitiveness has always been below the competitiveness observed in the remaining countries. The article suggests that productivity and resources availability are the dimensions that may have contributed to this divergence. Nevertheless, Portuguese companies recorded a favorable evolution in recent years (2015-2018).

This article opens avenues to several studies on the evolution of companies' competitiveness in Portugal. First, the impact of the COVID-19 pandemic crisis on enterprises' competitiveness is of utmost importance for policy makers, an issue that can be analysed taking into account the relative performance of companies considering their positioning in terms of competitiveness. Second, the current indicator and subsequent

^{11.} Lourenço *et al.* (2022) presents the detailed results for each of the distinct sectoral aggregates considered in the analysis.

^{12.} A classification by size class was considered in this analysis based on the number of employees in each year, taking into account four classes: from 10 to 19 employees, from 20 to 49 employees, from 50 to 249 employees and 250 or more employees.

analysis would benefit from additional data on specific dimensions like workers attributes or companies' export orientation would be critical to complement the analysis on dimensions not covered in the current article. Finally, increasing the number of countries covered in the sample will also contribute to a better understanding of enterprises' competitiveness in Portugal and Europe. The presence of these additional elements jointly with other econometric techniques is a challenge for future research.



FIGURE 5: ECI | Median of the distributions by country and sector of economic activity

Notes: The ECI corresponds, for each company, in each year, to its average position vis-à-vis companies with the worst and the best performances in their sector of activity in relation to each indicator, weighted having into account the procedure described in the previous section. The ECI has a value between 0 (worst performer) and 1 (best performer). The ECI has no absolute meaning and must be interpreted as a relative positioning of the companies in the group of countries presented. The figure shows, for each sector, the median values for the ECI. Sector information was aggregated into six broad categories of activity (Agriculture and mining - which includes companies associated with Sections A e B of NACE Rev.2; Manufacturing - Section C; Electricity, gas and water - Sections D and E; Construction - Section F; Trade, accommodation and food services - Sections G and I; Remaining services, which aggregates the remaining companies), which are broken down into 27 distinct sectoral aggregates. Lourenço *et al.* (2022) present the detailed results taking into account each of the distinct sectoral aggregates.



FIGURE 6: ECI | Median of the distributions by country and size class

Notes: The ECI corresponds, for each company, in each year, to its average position vis-à-vis companies with the worst and the best performances in their sector of activity in relation to each indicator, weighted having into account the procedure described in the previous section. The ECI has a value between 0 (worst performer) and 1 (best performer). The ECI has no absolute meaning and must be interpreted as a relative positioning of the companies in the set of countries presented. The figure shows, for each size class, the median values for the ECI for the companies located in each country. The information by size classes results from the segmentation of companies into four classes, considering the respective number of employees in each year (taking into account that the analysis considered only companies with at least 10 employees).

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Appendix

Section - Activities	Belgium	Spain	France	Italy	Portugal
A - Agriculture and fishing	1.1%	2.6%	1.1%	0.9%	2.5%
B - Mining	0.2%	0.5%	0.4%	0.4%	0.5%
C - Food, beverages and tobacco products	3.6%	4.0%	3.4%	3.5%	4.7%
C - Textiles	1.2%	2.3%	1.0%	4.9%	8.6%
C - Wood and paper	2.1%	2.5%	2.2%	2.9%	2.6%
C - Coke and refined oil products	0.0%	0.0%	0.0%	0.1%	0.0%
C - Chemicals	1.3%	1.1%	1.0%	1.5%	0.7%
C - Rubber and non-metallic minerals	2.5%	2.4%	2.1%	4.3%	2.7%
C - Mechanical engineering	4.6%	4.5%	4.4%	9.6%	4.2%
C - Optical and electric equipment	0.9%	0.8%	1.2%	2.7%	0.6%
C - Machinery and equipment	1.5%	1.7%	1.5%	5.3%	1.0%
C - Transport equipment	0.5%	0.7%	0.6%	1.3%	0.6%
C - Other manufacturing	2.0%	2.6%	2.7%	4.2%	2.8%
D/E - Electricity, gas and water	0.8%	0.8%	1.0%	1.8%	0.8%
F - Construction	14.9%	11.7%	15.7%	11.0%	13.7%
G - Vehicle sale and repair	4.8%	3.3%	4.6%	2.9%	3.2%
G - Wholesale trade	13.9%	12.5%	10.8%	9.6%	10.2%
G - Retail trade	9.6%	7.3%	10.2%	6.1%	8.8%
H - Transportation and storage	8.1%	5.9%	6.4%	4.9%	4.3%
H - Postal services	0.2%	0.2%	0.0%	0.1%	0.1%
I - Accommodation and food services	5.5%	9.6%	7.0%	8.5%	9.3%
J - Audiovisual	0.7%	0.8%	1.4%	0.9%	0.6%
J - Telecommunications	0.2%	0.3%	0.1%	0.2%	0.2%
J - Information technologies	2.8%	1.9%	1.9%	3.0%	1.5%
L - Real estate activities	1.0%	0.8%	1.3%	0.2%	0.8%
M/N - Administrative and technical activities	11.7%	10.5%	12.5%	6.9%	8.7%
Other activities	4.5%	8.5%	5.2%	2.2%	6.3%
Total	100%	100%	100%	100%	100%
Industries	20%	23%	21%	41%	29%
Trade	28%	23%	26%	19%	22%

TABLE A.1. Sample structure by economic activity | Sample used for ECI calculation