CONSELHO
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PRODUTIVIDADE

NATIONAL PRODUCTIVITY BOARD

The Productivity of the Portuguese Economy

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CONSELHO PARA A PRODUTIVIDADE
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I. Introduction

Labour productivity[1] growth rates have been declining in most European Union countries since the last decades. In Portugal, this situation is more relevant by the fact that productivity levels are lower than the European Union's average and because the recent recovery of economic activity has not been enough to significantly reduce that differential.

Several factors have been pointed out for the overall decline in productivity growth. The fall in investment, more pronounced since the international financial crisis, led to a reduction in the level of capital stock per worker, which reached historically low levels; the deindustrialization of advanced economies, in part following the trend of world production process fragmentation that has accompanied globalization and which is manifested through the displacement of productive activity to the emerging markets; the time lag between technological development and its efficient application in production. On the one hand, new technologies related to digitalisation have not yet translated into generalized productivity increases and, on the other hand, the productivity gains resulting from information and communication technologies developed in the 1990s would already be significantly depleted.

To the extent that economic growth and long-term welfare are strongly correlated with productivity increases, this issue has had significant importance on the international agenda. In 2014, the OECD put this theme in the priorities of the member countries, stablishing the Global Forum on Productivity. Subsequently, as part of several European Union initiatives to respond to the financial crisis aimed at reducing macroeconomic imbalances and structural vulnerabilities in the various countries, the Council of the European Union issued a Recommendation on 20 September 2016, with the objective of identifying or establishing national productivity boards to analyse the developments and policies influencing productivity and competitiveness, promoting convergence between economies and the necessary reforms at the national level to ensure sustainable economic growth.

In Portugal, the Council for Productivity was established on March 20, 2018 by a joint dispatch from the Minister of Finance and the Minister of Economy. The Portuguese authorities have decided to create a joint structure, taking advantage of the knowledge of two institutions that already carry out research in the field of productivity and have experience with the production of policy analysis and participation in international forums related to productivity issues: the Office for Economic Policy and International Affairs (GPEARI) of the Ministry of Finance and the Office of Strategy and Studies of the Ministry of Economy.

The main objectives of this Council are to monitor the performance of public policies in the area of productivity and to strengthen a public and broad discussion on the subject at national and international levels. Specifically, according to its mandate, the Productivity Board should monitor public policies in the field of productivity, developing *ex-ante* and *ex-post* analyses of the effects of these policies, in order to contribute to an improvement of implemented measures and for a more rigorous capacity to define new policies in areas such as innovation, investment, human capital adequacy or competitive capacity in international markets. In addition, with the

[1] To be rigorous, the official name is apparent labour productivity although in the text it will simply be referred as labour productivity.

objective of promoting a wider public discussion on the subject and reinforcing the importance of increasing the country's productivity, the Board should also promote debates among civil society, integrating different stakeholders.

Although some of the factors explaining the overall productivity decline may also have affected the productivity of the Portuguese economy, particularly the fall in investment levels since the financial crisis, the main drivers arise from vulnerabilities related to the functioning of national markets which condition the evolution of productivity in Portugal and explain the existing gap towards the European Union.

Despite the reduction in interest rates, accompanied by expansions of credit and investment in the period prior to the monetary union integration, there were no significant effects on productivity growth. The great expansion of credit, in the period leading up to the financial crisis, was accompanied by widening macroeconomic imbalances and inefficient allocation of resources towards the non-tradable sectors, which are generally less productive being exposed to less competition. On the other hand, excessive indebtedness of the economy and the resulting deterioration of the balance sheets of financial institutions still limit the access to credit and investment. In addition, the lower levels of human resources' qualification, labour market segmentation and product market regulations, particularly in the services sector, poor governance of some firms and the limited level of investment in research and development are factors usually identified as responsible for the worse performance of the Portuguese economy compared to its main trading partners.

Although some adjustment policies and a wide range of structural reforms, implemented under the Economic and Financial Assistance Programme, have contributed to alleviate some macroeconomic imbalances, several structural vulnerabilities and distortions that have characterized the Portuguese economy persist and continue to affect productivity.

This report aims to contribute to the fulfilment of the Productivity Board's mandate by analysing the evolution of productivity in the Portuguese economy, the multiple factors influencing this evolution and the role of public policies in this area. The diagnosis will guide the actions of this Board, both with regard to the research to be developed in order to better understand the determinants of productivity and to evaluate public policies.

The document is structured in the following manner:

- **Chapter 2 presents the evolution of different productivity measures over the last decades**, focusing in different factors of production (labour and capital) as well as in overall efficiency of these factors and indicators about the level of investment and the capital stock which may contribute to explain the productivity evolution of the Portuguese economy. This analysis is carried out in the most sectorially disaggregated possible way, allowing for the distinction of performance of various industries or services. Disaggregation has also shed some light into the resource reallocation across the various sectors over time, which is a particularly critical aspect given that productivity developments at the aggregate level depend not only on productivity increases in each sector but also on the allocation towards the most productive sectors or companies. This chapter also looks at the relationship between productivity and

competitiveness and how various productive factors as well as productivity have contributed to economic growth.

- **Chapter 3 considers the trends in productivity growth at the international level, the reasons for the observed decline, and a set of factors that could be at the root of the productivity evolution in Portugal.** These factors were selected based on the main findings from a broad economic literature on the determinants of productivity and consist, in particular, of the regulation and level of market competition, the qualification of human resources, business management practices and the adoption of more efficient technologies. While it is not intended to construct an exhaustive literature review, whenever possible, the analyses throughout this report were based on studies applied to the Portuguese reality. In addition, a set of indicators produced by various national and international organizations to characterize the situation of the Portuguese economy in relation to each of these determinants are analysed.
- **Chapter 4 reflects on how various policies, ranging from regulation and fiscal incentives to public investments, might improve the determinants of productivity**, thus contributing to increased economic growth. Despite the implementation of various structural reforms in recent years, most of them have not been systematically evaluated, making it difficult to assess their impact or effectiveness on the elimination of distortions which hamper productivity growth. This chapter also aims at identifying priority areas for the evaluation of existing policies, allowing for the definition of more effective measures.
- **Chapter 5 presents the main conclusions of the conducted analysis, setting out guidelines and priorities for the Productivity Board's future activity.** These guidelines concern the definition of research areas for a more informed diagnosis about the productivity of the Portuguese economy and its determinants. Priorities for the evaluation of policies already implemented are also included in this chapter in order to better define future policies.

II. The Productivity and Competitiveness of the Portuguese economy

The low level of productivity of the Portuguese economy, in particular its gap towards the EU average, has been a concern over at least two decades, expressed in several reports and studies by the academia, policy institutions and international organizations[2]. Low productivity contributes to limit the economy's growth potential and the convergence of income levels towards the EU average. This highlights the need of a thorough analysis to understand the dimension of the gap and the various factors responsible for its evolution.

Productivity is a measure of economic efficiency and evaluates whether the inputs used in the production process are transformed into output in an efficient manner. It can be measured in several ways: relative to a single input, to a combination of several inputs, for the economy as a whole or disaggregated by sectors.

The most commonly used single input measure is labour productivity, which consists on a ratio between production or value added and the number of workers or hours of labour. Single input measures, although simple to calculate and interpret, are affected by changes in the intensity with which other inputs are used in the production process and, therefore, do not capture exclusively the efficiency associated with the use of a specific factor. Nevertheless, labour productivity is a measure more closely associated with improvements in income and living standards, which are the main goals of increasing productivity. Another frequently used measure, more closely related to the concept of efficiency, is total factor productivity (TFP), which is obtained as a residual of the variation of output which is not explained by changes in inputs.

The overall productivity on an economy depends not only of the sum of firms' productivity gains across different sectors, but also on the allocation of resources within the economy. As such, significant productivity gains can be obtained by transferring resources from low productivity firms and sectors to more productive ones. A more disaggregated analysis of productivity, by taking these effects into account, can provide for a more accurate diagnosis. In particular, a shift-share analysis is frequently used for this purpose. It decomposes the evolution of productivity into that resultant from variations in firms' productivity, structural changes and a dynamic effect resulting from the transfer of resources to productivity growing sectors.

A concept closely related to productivity, and frequently used in an interchangeable way, is that of competitiveness. The capacity to sell in international markets is obviously dependent upon the efficiency to produce quality goods at a competitive price. So, as long as productivity gains are observed in tradable sectors, productivity is an important driver of competitiveness. However, this correlation between both concepts can also occur in the opposite way. The capacity to compete in more demanding markets can also contribute to greater efficiency in production. As such, firms more exposed to international competition are normally more productive, and competitiveness indicators can also be informative for a diagnosis of productivity.

This chapter presents some stylized facts concerning the productivity and competitiveness of the Portuguese economy. Section 1 examines indicators of productivity (labour, capital and total

[2] See for example OECD (2018) and IMF (2017)

factor), at both total and sectoral level. In section 2 a shift-share analysis is conducted in order to determine to what extent the evolution of productivity is the result of changes in firms' productivity or on the allocation of resources within the economy. Section 3 provides indicators of competitiveness. Finally, section 4 summarizes.

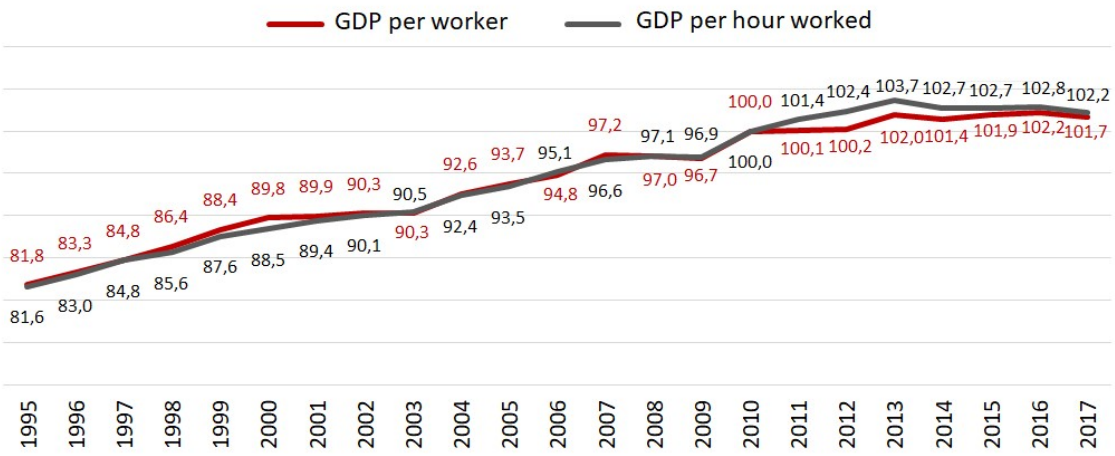
II.1 Productivity analysis

Productivity is the efficiency with which inputs, such as labour, intermediate products and capital, are converted into output by firms, industries and in the overall economy. As such, it affects production costs and prices as well as the overall quantity and quality of the goods and services produced. Efficiency can be measured with respect to a single input, such as labour or capital, or with respect to total inputs through total factor productivity. Even though this concept is relatively easy to define, several issues can arise when measuring productivity.

Labour productivity (LP) evaluates how efficiently labour is used in the production process, and is calculated as output per labour input. Several variables can be used to measure these concepts (total product or value added for output and number of workers or hours worked for labour). Value added per hours worked is perhaps a more precise indicator of efficiency as it reflects better the firm's outcome resulting from an increased work effort. However, data concerning the numbers of hours worked are less frequently available and normally refers to contractual hours and not hours actually worked. Therefore, labour input is defined here as the number of persons employed. Nevertheless, as shown in figure 1, the difference between the two measures is not very significant.

Labour productivity, however, only partially reflects the efficiency of labour in terms of the personal capacities of workers or the efficiency of their effort. The ratio between the output and labour depends largely on the use of other inputs (*e.g.* capital and intermediate inputs) as well as technical or organizational change and economies of scale.

Figure II.1 Labour Productivity |constant prices, 2010 = 100



Source: OECD

The global decline in labour productivity growth was also observed in Portugal (figure 2). Labour productivity in Portugal, defined as GDP per person employed, represents 76.6% of the EU average in 2017 – and 71.9% of the euro area (figure 3).

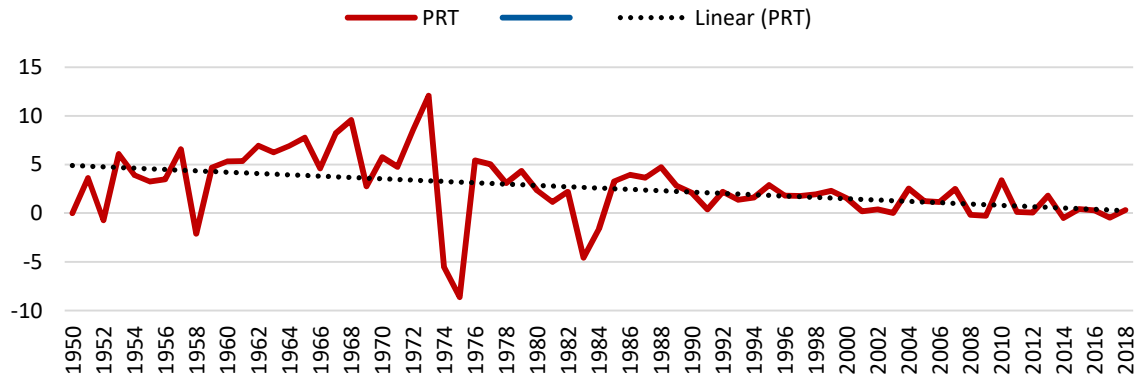
Despite the decline in growth, the evolution of labour productivity since 1995 exhibits a relatively stable upward trend (figure 4), albeit declining growth rates. Nevertheless, when compared to euro area's (EA-19) performance, some important desynchronization sub periods stand out.

Between 1995-2000 and later on between 2003-2007, aggregate labour productivity grew faster in Portugal than in the euro area. However, labour productivity was relatively stagnant in Portugal between 2000-2003, as many of the large foreign-capital companies that were attracted to the country in the 1980s relocated their operations to lower-cost emerging market economies, such as China and the Eastern European countries.

As for the euro area, the contraction in global demand associated to the wake of the global financial crisis disrupted the positive trend in labour productivity; however, Portugal recorded a much softer drop than that recorded by Euro area average.

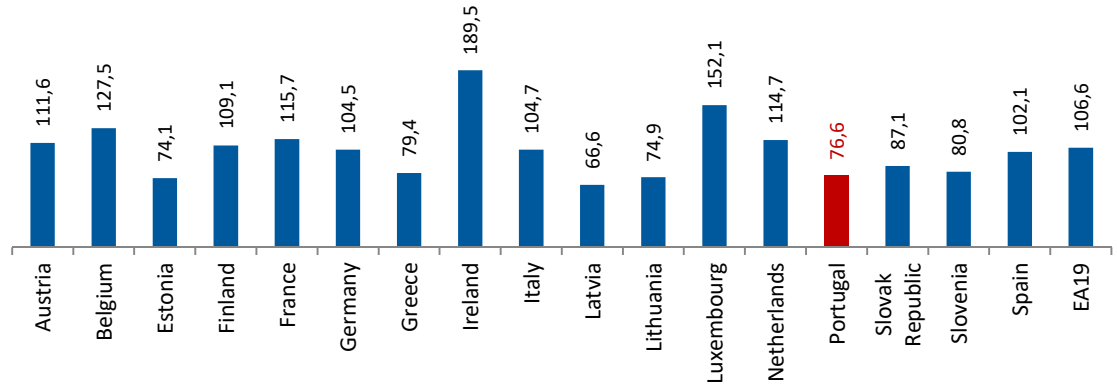
More recently, labour productivity in Portugal remained relatively sluggish, in contrast with Euro area average. This stagnation can, to a large extent, be explained by the fact that the recovery of economic activity since 2013 has been accompanied by a significant increase in employment in labour intensive sectors and by more limited capital accumulation. As such, labour productivity trends in the most recent period may be attributed more to lower capital deepening rather than to lack of labour efficiency per se.

Figure II.2 Labour Productivity (GDP per person employed) | annual growth and moving average



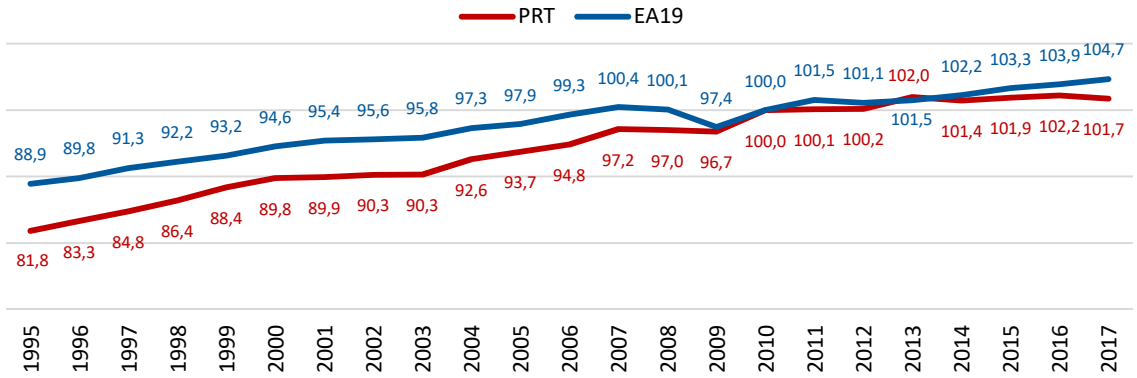
Source: The Conference Board

Figure II.3 Labour Productivity (GDP per person employed) | EU 2017 = 100



Source: OECD

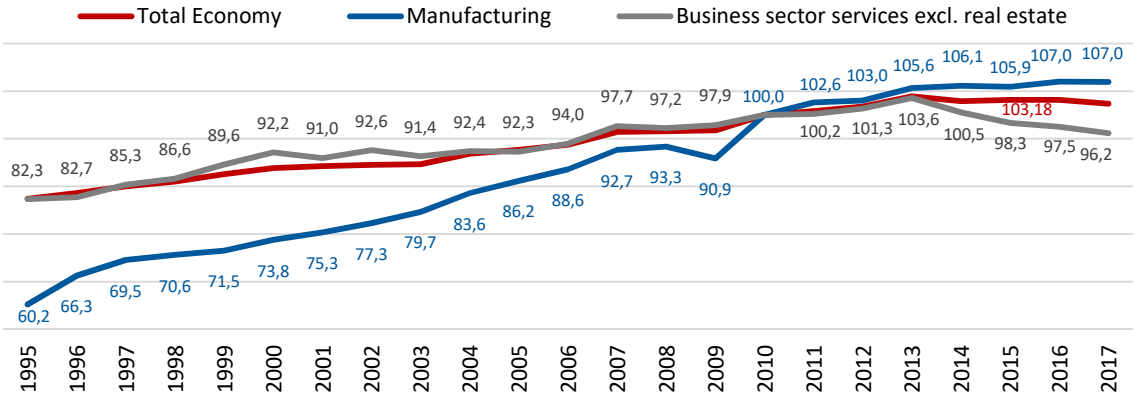
Figure II.4 Labour Productivity (GDP per person employed) | 2010 = 100



Source: OECD

A sectoral disaggregation illustrates that Portugal's labour productivity growth, between 1995 and 2017, was particularly stronger in the manufacturing sector, with a slump associated to the outburst of the crisis (figure 5). The business sector services (excluding real state), on the other hand, experienced a much slower labour productivity growth in the same period, displaying higher resilience during the crisis. More recently, from 2013 onwards, labour productivity on the manufacturing sector slowed down and labour productivity on the business sector services started to fall, dragging down aggregate labour productivity. This contrasts with the Euro area performance, which kept an upward trend in both sectors (figures A.1 and A.2).

Figure II.5 Labour productivity (GVA per person employed) | constant prices, 2010 = 100



Source: OECD.

A more detailed sector disaggregation within the manufacturing sector reveals that the upward trend in productivity was essentially broad based. However, it is noticeable that from 2013 onwards there are several industries in Portugal, from the manufacturing branch, slackening labour productivity growth, while the euro area records steady positive growth. This is most notably the case of '[C10_C12] - manufacture of food products; beverages and tobacco products', '[C26] manufacture of computer, electronic and optical products', and '[C24_C25] manufacture of basic metals and fabricated metal products, except machinery and equipment'.

It is also noteworthy that the '[C26] manufacture of computer electronic and optical products' is also one of the sectors depicting greater intra-sectoral dispersion of productivity among firms, with the implication that despite the overall negative performance of this sector, some firms can

be very productive. Overall, the dispersion of labour productivity among firms in the same sectors has been increasing since 2004 and is also particularly high in the '[C19] - manufacture of coke and refined products', '[C20] - chemicals and chemical products' and '[C21] - basic pharmaceutical products and pharmaceutical preparations' (figure A.5).

In '[C13-C15] - manufacture of textiles, wearing apparel, leather and related products' and '[C27] - manufacture of electrical equipment' labour productivity grew more in Portugal than in the euro area average.

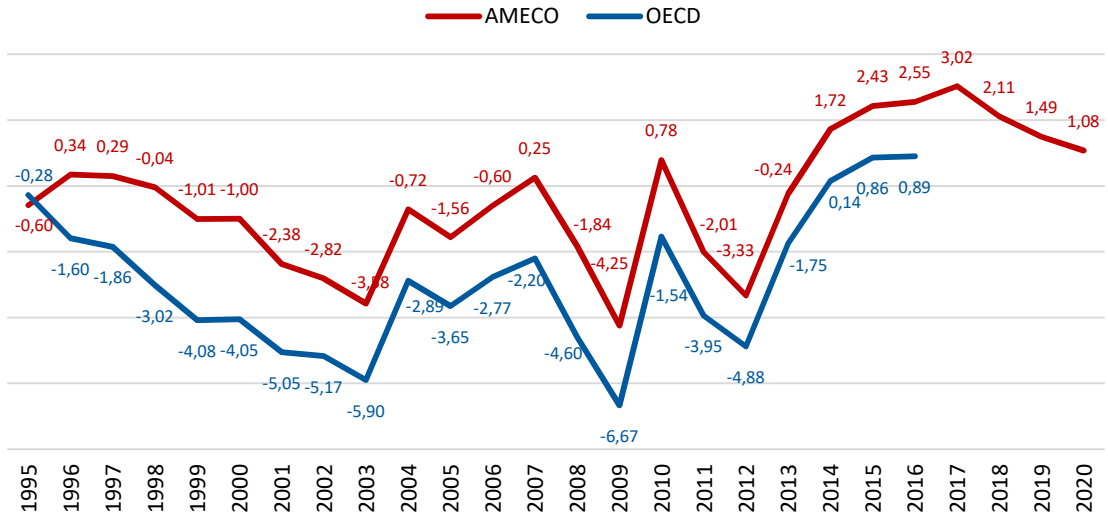
Concerning the business sector services, labour productivity grew at a higher rate than in the euro area, until 2013, but has recorded a significant decline ever since, in contrast with euro area performance (figure A.2). A more detailed sector-level analysis reveals that there are several sectors contributing to this labour productivity growth gap, namely '[K] - financial and insurance activities', which was particularly affected by the international financial crisis, and '[J] - information and communication'.

Labour productivity depends on how much and how efficiently capital is used in production. This relies on investment in physical and intangible capital (the so-called knowledge-based capital). In particular, investment in information and communication technologies (ICT) that enables new technologies to enter the production process is considered especially productivity-enhancing. Therefore, in order to better understand the dynamics of productivity it is important to examine the evolution of capital accumulation and its productivity.

Capital productivity is measured as the ratio between the volume of output, and the volume of capital input and shows how efficiently capital is used to generate output.

There are multiple ways to define capital input. The OECD, for example, uses the flow of productive services that capital delivers in production, *i.e.* capital services. These services are estimated using the rate of change of the productive capital stock, which takes into account wear and tear, retirements and other sources of reduction in the productive capacity of fixed capital assets. To ensure comparability across countries, the OECD capital services measures are based on a common computation method for all countries. AMECO on the other hand, calculates the net capital stock obtained by the perpetual inventory method based on the flows of gross fixed capital formation (GFCF) and on the consumption of fixed capital (CFC). The initial condition assumption is a capital/GDP ratio of 3 in 1960, expressed in 2010 prices. Despite different methodologies, both series on capital productivity growth yield relatively similar results concerning their trend, although not in levels (figure 6).

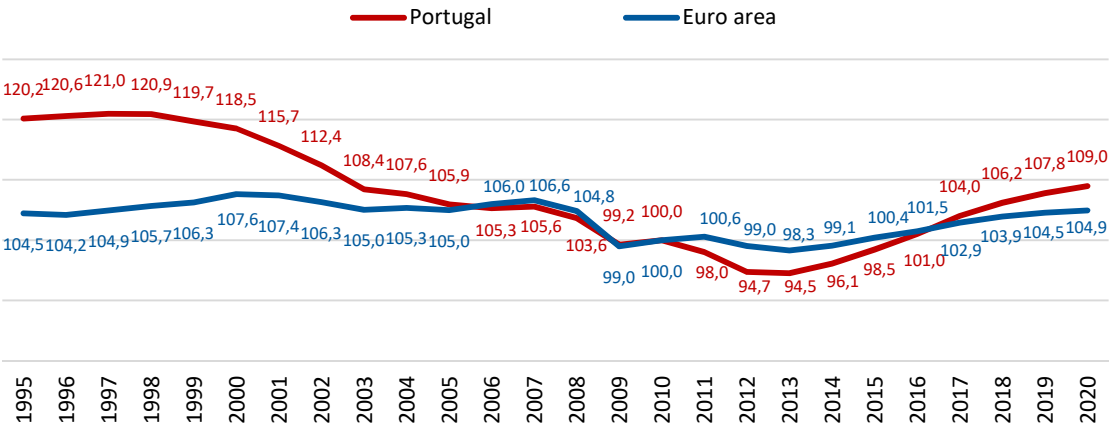
Figure II.6 Capital Productivity – multiple sources comparison | growth rate



Note: Forecasts from 2018 onwards.
Source: AMECO, OECD

Portugal's aggregate capital productivity, defined as GDP per unit of net capital stock, exhibits a strong downward trend since the late 1990s until 2013, and a recovery thereafter with capital productivity displaying a marked pick-up in recent years. As for labour, this evolution is to a large extent dependent upon the relative intensities of both inputs. The euro area, on the other hand, exhibits a relatively stable performance throughout most of the period under analysis, with a small slump during the financial crisis, followed by acceleration from 2013 onwards, even though smoother compared to Portugal (figure 7).

Figure II.7 Capital Productivity (GDP per unit of net capital stock) | 2010 = 100

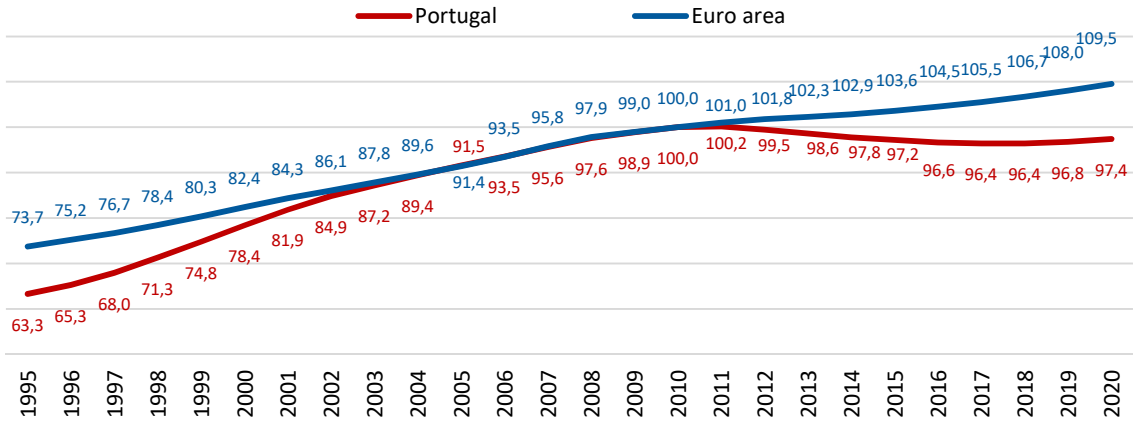


Note: Forecasts from 2018 onwards.
Source: AMECO

Until 2011, Portugal's net capital stock recorded an impressive upward trend, leading to increasing levels of (net) capital per person employed, *i.e.* capital intensity (figures 8 and 9). However, the financial crisis caused an abrupt decapitalization in the Portuguese economy, since 2011. Given high unemployment, capital intensity started to fall only after 2013, after

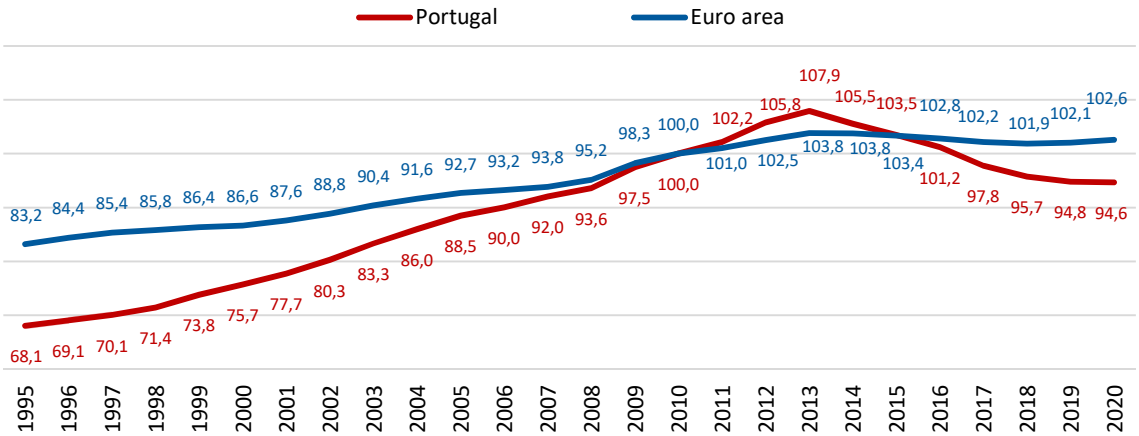
hitting a new maximum historical level. In the Euro area, these indicators kept a relatively steady rising path throughout the entire period.

Figure II.8 Net capital stock | constant prices, 2010 = 100



Note: Forecasts from 2018 onwards.
Source: AMECO

Figure II.9 Capital intensity (net capital stock per person employed) | constant prices, 2010 = 100



Note: Forecasts from 2018 onwards.
Source: AMECO

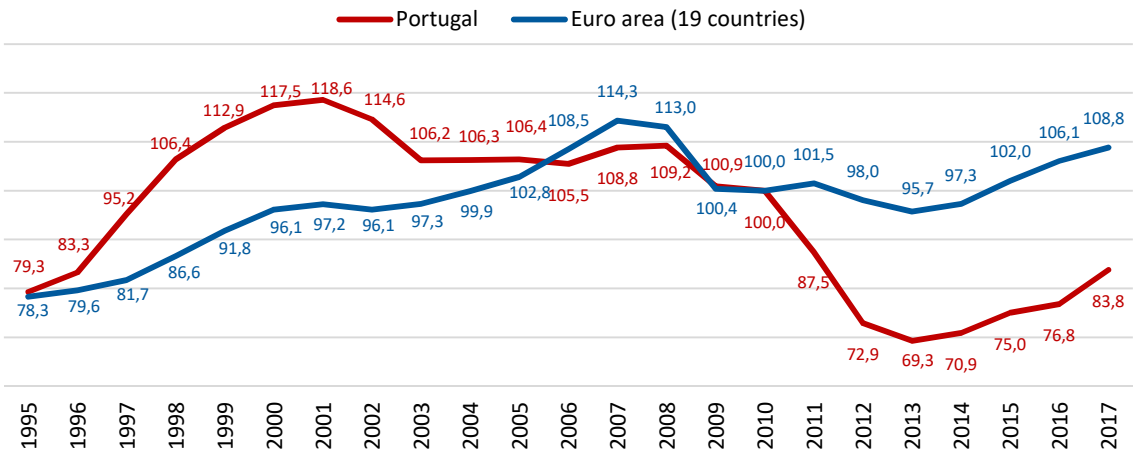
Changes in capital intensity can also reflect the flexibility of the economy to substitute between labour and capital. When one input becomes relatively more abundant (and cheaper), sectors that display higher elasticity of factor substitution, or greater flexibility with which capital and labour can be combined to produce output, will gradually replace the more expensive input by the relatively cheaper one, inducing a process of structural change in the economy.

Since the beginning of the period under analysis, Portugal had been increasing the use of capital comparing to labour. However, as the financial crisis made capital scarcer, labour input became relatively cheaper. As such, firms may have had less incentive to shift from labour-intensive methods to capital-intensive ones, affecting productivity growth.

Capital accumulation depends on investment in physical and intangible capital. Gross Fixed Capital Formation (GFCF) in Portugal fell substantially after the financial crisis, also in comparison with the euro area, but has been slowly recovering since 2013. This renewed

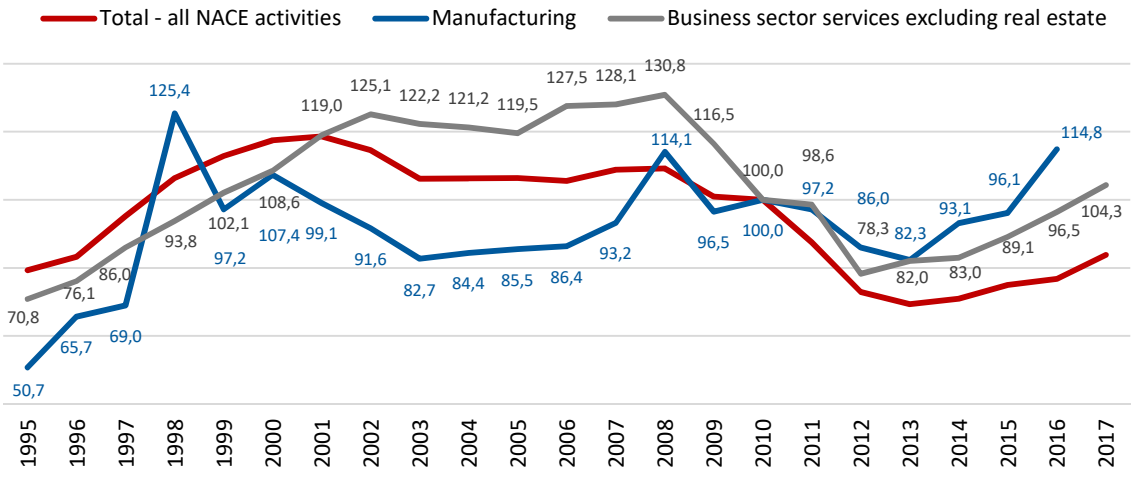
impetus is visible in both sectors, but has been particularly strong in the manufacturing sector (figures 10 and 11). This contrasts with the past evolution, as GFCF in manufactures weakened significantly in the early 2000s, while it continued to grow in the Business Sector services.

Figure II.10 Gross fixed capital formation (GFCF) | constant prices, 2010 = 100



Source: Eurostat

Figure II.11 Gross fixed capital formation, by sector | constant prices, 2010 = 100



Source: Eurostat

GFCF in the manufacturing sector was particularly affected in the early 2000s by the relocation of many large foreign-capital companies to lower-cost emerging market economies. The crisis exacerbated this effect causing a broad decapitalization of the economy. The negative effect of the crisis on capital accumulation was more long-lasting in Portugal than in the euro area, reflecting greater uncertainty and more difficult access to financial markets.

A sectoral breakdown (figure A.3) shows that recent acceleration in GFCF in the manufacturing sector is essentially broad based. Investment in '[C13-C15] - manufacture of textiles, wearing apparel, leather and related products', one of the mostly affected sectors by the GFCF loss since the early 2000s, has increased since 2006. '[C28] - manufacture of machinery and equipment n.e.c.' and '[C29-C30] - manufacture of motor vehicles, trailers, semi-trailers and of other

transport equipment', where investment also weakened significantly during the early 2000s, are also now gaining momentum.

From the manufacturing branch, '[C10-C12] - manufacture of food products; beverages and tobacco products' is the only sector lagging behind this recent upward trend.

Although investment in the manufacturing sector is normally considered more productivity-enhancing in terms of the aggregate economy, investment in business services sectors, particularly in those providing services more closely linked to the productive process in manufacturing, can also contribute to enhance productivity in manufactures.

Portuguese GFCF in the business services sector exhibits a strong upward trend starting in the mid-1990s, a relative stagnation between 2000 and 2008 before substantially decreasing in the next 5 years, followed by a rebound since 2013 (figure A.4). The recent acceleration in GFCF in the business sector services is essentially anchored in the performance of '[G] - wholesale and retail trade; repair of motor vehicles and motorcycles', '[I] - accommodation and food service activities' and '[M_N] - professional, scientific and technical activities; administrative and support service activities'.

The most affected sector by the crisis was '[K] - Financial and insurance activities', as evidenced by the large drop in investment since 2008.

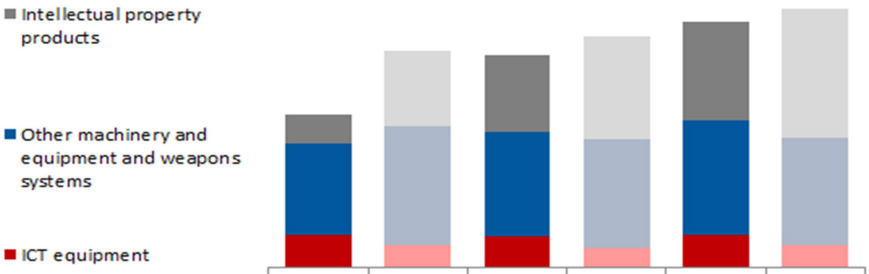
Investment in '[J] - information and communication' followed the trend of the rest of the euro area, between 1995 and 2007. Underinvestment in this sector might be a concern as it is particularly important for the manufacturing sector. Inputs from this sector, such as computer programming, consultancy and telecommunications, can enable new tailored technologies to enter the production process and are assumed to be especially productivity-enhancing. In recent years though, Portuguese GFCF in this sector exhibited a significant slowdown, desynchronized from the Euro area upward trend. Access to more detailed data, shows that the underlying performance of this sector is related to a decrease in investment by the telecommunications services in construction assets. Given that Portugal is a front runner comparing to the euro area average in the telecommunication infrastructures field, this desynchronization may not be a matter of major concern.

'[M_N] - professional, scientific and technical activities; administrative and support service activities' is also important to support business, in particular the manufacturing sector. Inputs from this sector include, among others, R&D activities which are also considered especially productivity-enhancing. In recent years, Portuguese GFCF growth in this sector has been stronger than that recorded in the euro area. The performance of this sector is related to an increase in the GFCF performed by 'administrative and support service activities' in transport equipment assets, probably linked to rent-a-car services associated, essentially, to tourism activities.

A well-established economic fact is that the observed differences in economic growth rates among countries are not only explained by the differences in the level but also in the composition of their capital stock. Breaking down total GFCF in the total economy by asset type highlights important changes in the composition of Portuguese GFCF, leading to a greater convergence towards the euro area structure. In particular, the GFCF component of total construction has progressively shrunk, clearing the way for more productive investments assets

such as intellectual property products, machinery and equipment. Interestingly, ICT equipment quota in Portugal has been higher than the euro average (figure 12).

Figure II.12 Gross fixed capital formation by asset type, Total Economy| % total fixed assets

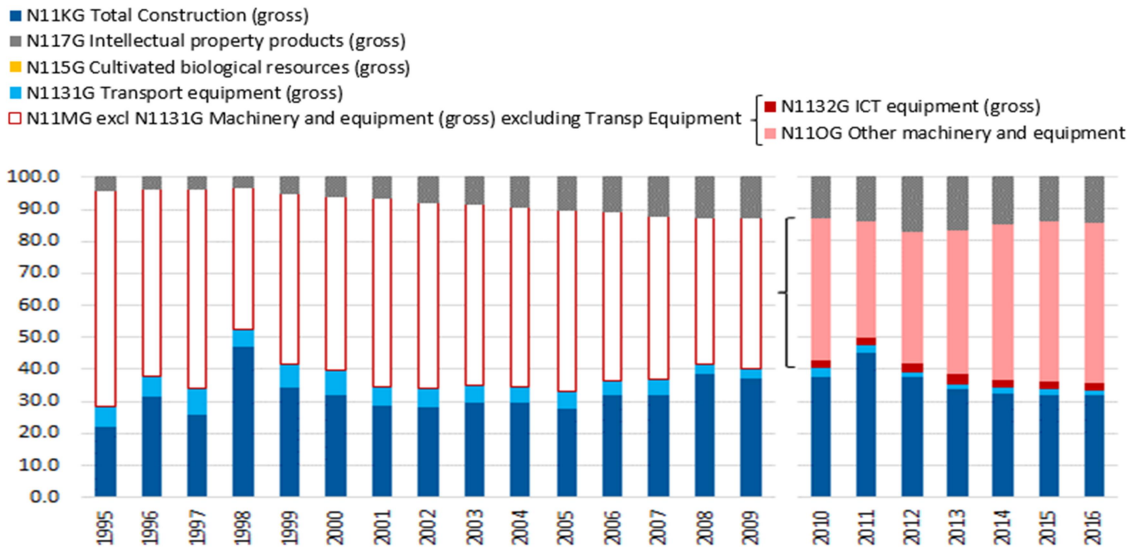


	PT	EA19	PT	EA19	PT	EA19
	1995		2010		2016	
Intellectual property products	4.9	12.6	12.9	17.1	16.4	21.4
Other machinery and equipment and weapons systems	15.2	19.7	17.4	18.2	19.3	18.1
ICT equipment	5.6	3.9	5.3	3.4	5.4	3.7
Total Construction	63.2	56.2	57	53	48.2	47.6
Transport equipment	9.2	7.2	6.3	8.2	8.9	8.9
Cultivated biological resources	1.8	0.3	1.1	0.2	1.7	0.3

Source: Eurostat

In the manufacturing branch there are also some changes in the asset composition of GFCF. The share of investment in intellectual property products increased significantly since 1995. Investment in machinery and equipment expanded recently, while investments in transport equipment and total construction have been decreasing since 2011 (figure 13).

Figure II.13 GFCF by asset type, Manufacturing | % total fixed assets



Source: Eurostat

One important limitation of partial productivity measures is that by being sensitive to changes in the intensity of other inputs, they provide a biased picture of the efficiency with which all inputs are being used in the production process.

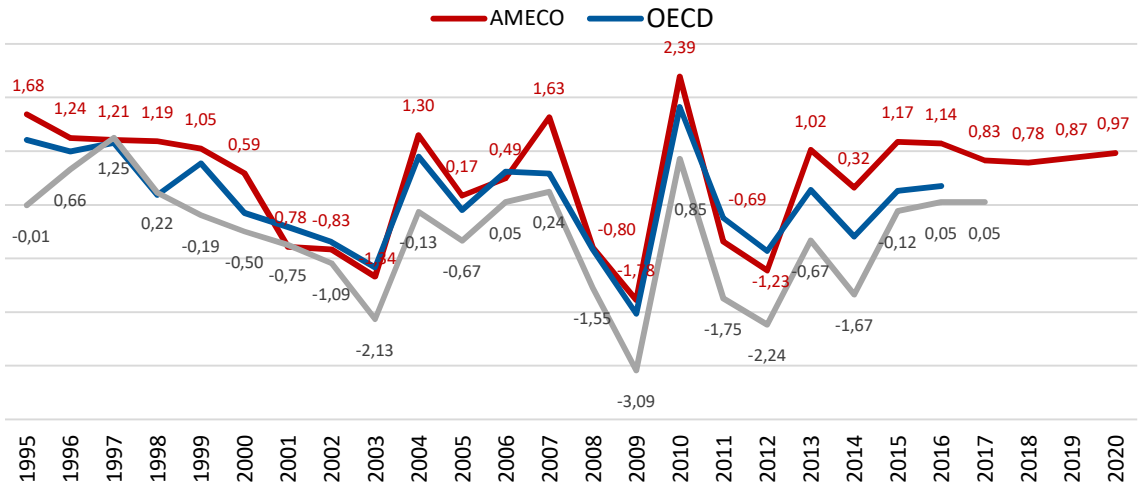
Total factor (or multifactor) productivity (TFP) is not a simple ratio of output to input, but rather a compounding measure, or residual, that captures the growth in domestic output unexplained by the growth in all factor inputs used in the production process. However, the magnitude of TFP residual will depend on how and which factor inputs are being explicitly measured.

Methods to compute TFP typically use the Solow's neoclassical growth model as the starting point, where output depends upon the quantity of labour and physical capital used in the production process, plus the technological change parameter. TFP growth is then obtained from this parameter, the so-called Solow's residual, and can be thought as the disembodied technological progress (Solow, 1957). However, as noted by Van Ark, (2014), this residual can also include a range of other effects beyond technological change – such as business environment, management quality, spillovers from production factors, economies of scale etc. In order to distinguish between these other effects, such as changes in the quality of factor inputs, this basic two-input model can be extended to consider different types of human capital (age, gender and skill level) and physical capital (machinery, transport equipment, ICT, etc.). As more factors are explicitly accounted for in the production function, the residual identified as TFP can be narrowed down.

However, it is difficult to explicitly measure all inputs used, mostly because some of them refer to unobserved factors such as R&D, software, management techniques, changes in production processes, changes in organizational structure of firms, branding and marketing, changes in institutional and framework conditions, etc. The more unmeasured inputs, the greater will be the residual factor.

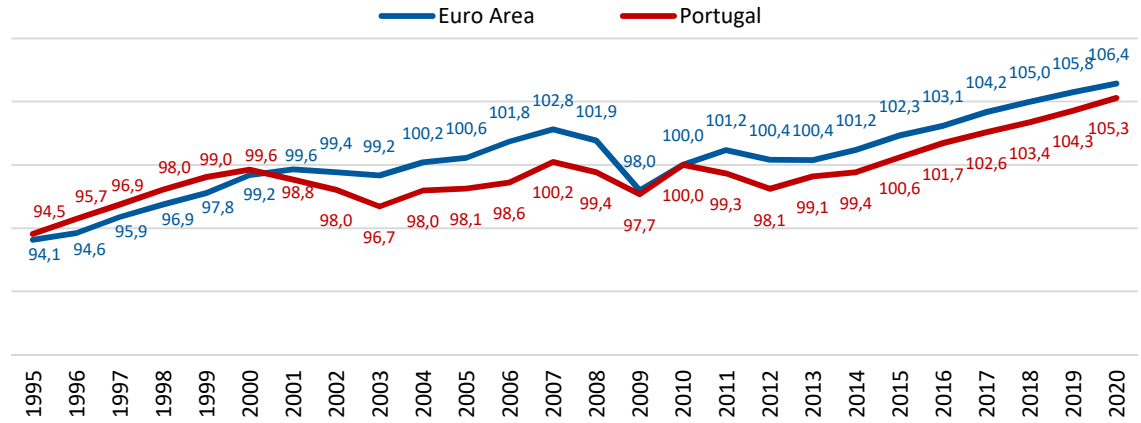
These computational differences can explain different results for TFP growth according to different methodologies. TFP is calculated as a residual measure, and therefore dependent upon the variables for which their contribution to output growth is considered explicitly in the production function. AMECO uses a standard neoclassical production function with two factor inputs, namely labour (persons employed) and capital (net capital stock). As such, TFP residual reflects the growth impact of all other factors, such as improvements in the quality of inputs that are not explicitly accounted for in the production function. *The Conference Board* uses an extended model which already considers adjustments for quality change in factor inputs. This contributes to narrow down the TFP residual, as the contributions to growth arising from improvements in the quality of inputs are, in this case, not included in the residual (figure 14).

Figure II.14 Total Factor Productivity – multiple sources comparison | growth rate



Note: Forecasts from 2018 onwards.
Source: AMECO, OECD, The Conference Board (TCB)

Figure II.15 Total Factor Productivity | 2010 = 100

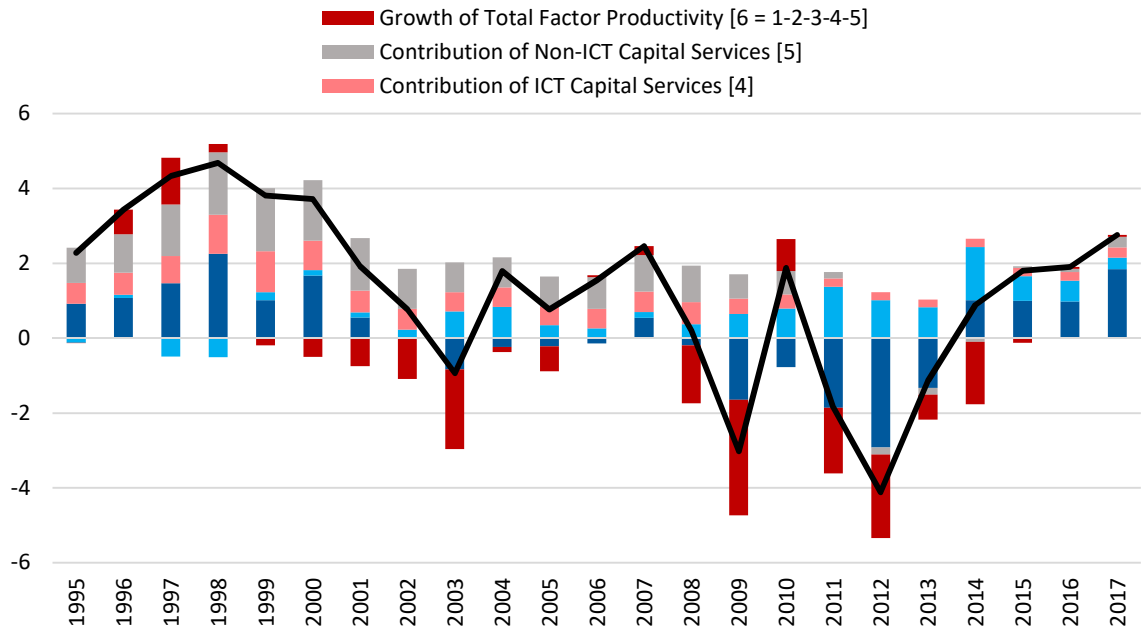


Note: Forecasts from 2018 onwards.
Source: AMECO

Total Factor Productivity evolves along three distinct periods (figure 15). During an initial period until 2000 some productivity gains can be observed. This was followed by a period of productivity losses and overall economic stagnation. The desynchronizations with the euro area average was greater during this period, which restrains Portugal's growth potential and can, to some extent, explain the absence of income convergence with the euro area average. The economic recovery after 2013 was accompanied by an improvement in productivity.

Output growth can be decomposed into changes in the quantity and quality of factors of production and changes in productivity. Economic growth can be achieved if more and better inputs are used in production, or through improved overall efficiency with which labour and capital are used together, *i.e.* higher multifactor productivity growth (MFP).

Figure II.16 Contributions to real GDP Growth | annual growth



Source: The Conference Board (TCB)

Concerning the contribution of factor inputs, it is clear that recent output growth in Portugal relied significantly on the amount of labour used. In fact, in almost all of the years analysed, GDP growth follows changes in employment – more so than changes in reported TFP. Furthermore, compared to the late 1990s, the labour quality contribution is now much larger and non-ICT capital contribution has been gradually clearing the way for increased contribution of ICT assets. This suggests important changes in the input-mix that might be conducive to an increased sophistication of production and sustainable growth (figure 16).

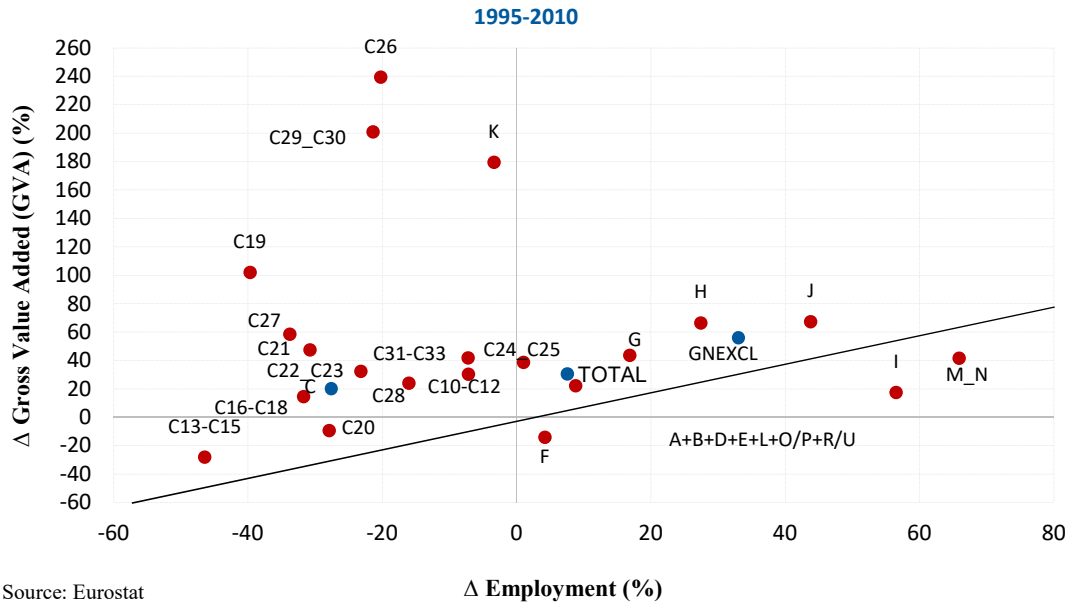
Moreover, once the adjustments for changes in the quality of labour and changes in the composition of capital assets are extracted from the residual, TFP contribution to Portugal's GDP growth is predominantly negative during the period under analysis. However, improvements in the quality of labour and capital inputs are equally important for economic growth and, as noted above, the inclusion of additional inputs in the production function considerably narrows down the residual identified as TFP.

II.2 Resource allocation and shift-share analysis

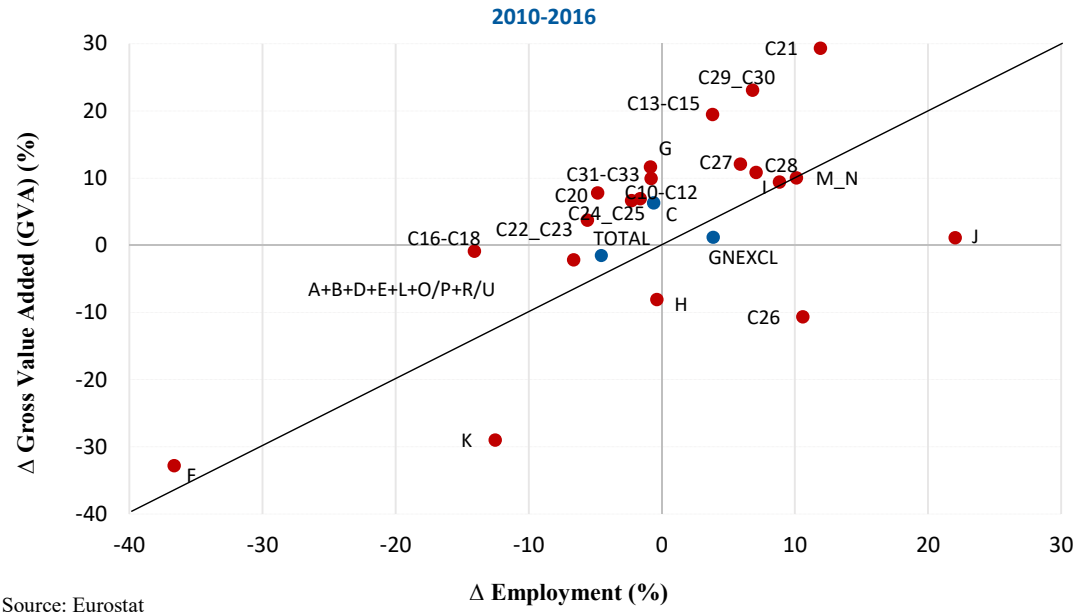
As shown in the previous section productivity can vary significantly across sectors. Therefore, overall economic productivity depends not only on productivity growth in individual sectors but also on the allocation of resources in the economy, *i.e.* on whether resources are allocated towards more productive sectors.

Some of these dynamics are illustrated in figure 17. Sectors above the 45-degree line are those which have recorded positive labour productivity growth, since GVA grew (decreased) at a higher (lower) rate than employment. A positive allocation of resources would be depicted in the first quadrant above the 45-degree line, as resources (employment) are shifted towards more productive sectors, or in the third quadrant below that line, indicating that resources were withdrawn from less productive sectors.

Figure II.17 Underlying Dynamics of Labour Productivity Growth | y-o-y growth rate



Source: Eurostat



Source: Eurostat

Over the 1995 to 2010 period, labour productivity rose in the total economy and for most industries in Portugal. Overall labour productivity growth, in this period, arised from the fact that total GVA grew considerably faster than total employment in the economy. In the case of the business sector services and most of its sub-sectors labour productivity growth was also coupled with an increase in employment. By contrast, in manufactures, and on most of its sub-sectors, labour productivity growth accrued from a different underlying dynamic, where real GVA growth was accompanied by a decline in employment. This is associated with the process of deindustrialization that started over the second half of the 1990s and accelerated throughout the 2000s, where resources were shifted towards the services sectors.

'[C24_C25] Manufacture of basic metals and fabricated metal products, except machinery and equipment' is the only sector from the manufacturing branch that exhibited a positive dynamic with employment shifting to a growing productivity sector.

In the case of '[C13_C15] manufacture of textiles, wearing apparel, leather and related products', and '[C20] manufacture of chemicals and chemical products', both sectors recorded positive labour productivity growth reflecting the fact that GVA dropped to a less extent than employment.

'[F] - Construction', '[I] - accommodation and food service activities' and '[M_N] - professional, scientific and technical activities; administrative and support service activities' were the only sectors displaying a contraction in labour productivity. In the case of "[F] - construction", labour productivity dropped by the fact that GVA fell while construction-related employment increased. In the case of the other two sectors, labour productivity dropped because GVA growth lagged behind employment growth.

Between 2010 and 2016, labour productivity also rose in the overall economy and for most industries in Portugal. However, the underlying dynamics were different from the previous period. Overall labour productivity growth accrued from the fact that total GVA fell to a less extent than total employment. The decrease in total GVA was mostly attributable to the construction sector [F] and financial and insurance activities [K], as GVA in both total manufactures and other services increased (see also figures 17 and A.6).

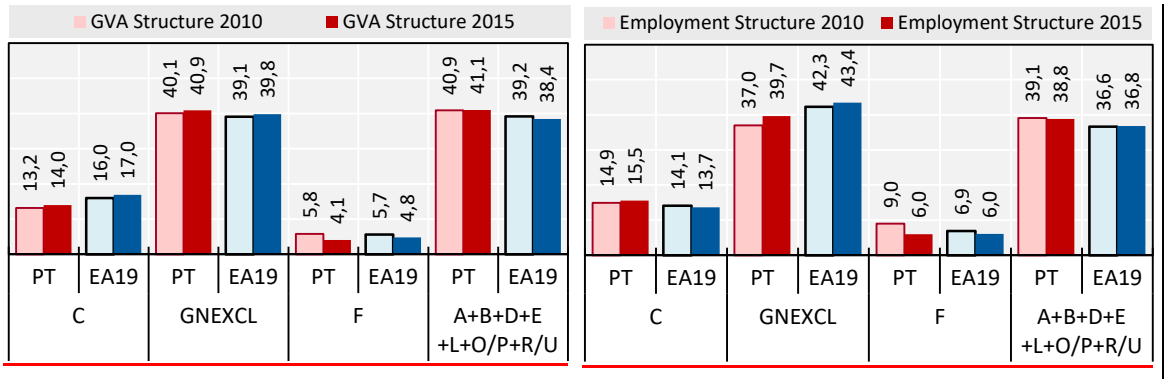
In the business sector services, labour productivity fell because employment grew more than GVA. But some of its sub-sectors displayed positive labour productivity growth triggered by relatively faster GVA growth.

In manufactures, labour productivity grew in all sectors except '[C26] manufactures of computers, electronic and optical products' in sharp contrast with the behavior during the previous period. However, contrasting with the previous period, productivity gains are driven by both higher employment and GVA in 5 of its sub-sectors[3]. These more positive dynamics in terms of resource allocation suggest a reversal of the previous process of deindustrialization in these sectors. In most of these sectors GFCF also increased significantly during this period.

These dynamics also differ from those of the euro area, where productivity growth accrued from the fact that GVA growth outperformed employment growth (figure A.6) and where productivity gains extended to both manufactures and services. In Portugal the shift in employment toward services came mostly at the expense of construction while in the Euro area most of the adjustment occurred through the manufacturing sector (figure 18).

Figure II.18 Employment and GVA Structures, 2010 vs 2015

[3] Namely, '[C13-C15] - manufacture of textiles, wearing apparel, leather and related products', '[C21] - manufacture of basic pharmaceutical products and pharmaceutical preparations', '[C27] - manufacture of electrical equipment', '[C28] - manufacture of machinery and equipment n.e.c.' and '[C29-C30] - manufacture of motor vehicles, trailers, semi-trailers and of other transport equipment'.



Source: Eurostat

The underlying dynamics of labour productivity across sectors described above can allow us to understand whether employment went to more productive sectors. However, in order to assess the overall contribution of resource allocations to productivity growth a shift-share analysis, whereby changes in productivity and employment in each sector are weighted by their relative importance in the total economy is more appropriate.

Changes in labour productivity can be driven by either changes in the productivity of individual industries or structural shifts of resources between contracting and expanding industries. The shift-share analysis decomposes productivity growth into three components:

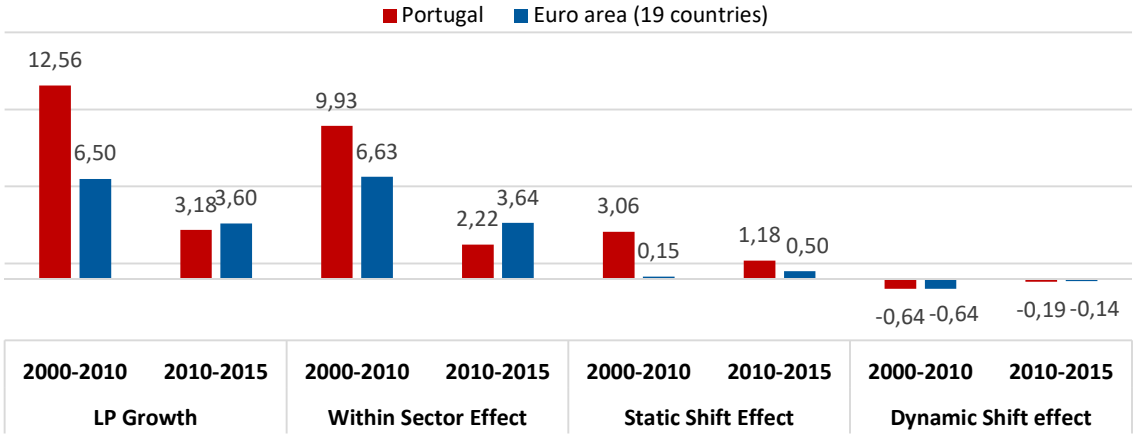
- **Within-sector productivity growth effect:** captures the effect of productivity growth within the different industries in the absence of structural change, *i.e.* holding employment shares constant in specific industries.
- **Static shift effect** (or between-sector productivity growth effect)**:** captures the contribution to aggregate labour productivity growth of a shift of employment towards sectors with different labour productivity levels at the beginning of the period. This effect (static component of structural change), is positive if labour shifts to initially higher productivity sectors.
- **Dynamic shift effect** (Cross-sector productivity growth effect)**:** captures the joint impact of changes in employment shares and changes in labour productivity. This effect (dynamic component of the structural change) is positive if labour shifts to growing productivity sectors.

As observed in figure 19, in both periods considered, the largest contribution to overall labour productivity growth stemmed from productivity gains within sectors, for both Portugal and the euro area.

However, comparing the Static-Shift effect in both Portugal and the Euro area, it is clear that this effect played a larger role on productivity gains in Portugal – especially in the second period where it was proportionally larger – highlighting a higher contribution of the reallocation of labour into sectors with relatively higher initial labour productivity. By contrast, in both periods, the Dynamic-Shift effect was negative. This suggests that although employment shifted to initially higher productivity sectors, these were not the sectors displaying larger productivity gains during the periods under analysis. This can be explained by lower capital deepening in these sectors, stemming from the fact that increases in labour were probably not matched by equivalent increases in investment.

Overall, resource allocations played a larger role to productivity gains in Portugal than in the euro area.

Figure II.19 Shift-share analysis of labour productivity



Source: Eurostat

II.3 Competitiveness analysis

Competitiveness is a broad and complex concept, with no consensual definition[4]. It is usually associated with a country's capacity to produce and sell goods in international markets and should be assessed in relative terms with respect to trading partners. It can depend on several factors and, in the case of Portugal, the late industrialization process, the export product mix and the increased competition from emerging markets were particularly relevant to determine export performance. The majority of Portuguese exports are concentrated in low-technology and slow-growing sectors as well as in labour intensive goods, compared to the EU average (EC, 2011, Box. 1). Moreover, EU trade agreements with China following its adherence to the World Trade Organization (2001) and the EU membership of Eastern European countries (2004) decreased Portugal's comparative advantage, in a period also characterized by a significant euro/dollar appreciation.

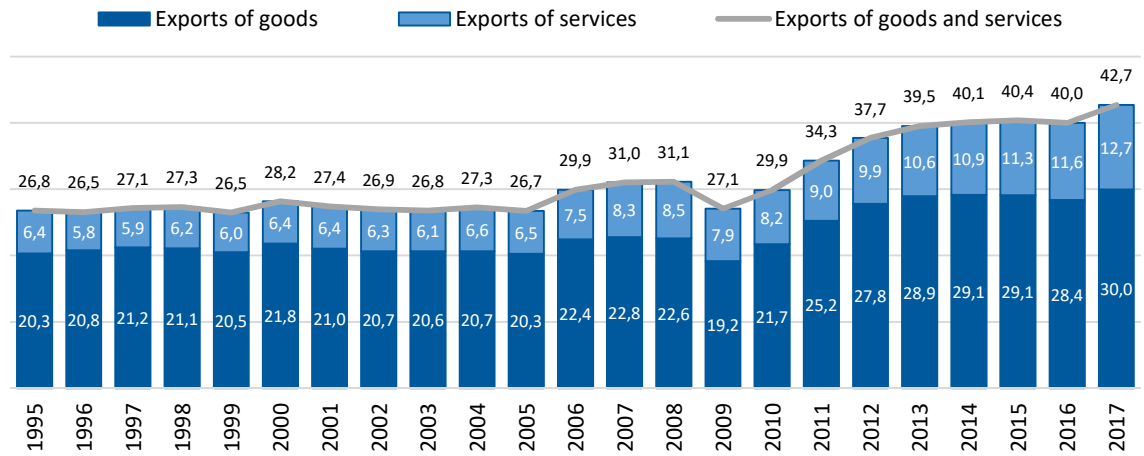
Trade performance can be explained in part exogenously by the robustness of a country's foreign demand. Another part is determined endogenously and depends essentially on a country's competitiveness. Between 1995 and 2017, Portuguese exports of goods and services grew from 26.8% to 42.7% of GDP (figure 20). Exports started to accelerate mainly in 2006, even though the global financial crisis halted this process with a sharp contraction of exports in 2009. The rebound of the Portuguese exports, both in goods and in services, continued

[4] For example, Krugman (1996) criticizes Lester Thurow's view that nations compete in the world market in the same way as corporations do. According to Krugman (1994), "If competitiveness has any meaning, it is simply just another way to express productivity. The ability of a country to improve its standard of living over time depends almost entirely on its ability to raise its productivity. (…) competitiveness is meaningless word when applied to national economies. And the obsession with competitiveness is both wrong and dangerous." Porter (1990) states that "The only meaningful concept of competitiveness at the national level is national productivity". More consistently with these views, The World Economic Forum's Global Competitiveness Report defines competitiveness as "the set of institutions, policies and factors that determine the level of productivity of a country".

thereafter even though services, due to the vibrancy of tourism industry, have outperformed goods exports during most of the period.

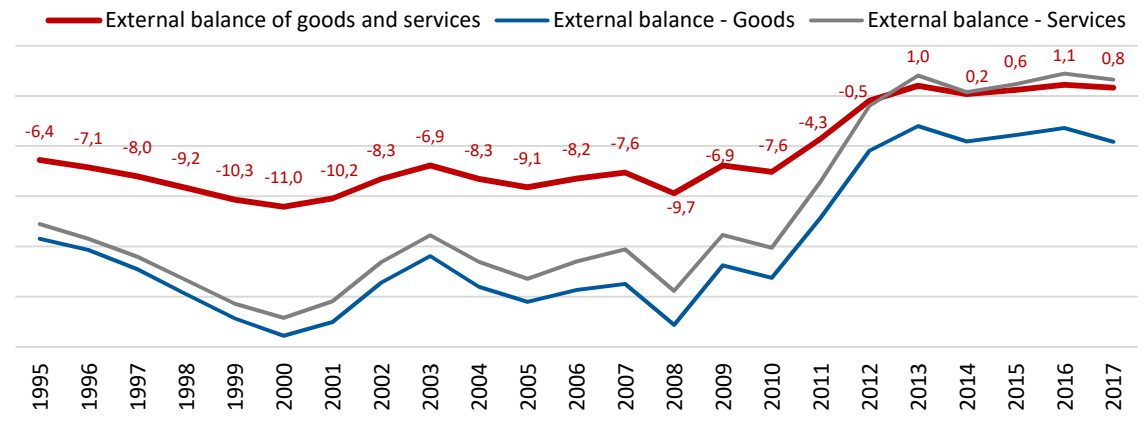
Given these developments, the balance of trade in goods and services has been positive since 2013, for which the contraction of imports was also a contributing factor, and Portugal's export market share grew to 0.42% of world exports of goods and services in 2017, from a minimum of 0.37% in 2012 (figures 21 and 22).

Figure II.20 Exports of goods and services, current prices | in percentage of GDP



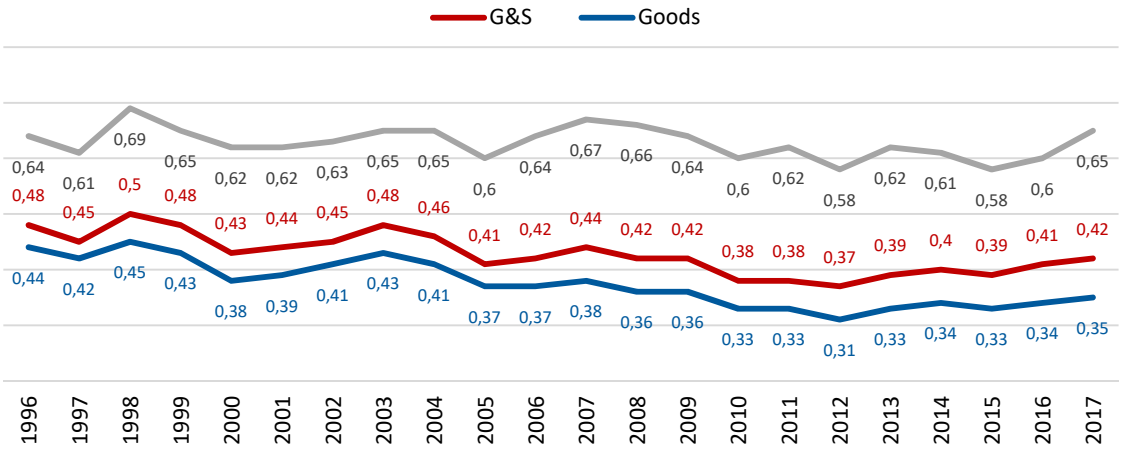
Source: Eurostat

Figure II.21 Trade balance of goods and services, current prices | in percentage of GDP



Source: Eurostat

Figure II.22 Portuguese export market shares | in percentage of world trade



Source: Eurostat

As the capacity to export can depend on both price and non-price (quality) attributes of the goods produced, it is useful for analytic purposes to distinguish between price and non-price competitiveness.

Price competitiveness refers to the level of a country's costs/prices relative to its main competitors in international markets. Real effective exchange rates (REERs) are the most common indicators to measure changes in relative prices between domestic products and foreign products.

REERs can be calculated with several price indexes, with the consumer price inflation (CPI) or unit labour costs (ULC) being the most frequently used. As consumer baskets used to calculate CPI indexes typically include a significant portion of imported goods, ULC, which consist on the ratio between (nominal) labour remuneration and (real) labour productivity, can better reflect relative prices/costs between domestic and foreign products – if labour costs represent a significant share of total costs.

Three distinct periods can be observed from the evolution of REERs also coinciding with different contexts in terms of the overall performance of the Portuguese economy: a first period, lasting until approximately 2000, associated with a convergence process of the Portuguese economy to the EU, where CPI based indicator depreciated while ULC based REER appreciated; a second period, from thereon until the financial crises, marked by economic stagnation, severe macroeconomic imbalances and a deterioration of competitiveness, as illustrated by the appreciation of both indicators; and a final period starting around 2010/2011 showing an improvement in competitiveness, consistent with the recovery of the Portuguese economy (figure 23).

Before the launch of the Euro, the sharp depreciation of REER on a CPI basis reflects the stabilization policies implemented in the run up to the euro and favourable expectations, which allowed a significant reduction in inflation and interest rates. Low interest rates and greater financial liberalization, in the context of the EU single market, facilitated access to credit, thereby contributing to increase consumption and investment (mostly in the real estate sector). The dynamism of economic activity was accompanied by the reduction of the unemployment rate (which at 4% in 2000 was significantly lower than the EU average). The tightness of labour market conditions contributed to wage increases, in excess of productivity gains, thereby raising

ULC indicators and further fuelling the demand-led growth. These developments contributed to the convergence of the Portuguese economy to the EU, both in real and nominal terms, but were also accompanied by growing indebtedness and current account deficits.

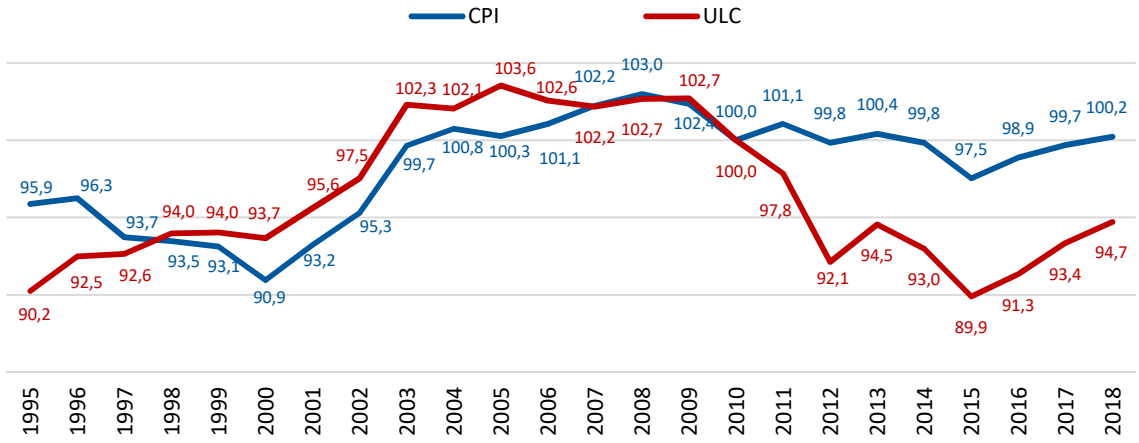
By around 2000, it became clear that this demand-led growth accompanied by increasing macroeconomic imbalances, but without the reforms needed to increase productivity and GDP potential, became unsustainable. As agents adjusted to high indebtedness levels, consumption decreased. Reflecting weak aggregate demand, lower profits and more pessimist expectations, investment also declined. The economy was also affected by negative external demand shocks stemming from increased competition in traditional sectors for the Portuguese economy (*e.g.* textiles and footwear) due to the greater integration of East European economies and the greater participation of emerging markets in international trade (*e.g.* China joined the World Trade Organization in 2001). The appreciation of the euro and relatively loose policies led to higher macroeconomic imbalances and to a deterioration of competitiveness, as illustrated by the appreciation of both CPI and ULC based REER. As opposed to the first period, where the appreciation of ULC was mostly driven by significant wages increases (as labour productivity also grew), in this period wage increases played a more modest role as productivity was relatively stagnant, at least until 2003.

The international financial crisis and the European sovereign debt crisis had severe consequences on the Portuguese economy. The related changes in investors' market sentiment were particularly penalizing for more vulnerable countries like Portugal, with large indebtedness levels and stagnant economic activity. Portugal was also affected by the lower demand from partner countries, which led to a sharp contraction in exports. Together with the uncoordinated response at the EU level, Portugal, Greece, Ireland and Cyprus lost their ability to refinance public debt and bail out over-indebted banks. These events led to the signing of a financial assistance and economic programme with the IMF and EU institutions, aimed at restoring access to international financial markets, promoting competitiveness and sustainable economic growth. The programme relied on three main pillars: fiscal consolidation; financial stability and; structural transformation of the Portuguese economy in order to promote productivity and competitiveness. These measures and the restrictiveness of economic policies contributed to the reduction of macroeconomic imbalances and to the depreciation of REER indicators, especially ULC-based. The trade balance improved from a large deficit to a surplus since 2013. Even though a contraction in imports contributed to this result, export growth (both in services and manufacturing) was also robust.

Despite the depreciation of ULC, the price of Portuguese exports actually rose during this period (figure 24). Reduced costs were not translated into prices implying higher profit margins for exporting firms and greater investment capacity. As noted by Blanchard and Portugal (2017), a plausible explanation is the fact that Portuguese firms are price-takers in international markets and the increase in margins allowed them to invest and increase market shares.

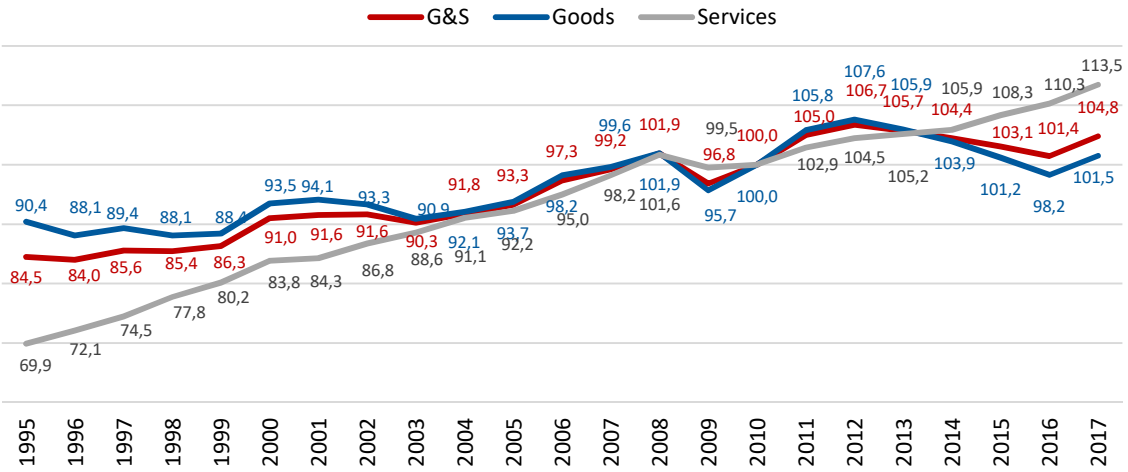
This also implies that factors other than price dynamics need to be considered when assessing the competitiveness of an economy. In fact, the increase in Portuguese market shares cannot be explained only by developments in price competitiveness indicators, especially since 2015.

Figure II.23 Real Effective Exchange Rates (37 trading partners) | 2010 = 100



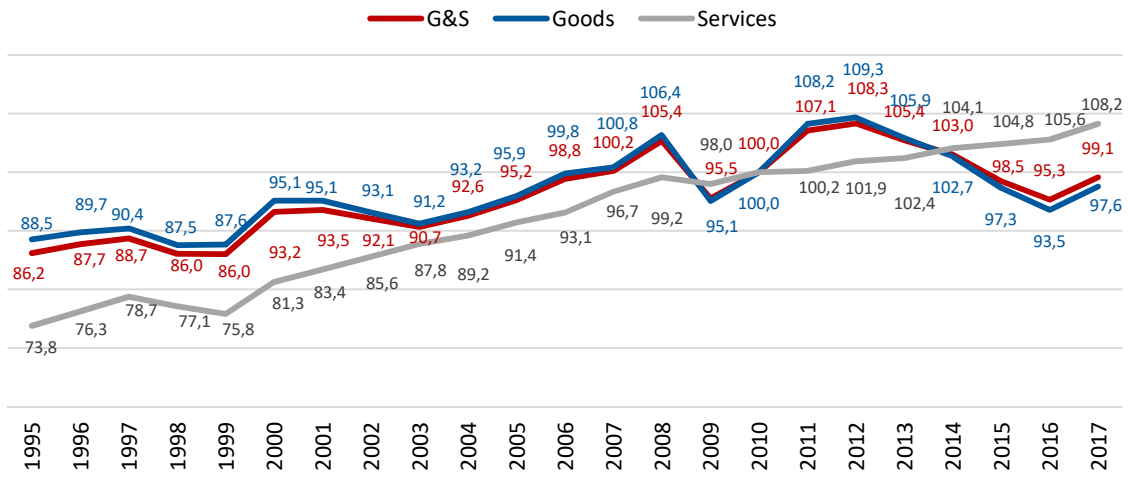
Source: Eurostat

Figure II.24 Portugal export price index | 2010 = 100



Source: Eurostat

Figure II.25 Portugal import price index | 2010 = 100



Source: Eurostat

Although prices and costs play an important role in defining a country's competitiveness, it is not infrequent that the fastest growing countries in terms of export market shares are also those

displaying highest increases in relative prices. This is commonly referred to as the Kaldor Paradox and supports the idea that cost and price factors, although relevant, cannot by themselves explain failure or success on international markets.

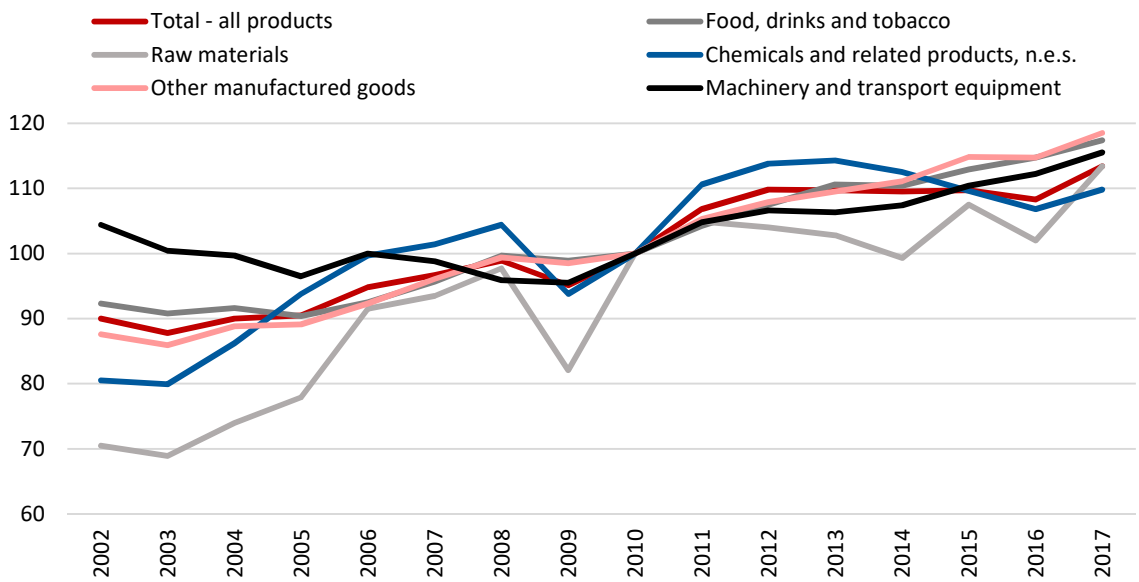
In a world of increasingly global competition, the type and quality of products or services that a country has to offer in international markets also matters to compete and expand market shares. The relative importance of price and non-price factors depends on the degree of substitutability of the products. If a country offers relatively homogeneous products compared to its international competitors, competition will be mostly based on prices. However, for products that can be differentiated through quality, design and technology, the price factor loses relevance. In fact, to the extent that higher prices may reflect inner quality or some other source of products' differentiation, they can even be indicative of competitiveness.

The reliance on **non-price drivers of competitiveness** is particularly relevant for highly indebted countries and in a low inflation environment, as the capacity to improve competitiveness through restrictive policies, without risking deflation and, consequently, increasing the real value of public and private debt, is more limited.

A major challenge in assessing non-price indicators of competitiveness relates to the measurement of quality and differentiation on a country's exports. One common approach is to use relative export unit values – the ratio of the value to the quantity sold – as a proxy for quality. The unit value indices of Portugal's exports exhibit an upward trend in the period under analysis, for all products, except for fuels, lubricants and related materials (figure 26). Even though there are some limitations in using the value of exports as a proxy for quality, when combined with increased export market shares and lower ULC, this indicator can be more illustrative of non-price competitiveness factors.

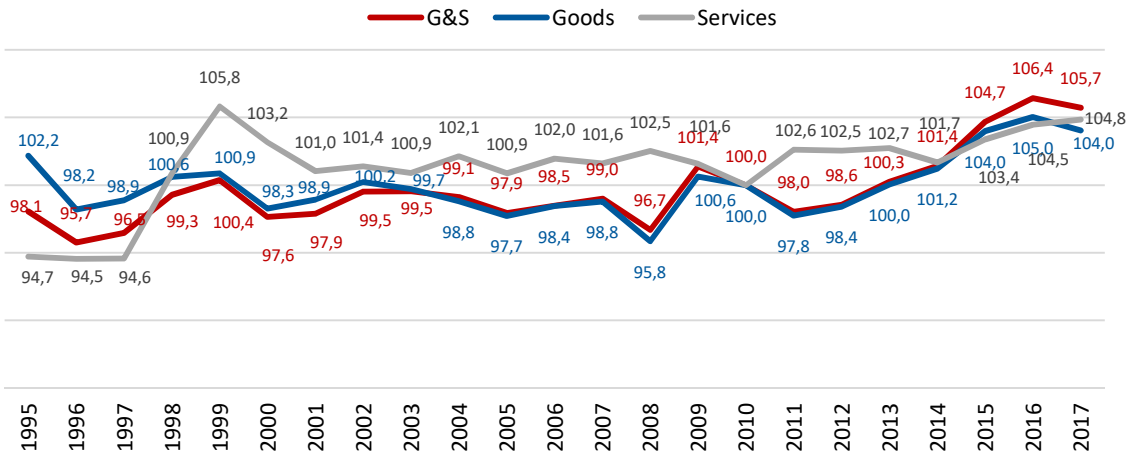
Terms of trade developments (*i.e.* a country's export prices in relation to its import prices) are also relevant to assess competitiveness. While a decline in import prices is often associated with increased competition from low-cost countries, export prices increases may signal structural changes due to shifts in the composition of exports toward higher quality range of products or towards more dynamic markets of destination. As shown, the underlying causes of recent terms of trade improvements differ according to sector. In manufacturing this improvement was mostly due to the decline in import prices, while in services it reflects mostly higher export prices (figures 25, 25 and 27).

Figure II.26 Portugal export unit value index | 2010 = 100



Note: Mineral fuels, lubricants and related materials not represented in the graph.
Source: Eurostat

Figure II.27 Portugal Terms of Trade | 2010 = 100

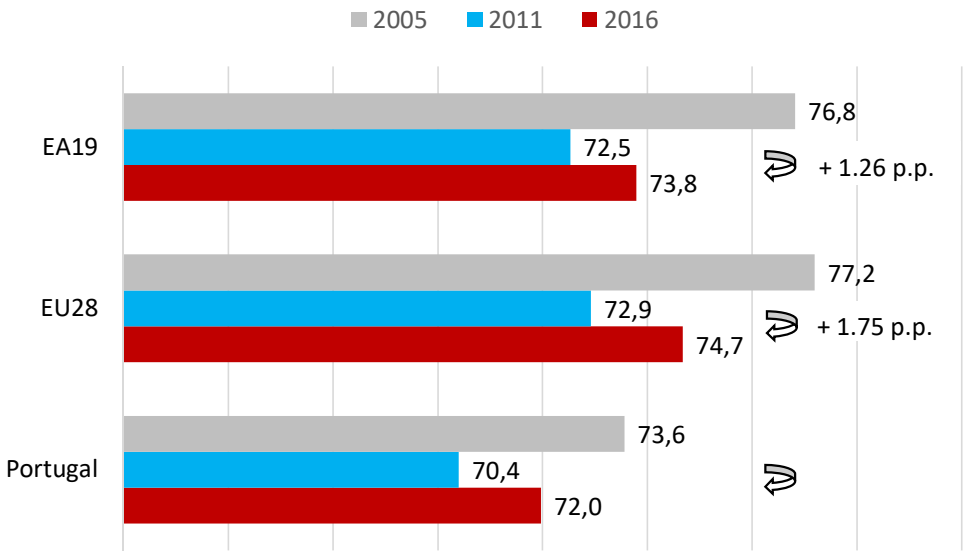


Source: Eurostat

The growing importance of global value chains in international trade implies that measures of gross exports are likely to overstate the importance of the export sector. To the extent that the value of exports also incorporates intermediate imported goods, the performance of the export sector can be better assessed by the domestic value added content in exports.

The share of domestic value added in gross exports exhibits a downward trend in Portugal and the euro area, as expected with a greater participation in value chains and an increased reliance of imported intermediate inputs (figure 28). However, the value added share of Portuguese exports is lower than that of the euro area, even though the differential has decreased over the recent years.

Figure II.28 Domestic Value Added as a share of Gross Exports (%)

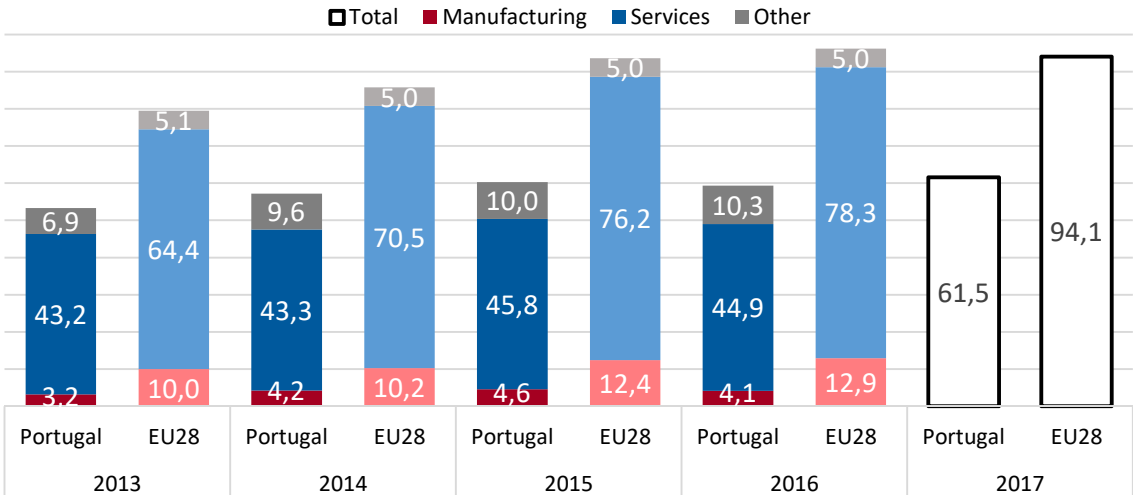


Source: GEE, based on OECD-Trade in Value Added data, December 2018.

The capacity of a country to attract foreign direct investment (FDI) can also be relevant to assess an economy's competitiveness. In fact, relevant drivers of productivity and competitiveness such as the quality of institutions, well-functioning product and labour markets, unit labour costs, the degree of trade openness are also important determinants of FDI.[5] In addition FDI, by relaxing financing constrains at the national level and by allowing the transfer of technologies and know how, can also be conducive to productivity gains.

The behaviour of FDI stocks also reflect the improved performance of the portuguese economy. The stock of FDI in percentage of GDP has been following an upward trend, rising from 53.3% in 2013 to 61.5% in 2017 (figure 29). Services have been the most atractive sectors to foreign investors, particularly in the areas of financial and insurance services; consulting, scientific, technical and similar activities; and gross and retail trade.

Figure II.29 Foreign Direct Investment | stocks, in percentage of GDP



[5] See for example, Dellis *et al.* (2017)

Source: Eurostat

II.4 Conclusions

Following a period of relative stagnation, total factor productivity has been increasing since 2013 in line with the euro area. This evolution is coincident with the improvement of competitiveness and with overall economic recovery, suggesting the importance of productivity gains as a driver of both economic growth and competitiveness.

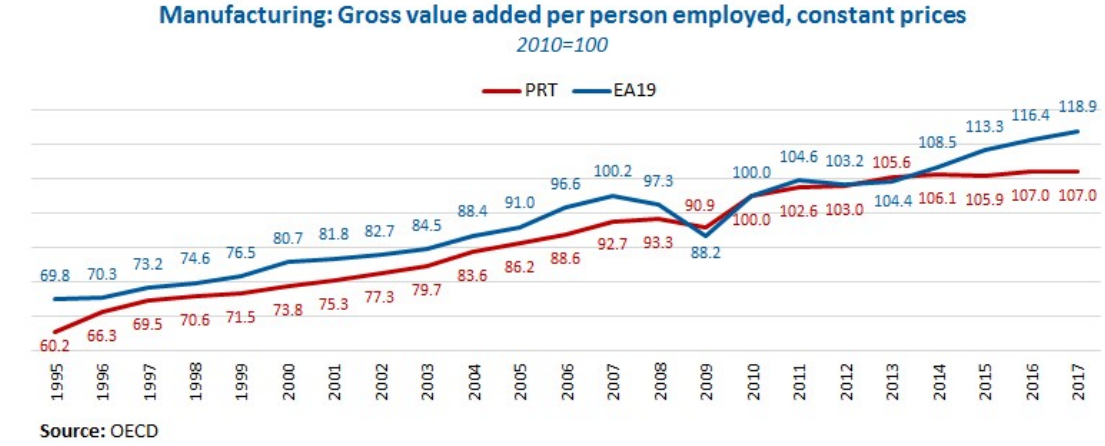
However, productivity gaps between Portugal and the euro area are still significant and, despite the recent recovery, clear evidence of a sustained convergence towards EU income levels is still missing. Nevertheless, there are signs of some important structural changes associated with improvements in both the quality of labour and investment, as well as with the allocation of resources within the economy. An analysis of the contribution of factor inputs to GDP growth illustrates a more significant role played by labour quality over recent years. The decomposition of capital stock by asset type shows a significant reduction in the share of investments related to construction which have been increasingly replaced by more productive ones such as intellectual property and machinery equipment. In addition, intra-sectoral shifts of employment seemed to have contributed more to productivity gains, also in comparison with the euro area.

The analysis of single-input measures of productivity, in particular labour productivity, is particularly relevant given its relation with wages and income levels. The evolution of labour productivity in Portugal, especially if measured by the ratio of GVA per person employed, is closely associated with the development of capital intensity, either driven by changes in capital accumulation or by changes in employment levels (more than in the euro area). The increase in labour productivity until 2013 seems to match that of capital intensity and the relative stagnation thereafter is accompanied by a reduction in capital intensity driven by greater employment. The recent productivity slowdown in the business sector services can, to a large extent, be explained by higher employment and lack of investment. Even though single input measures of productivity are normally affected by changes in the intensity usage of other inputs, the strong relationship seems to suggest that capital constraints are more relevant in Portugal than in the euro area.

The intra-sectoral dispersion of productivity levels among firms seems to be high, particularly in some sectors, and has been increasing since 2004. There seems to be no discernible pattern or relationship between this dispersion and overall productivity or capital intensity across sectors, making it difficult to assess its relevance. Even though this may suggest that factors intrinsic to the firm (such as the quality of management, labour qualifications, or investment levels) are more relevant determinants of a firm performance than factors related to the functioning of the market or to the economic environment, it may also be indicative of limited spillovers or technology transfers among firms.[6] Additional research on the causes and implications of these levels of productivity dispersion might be relevant to understand the dynamics underlying productivity gains and its determinants.

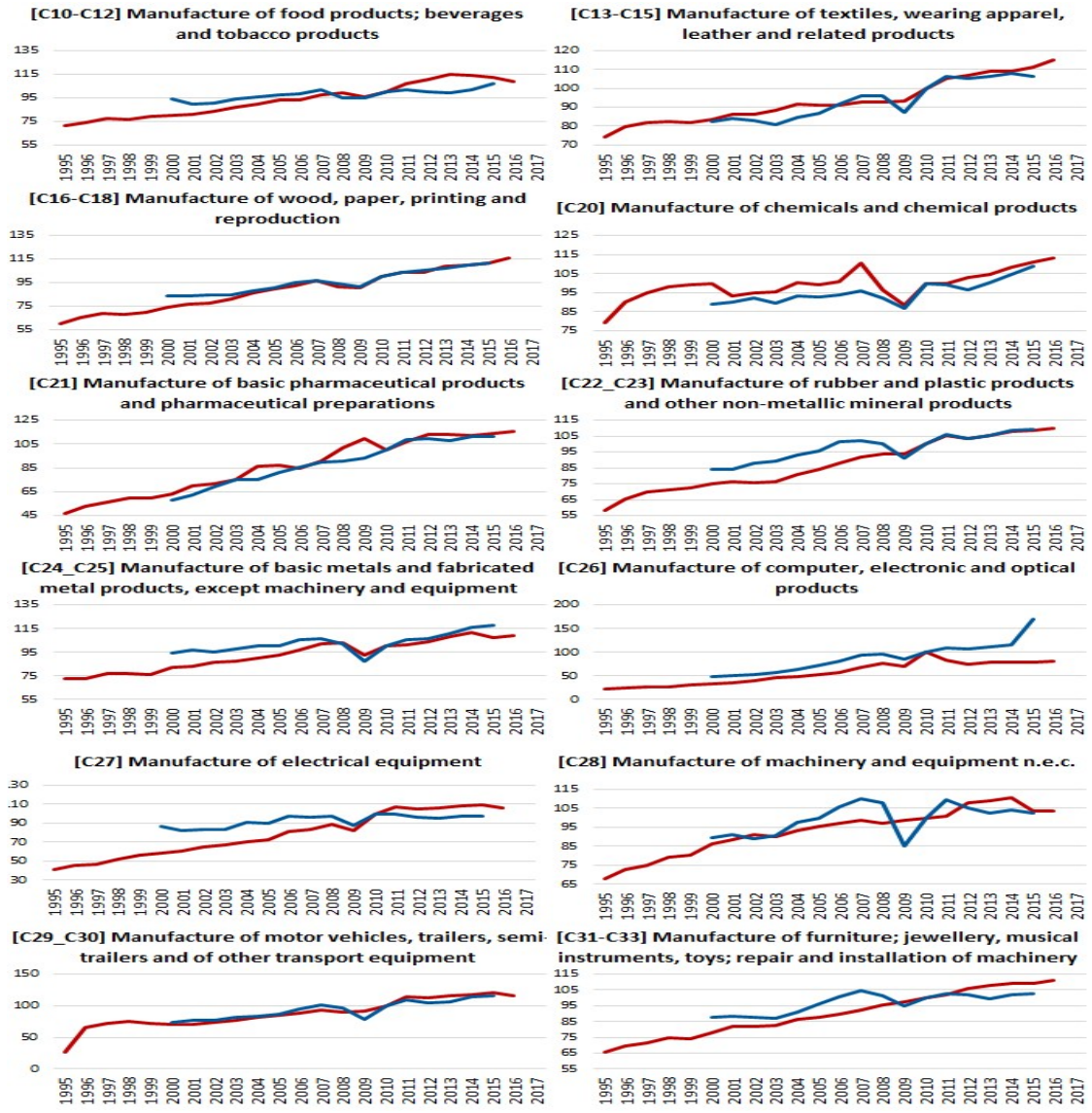
[6] Andrews et al (2016) attribute this dispersion to 'winner takes all dynamics' driven by digital technologies and to stalling technological diffusion and market dynamism amongst laggards.

Figure A.1 Labour Productivity in manufacturing, by sector | constant prices, index 2010 = 100



Source: OECD

Of Which:



Source: Eurostat

Figure A.2 Labour Productivity in the Business Sector Services (Excluding Real State), by sector | constant prices, index 2010 = 100

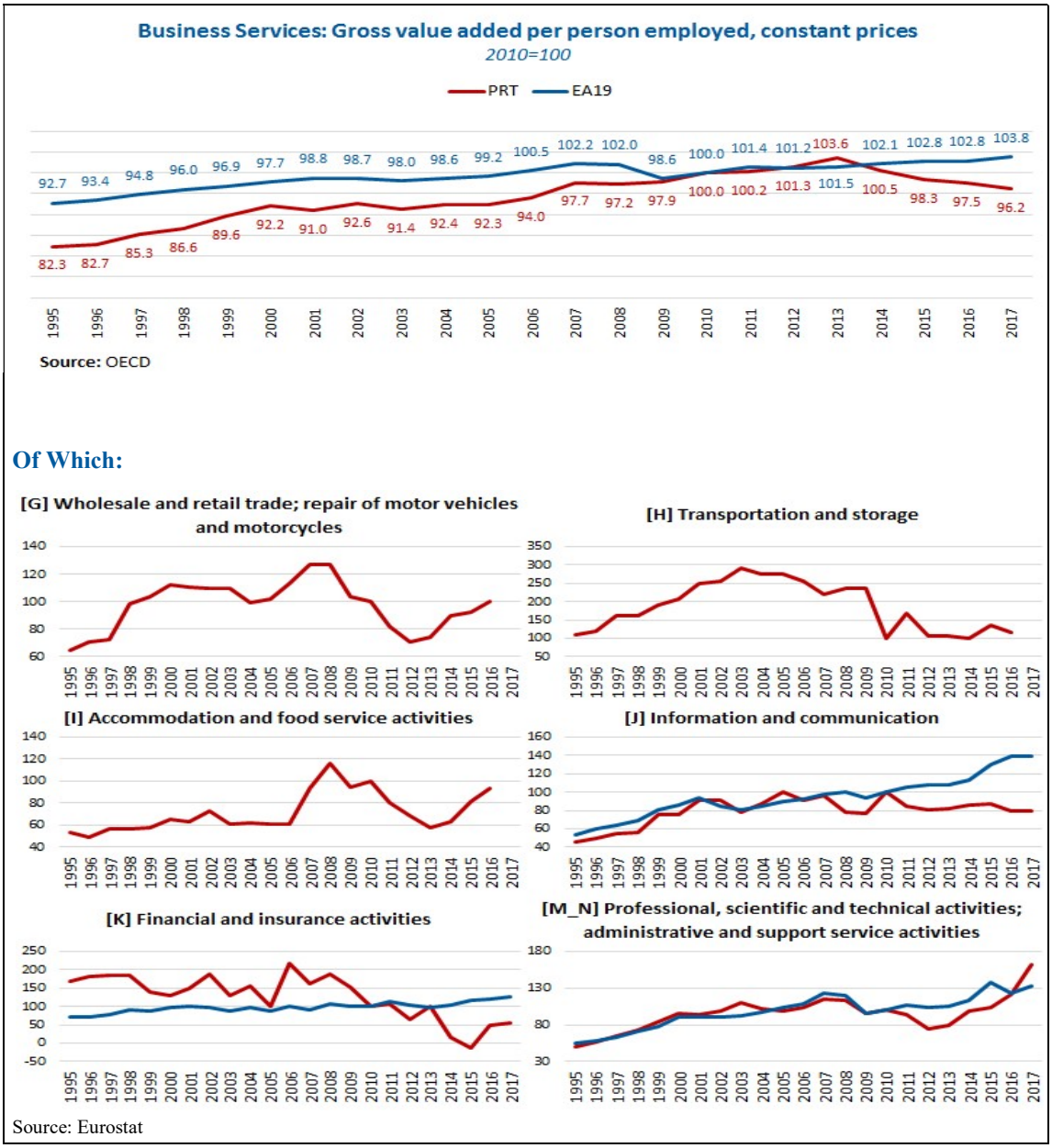
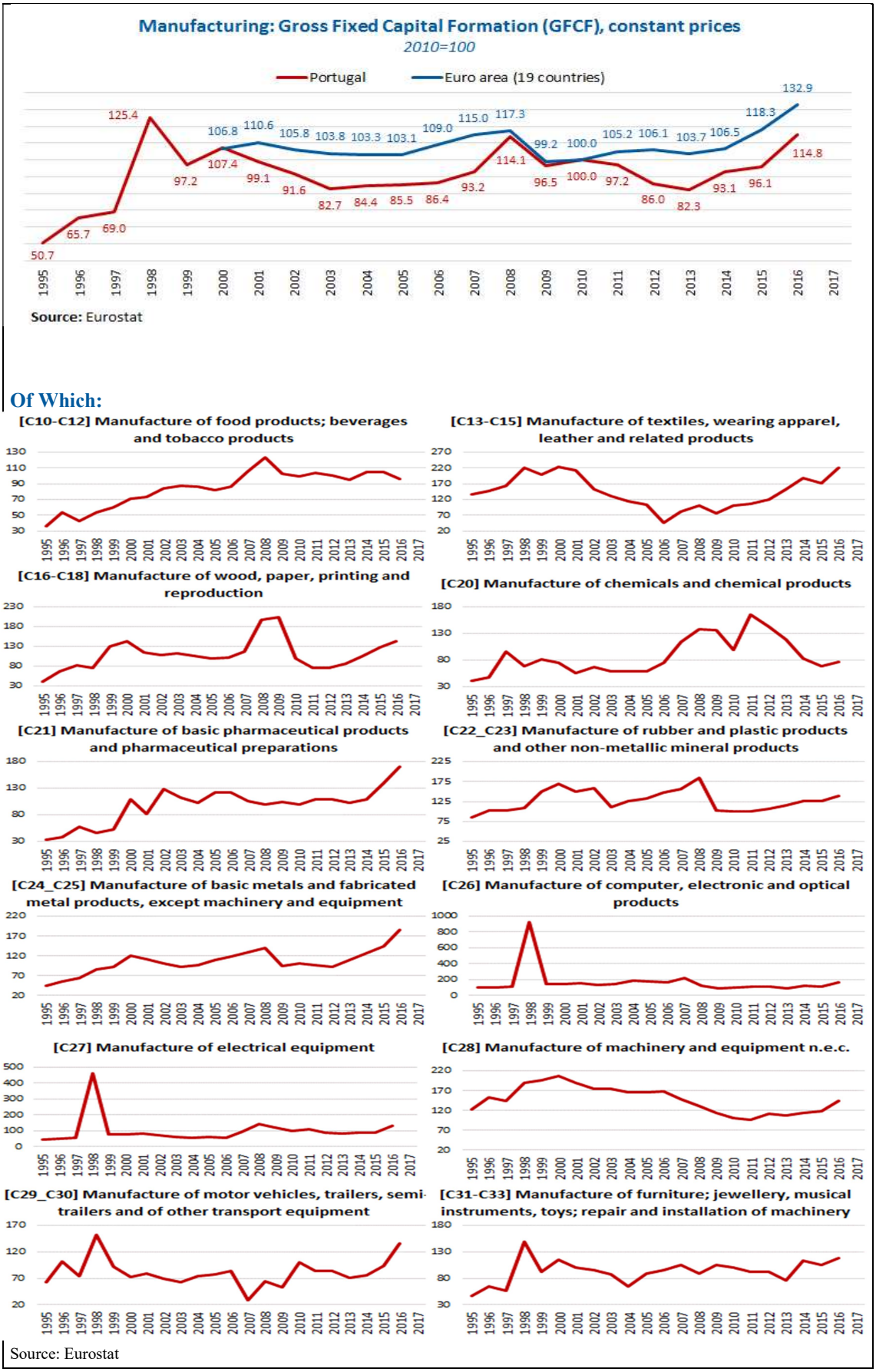
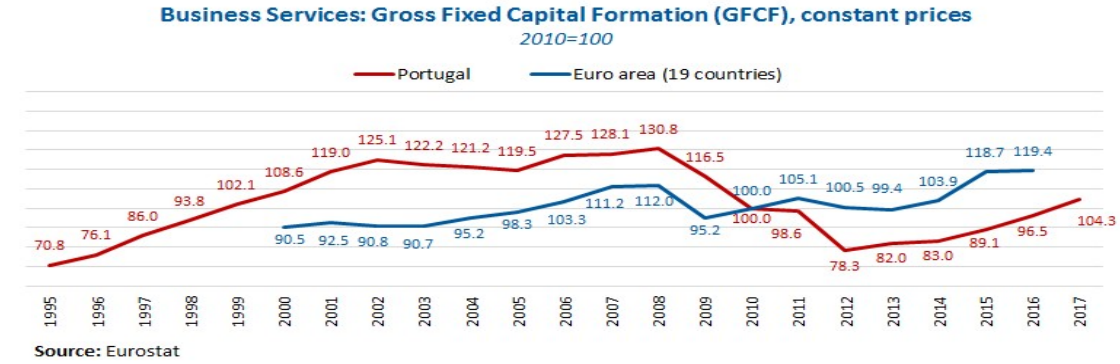


Figure A.3 Gross fixed capital formation, manufacturing | constant prices, index 2010 = 100



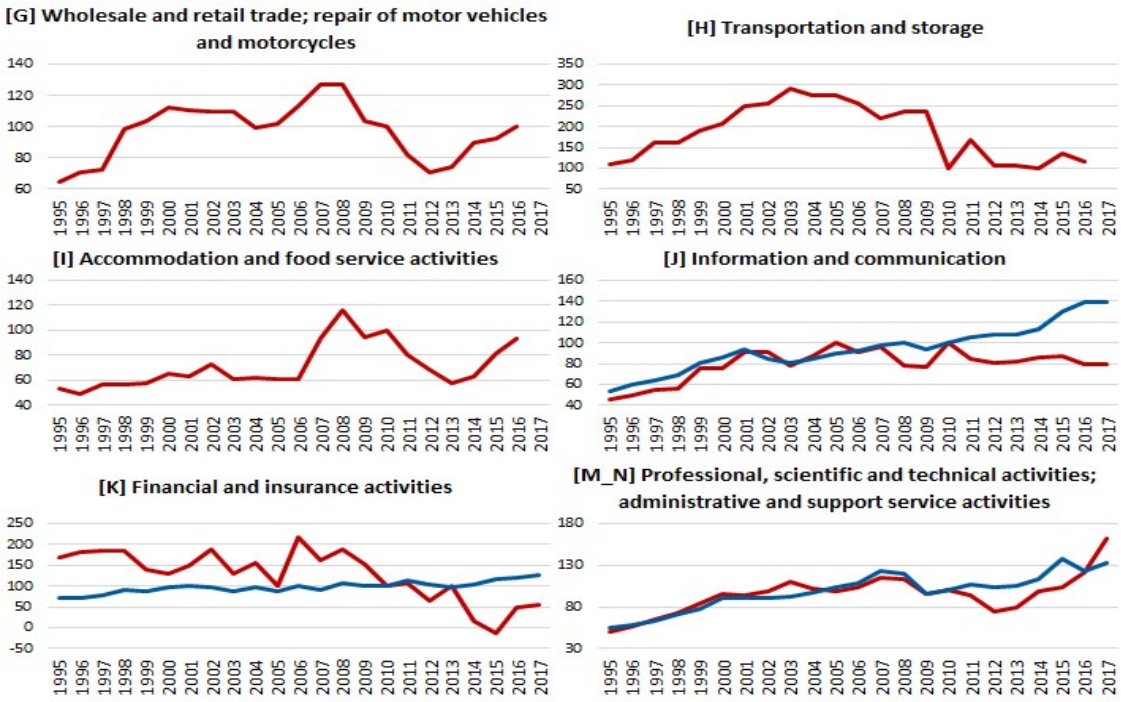
Source: Eurostat

Figure A.4 Gross fixed capital formation, business services | constant prices, index 2010 = 100



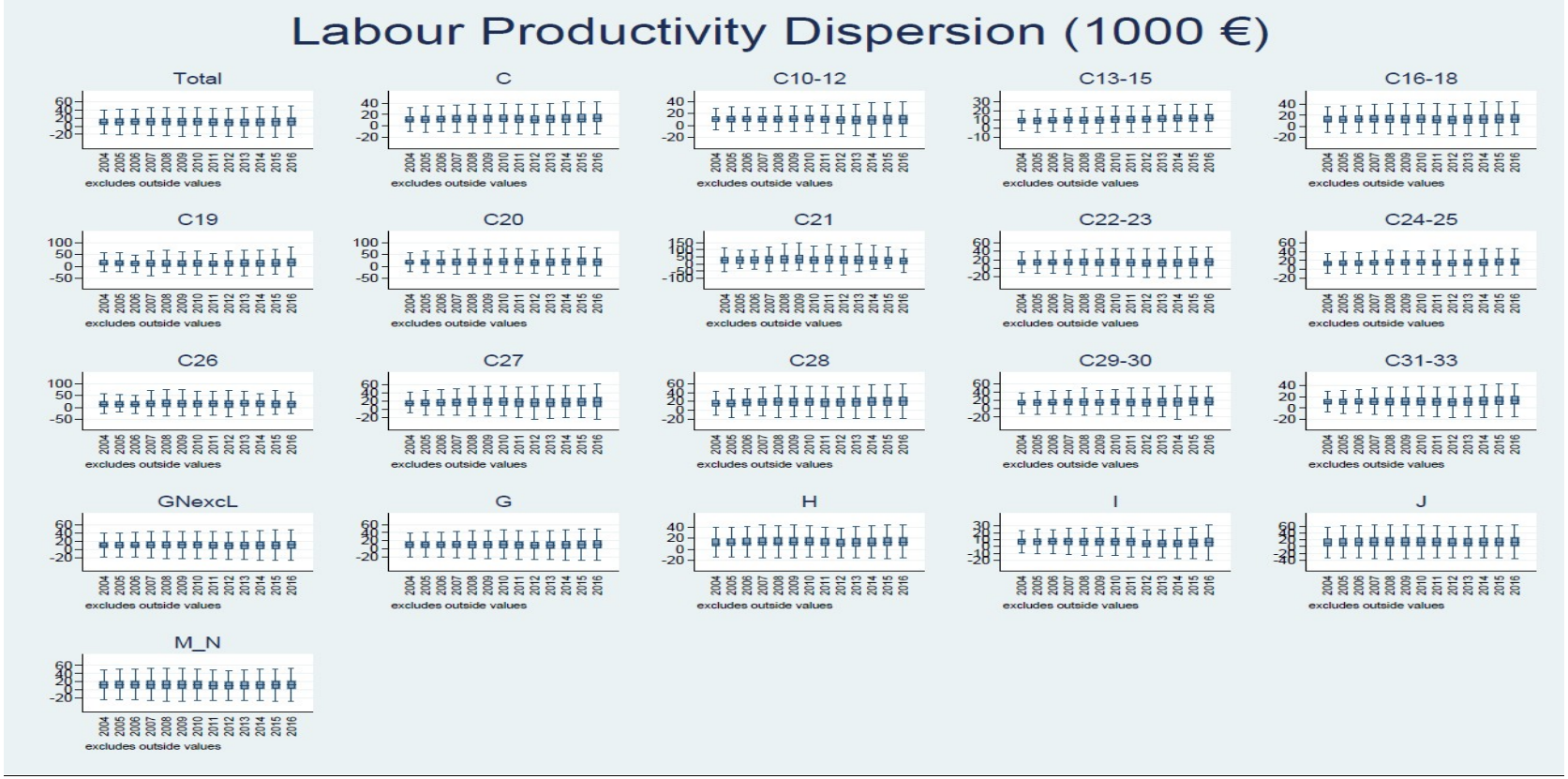
Source: Eurostat

Of which:



Source: Eurostat

Figure A.5 Intra-sectoral dispersion of labour productivity among Portuguese non-financial enterprises



Note: The database covers all Sections from A to S excluding K and O.
Source: Microdata, Statistics Portugal.

Figure A.6 Growth in employment, GVA, GFCF and labour productivity: Portugal *vs* Euro Area: 2010-2015

		Employment y.o.y (%)	GVA y.o.y (%)	GFCF y.o.y (%)	LP y.o.y (%)
Total - all NACE activities	PT	- 6.1	- 3.1	- 25.0	+ 3.18
	EA19	+ 0.7	+ 4.3	+ 2.3	+ 3.60
[C] - Manufacturing	PT	- 2.3	+ 3.5	- 3.9	+ 5.95
	EA19	- 2.6	+ 10.4	+ 18.3	+ 13.33
[C10-C12] - Manufacture of food products; beverages and tobacco products	PT	- 4.0	+ 7.5	+ 4.5	+ 12.03
	EA19	+ 0.9	+ 8.3	+ 11.8	+ 7.34
[C13-C15] - Manufacture of textiles, wearing apparel, leather and related products	PT	+ 3.7	+ 15.6	+ 71.4	+ 11.48
	EA19	- 8.0	- 2.2	+ 3.6	+ 6.38
[C16-C18] - Manufacture of wood, paper, printing and reproduction	PT	- 12.8	- 2.6	+ 27.5	+ 11.74
	EA19	- 13.2	- 2.9	- 0.9	+ 11.86
[C19] - Manufacture of coke and refined petroleum products	PT	- 8.6	- 85.1	- 90.9	- 83.70
	EA19	- 5.3	+ 54.3	- 21.8	+ 62.86
[C20] - Manufacture of chemicals and chemical products	PT	- 9.0	+ 1.0	- 30.9	+ 11.03
	EA19	+ 0.9	+ 9.7	+ 11.5	+ 8.74
[C21] - Manufacture of basic pharmaceutical products and pharmaceutical preparations	PT	+ 6.0	+ 20.6	+ 40.3	+ 13.79
	EA19	- 1.4	+ 9.4	+ 68.6	+ 10.99
[C22_C23] - Manufacture of rubber and plastic products and other non-metallic mineral products	PT	- 8.8	- 1.3	+ 25.8	+ 8.24
	EA19	- 6.3	+ 2.6	+ 9.3	+ 9.45
[C24_C25] - Manufacture of basic metals and fabricated metal products, except machinery and equipment	PT	- 5.1	+ 1.5	+ 43.9	+ 6.88
	EA19	- 3.9	+ 13.3	+ 5.2	+ 17.94
[C26] - Manufacture of computer, electronic and optical products	PT	+ 5.8	- 16.1	+ 9.0	- 20.75
	EA19	- 3.8	+ 63.6	+ 1.0	+ 69.96
[C27] - Manufacture of electrical equipment	PT	+ 4.1	+ 13.6	- 13.8	+ 9.11
	EA19	- 3.2	- 5.9	+ 2.0	- 2.79
[C28] - Manufacture of machinery and equipment n.e.c.	PT	+ 3.7	+ 7.6	+ 17.3	+ 3.70
	EA19	+ 4.4	+ 7.3	+ 20.1	+ 2.72
[C29_C30] - Manufacture of motor vehicles, trailers, semi-trailers and of other transport equipment	PT	+ 4.1	+ 24.9	- 5.8	+ 19.98
	EA19	+ 4.4	+ 21.5	+ 27.4	+ 16.46
[C31-C33] - Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	PT	- 3.8	+ 4.9	+ 6.0	+ 9.03
	EA19	- 3.8	- 0.9	+ 7.0	+ 2.95
[GNEXCL] - Business sector services excluding real estate	PT	+ 0.7	- 1.2	- 10.9	- 1.87
	EA19	+ 3.4	+ 6.3	+ 18.7	+ 2.85
[G] - Wholesale and retail trade; repair of motor vehicles and motorcycles	PT	- 2.7	+ 8.8	- 7.5	+ 11.82
	EA19	- 1.1	+ 7.2	+ 10.2	+ 8.37
[H] - Transportation and storage	PT	- 3.4	- 6.8	+ 36.4	- 3.50
	EA19	- 0.4	- 1.4	- 2.3	- 0.96
[I] - Accommodation and food service activities	PT	+ 2.3	+ 5.0	- 18.3	+ 2.61
	EA19	+ 9.0	+ 4.2	+ 0.8	- 4.43
[J] - Information and communication	PT	+ 18.3	- 1.7	- 12.4	- 16.87
	EA19	+ 4.6	+ 17.6	+ 30.4	+ 12.39
[K] - Financial and insurance activities	PT	- 10.6	- 26.8	- 114.4	- 18.06
	EA19	- 3.8	+ 0.5	+ 17.9	+ 4.42
[M_N] - Professional, scientific and technical activities; administrative and support service activities	PT	+ 5.7	+ 3.4	+ 3.1	- 2.22
	EA19	+ 9.5	+ 7.6	+ 37.2	- 1.76
[F] - Construction	PT	- 37.4	- 32.4	- 39.5	+ 7.92
	EA19	- 12.1	- 11.4		+ 0.75
[A+B+D+E+L+O/P+R/U] - Other	PT	- 6.7	- 2.7		+ 4.23
	EA19	+ 1.4	+ 2.3		+ 0.88

Source: Eurostat

III. The Main Determinants of Productivity in Portugal

Productivity can be influenced by a number of factors, such as employee qualification, investment decisions, the adoption of more efficient technologies and management, or external factors related to the functioning of markets and demand. In fact, several aspects related to the market framework, such as regulation or the level of competition, can affect the productive process or the allocation of resources in the economy, with an impact on productivity. In addition to these more supply-side factors, the evolution and characteristics of demand, by determining the type and amount of investment and the level of quality requirements of the various products on the market, can encourage more efficient production processes[7].

Over the past few years there has been a decline in labour productivity growth in most industrialized countries. Given the impact of this evolution on global growth, the analysis of the causes and determinants of productivity has taken a prominent place in the agenda of various international organizations, political authorities and academia. In addition to this general decline, there is also some dispersion in the evolution of productivity in the various countries, which may jeopardize the competitiveness of some economies. In some ways, differentiated productivity growth rates between countries would be expected to translate into an adjustment process leading to greater convergence. Indeed, progress in communications, by facilitating technological diffusion, enables countries with a lower level of productivity to adopt technologies from countries closer to the technological frontier, thereby achieving productivity gains at a lower cost and without the need to make significant investments in research and innovation. However, the dispersion observed does not necessarily translate into a greater convergence between countries and, in this context, the productivity evolution of the Portuguese economy is particularly worrisome. Despite the low productivity of the Portuguese economy compared to the average of the euro area, recent developments have not been able to significantly reduce this differential.

This chapter aims to examine the factors that could explain the evolution of productivity of the Portuguese economy. The first section analyses productivity trends at the international level, the possible causes of the observed decline in productivity growth and future prospects. Although these global trends may also explain, to some extent, the developments of productivity in Portugal, national factors play a larger role in the observed difference between the productivity of the Portuguese economy and the average of the euro area. The second section presents some empirical evidence on factors that may determine the poor productivity of the Portuguese economy. Finally, the last section concludes on the need for additional research for an improved diagnosis on the productivity of the Portuguese economy in order to guide the policy design in this area.

III.1 Global trends

The decline in labour productivity growth in most countries has been particularly pronounced following the international financial crisis. According to the McKinsey report (McKinsey

[7] In addition, the evolution of demand, in determining the market price of a product, also interferes with the measurement of productivity evaluated on the basis of the value of the product..

Global Institute, 2018) this evolution at the global level can be explained by three different phenomena.

Firstly, part of the decline may reflect diminishing returns of the positive effects on productivity originated from several shocks in the productive processes that occurred in the 1990s, related to innovations in the area of information and communication technologies (ICT), to the fragmentation of the world production process and reorganization of international trade in global value chains. Indeed, productivity gains that can be generated from innovations, both at product level and from a reorganization of the production process, are not independent of the product (or process) life cycle and tend to fade as soon as optimal use of these new technologies is achieved.

A second explanation is that recent innovations related to the digitalization of the economy - for example, the development of online markets and the processing of information through machine learning techniques - have not yet translated into significant productivity gains. In fact, the adoption of new technologies involves changes in the production process and the business model of several industries, which take time to implement and generally entail considerable initial costs (installation, adjustment, training of workers, etc.). It also happens that at an early stage the new technology does not completely replace the previous one, which may imply a duplication of effort - for example, the possibility of online sales with the largest digitalization of the economy does not completely replace the existence of physical stores and the maintenance of the two technologies simultaneously entails additional costs. Thus, a temporal mismatch between technological innovations and productivity is to be expected. It should be noted, however, that the benefits of digitization differ between sectors, thus it is possible to have very productive sectors despite the general decline.

Finally, the financial crisis and the consequent instability had a marked effect on global aggregate demand, notably in the reduction of investment and the capital stock per worker, which reached the lowest level since World War II. The low level of investment limits the possibility of taking advantage of economies of scale, negatively impacting productivity. The post-crisis economic recovery has been characterized by strong job creation, also contributing to low capital intensity and low labour productivity.

Nevertheless, some of the causes identified for the decline in productivity growth, may signal the possibility of progress in the future. The crisis-related effects will tend to fade away and the time lag between the economy's digital transformation and its impacts suggests potential productivity gains yet to materialize. In this context, setting the conditions for the expansion of demand and investment and for better usage of the benefits with digitization seems to be the way to reverse the overall decline in productivity.

An additional interpretation for the observed decline in productivity partially attributes it to measurement error[8]. This error would essentially be related to the difficulty in assessing productivity in the ICT services sector, since improvements in the quality of these services do not necessarily translate into higher prices, which would tend to underestimate productivity. However, Syveson (2016) finds it difficult to reconcile this interpretation with the empirical evidence to the extent that the ICT sector is not significant enough to explain the magnitude of

[8] See, for example, Byrne *et al.* (2016) and Hatzius and Dawey (2015)

the observed decline and, furthermore, there seems to be no evidence of a stronger correlation between this decline and the relative weight of this sector in the various countries.

The expansion of the service sector, on average less productive than industry, is another factor that may contribute to explain the decline in productivity growth (Sorbe *et al.*, 2018). Although a reversal of this trend cannot be expected (given the greater importance of intangible assets and the fact that the consumption of services tends to increase with an aging population and higher levels of income), there is, however, scope for increasing productivity of this sector through better application of new technologies and reforms aimed at improving competition and the internationalization of the sector.

The decoupling of productivity and wages growth is another phenomenon that has been accompanying the decline in productivity growth. In particular, wage growth in real terms has been lower than productivity growth, translating into a reduction of the share of output distributed in labour income. According to the International Labour Organization[9], the weight of labour income in the economy has declined in 91 of the 133 countries analysed, especially since 1980.

According to Schwellnus *et al.* (2018), the lower correlation between productivity and wages can be attributed to changes in the productive process made possible by technological progress and the expansion of global value chains. These changes, by allowing a greater substitution between capital and labour, reduce the relative demand of less skilled workers, thus contributing to the reduction of the labour cost component in value added, but also to an increase in wage inequalities. The dissociation between the productivity and wages growth of a typical (median) worker would result in increasing wage inequality (increase in the median wage) and the growing gap between productivity per worker and average wages).

This phenomenon can also be explained by institutional or structural changes in the economy. Pasimeni (2018), based on data from 34 countries over the last 50 years, concludes that wage stagnation is also the result of structural changes in labour markets, namely the loss of workers' bargaining power (*e.g.* lower collective bargaining and unionization).

The relative stagnation of labour income may also have a negative impact on aggregate demand and consequently on productivity and growth. Onaran and Obst (2016) analysed the effect of a wage increase in 15 European Union countries and concluded that there was a positive impact on domestic demand and economic growth in most countries, including Portugal. This effect would result from the fact that the increase in consumption resulting therefrom would more than offset the negative effect on investment and exports. This effect would be greater if the wage increase is synchronized between several countries.

III.2 Determinants of the productivity of the Portuguese economy

Since the end of the 1990s, the evolution of productivity and growth of the Portuguese economy has contributed to the deepening of the differential of income and standards of living between the country and the European Union. Although reductions in interest rates and increased access to finance in the run-up to the financial crisis enabled investment growth, a poor allocation of

[9] ILO Global Wage Report 2016/17: Wage inequality in the workplace.

resources, as evidenced by Reis (2013) and Dias *et al.* (2015), limited its impact on the productivity of the Portuguese economy. In fact, much of the investment in the pre-crisis period has been directed towards the non-tradable (*e.g.*, real estate) sectors which are by definition less exposed to international competition and thus, typically less productive.

Despite some progress in recent years, following a series of reforms implemented under the Economic and Financial Assistance Program, the Portuguese economy is still characterized by vulnerabilities that limit higher productivity gains [10].

Even though productivity can also be determined by demand-side factors, as evidenced by the impact of the financial crisis on the overall decline in investment – particularly in Portugal – supply-side factors generally play a larger role in explaining productivity differentials across countries. Indeed, increased globalization and greater integration in international trade can partially mitigate the negative effects of domestic demand on productivity. Thus, the factors that determine the ability to take advantage of technological change, or to compete in the international markets, are key explanatory elements to the differences in productivity observed between the various countries [11].

Among the main determinants of productivity are the external factors (outside the firms' control), related to product and labour market flexibility, regulation, the level of market competition, which are largely explained by economic policies, and the internal factors, which can be promoted by efficient policies but are essentially under the control of entrepreneurs, such as job qualification, management and investment decisions, particularly in research and development.

External factors, such as the degree of competition, act indirectly on productivity, by affecting producers' incentives, the selection of firms in the market, resource allocation and knowledge diffusion and technology transfer between firms.

The large disparity in productivity among firms in the same sector, even when sectors are narrowly defined, suggests that the factors intrinsic to the firm are also relevant to productivity. These disparities may also provide evidence that the positive externalities that arise from knowledge and technology transfers may not be working properly.

There are some empirical studies that analyse the relative importance of several determinants of productivity in the Portuguese economy. According to Branco *et al.* (2018), innovation, qualification of workers and financial soundness would be the most significant determinants of productivity in the services sector. For industry, the size of the company, exports and training expenditure would be the main determinants (Gonçalves and Martins, 2016).

According to Fernandes *et al.* (2018), the results of ex-post evaluation studies of policies implemented in Portugal point to positive effects on productivity, both in the short and long term, of reforms aimed at deregulating the product market, improving the insolvency regimes, and in areas related to the financial system, tax payments and innovation. In addition, measures in policy areas such as health, primary education, higher education and vocational training and

[10] See Pinheiro Alves (2018) for an analysis on the evolution of the productivity of the Portuguese economy.
[11] See Syverson (2011) for a review of the literature on the determinants of productivity.

business environment (*i.e.*, procedures for starting a business), despite negative short-term effects, have positive effects on the long- term.

The European Commission (2018a) points to the low level of qualifications of the workforce, enterprise size, the low level of investment and inefficiencies in product and labour markets as the main barriers to productivity growth.

III.2.1 Services and product markets

Adequate regulation can foster greater market competition and efficient resource allocation. Increased competition by introducing rivalry between firms is an incentive for more efficient production and higher quality products at a lower price. Moreover, competition has underpinned a Darwinian selection mechanism that can lead to the exit of less efficient firms, thereby increasing overall productivity. The lack of barriers to entry and exit allows the more dynamic and productive companies to replace the less efficient, thus giving rise to a better resource allocation.

It should also be noted that not all sectors are exposed to regulation in the same way. In product markets, in addition to direct exposure, a sector may be exposed indirectly through the use of intermediate goods or production factors from regulated markets.

Portugal has received several recommendations from international organizations (IMF, OECD and European Commission) to implement structural reforms aimed at greater flexibility in labour and product markets with the aim of increasing productivity and competitiveness. Indeed, the Economic and Financial Assistance Program, following the euro area sovereign debt crisis, envisaged an extensive reform program in these areas.

It is often difficult to empirically verify the outcome of structural reforms or the impact of regulation on resource allocation. According to Andrews and Cingano (2013) these reforms are often implemented gradually or partially and their impact depends not only on the regulatory changes made, but also on the degree of compliance and on the coherence between various types of reforms. However, the indicators available to characterize reforms do not generally consider all these dimensions, which tend to limit the analysis of their impact.

There is, however, some evidence of a strong correlation between the regulatory environment conducive to competition and productivity in Portugal (Carvalho, 2018). In addition, there is also a high complementarity between the productivity of the economy and the regulation or the flexibility of markets for intermediate products.

Gouveia, Santos and Monteiro (2017) analyse the impact of changes in the regulation of upstream sectors of the Portuguese economy (*i.e.* that produce goods that are used as inputs by other companies), and concluded that product market deregulation had positive productivity effects in the short term, which are sustained over the long term. These effects were more positive for companies that were further away from the technological frontier, and there was a great deal of heterogeneity in sectoral terms. The study also concludes that these reforms have promoted a more efficient allocation of resources by encouraging the exit of less productive companies, increasing the resilience of the economy to adverse shocks.

This result is consistent with Conway and Nicoletti (2006) who, with an analysis of several countries, concluded that regulation has direct effects on productivity, in particular in the services sector, but also indirect effects, arising from the fact that services are intermediate products in the production processes of other sectors.

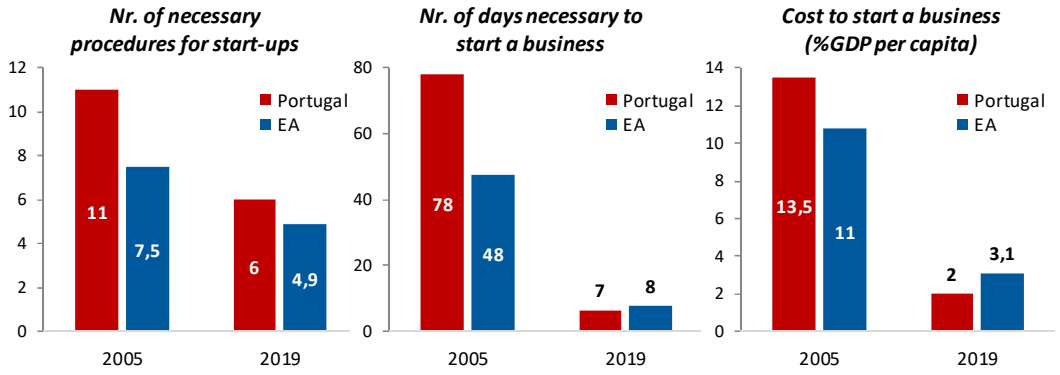
Distortions to market competition can take various forms, from barriers to entry or exit or other barriers that limit the functioning of market mechanisms.

Barriers to entry are the first source of market imperfection or distortion of competition that a company may face. Indeed, these barriers tend to protect existing firms and inhibit the market mechanisms through which increased competition would lead to lower production costs, lower prices and greater efficiency. Barriers to entry can take many forms, ranging from complex bureaucratic procedures, capital and licensing requirements or high entry costs. Barseghyan (2008) presents empirical evidence on the significant negative impact of increased input costs on firm level productivity.

Complex administrative procedures or high entry costs can be measured through World Bank *Doing Business* indicators, which measure the number of procedures, the number of days to execute them, and the costs of setting up a business.

This type of barriers decreased significantly in Portugal, helping to reduce or even reverse the differential compared to the euro area average (figure III.1)[12].

Figure III.1 Administrative procedures necessary for setting up a business



Source: Doing Business, World Bank

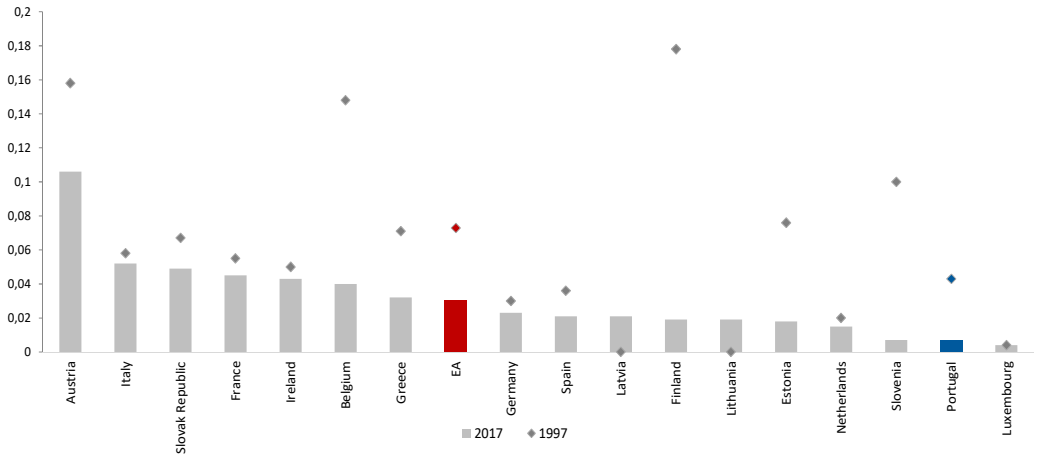
Simplifying and reducing barriers to entry may have contributed to the high growth of small and medium-sized enterprises in Portugal over the last few years (Portugal recorded a 13.8% average new business creation rate between 2008 and 2016, above the average of 9.76% registered by the Euro Area[13]).

An additional relevant indicator is the *FDI Regulatory Restrictiveness Index*, calculated by OECD, which examines regulatory barriers to foreign direct investment. According to this indicator, Portugal is the second country with the lowest restrictions on FDI (figure III.2).

[12] This improvement may be associated with the implementation of measures aimed at reducing and simplifying administrative procedures (SIMPLEX and Zero Licensing Program) and reducing entry costs - Reduction of the initial minimum capital requirement to start up a company from € 5000 to € 1 per partner in 2011.

[13] Source: Eurostat; rate of creation of new companies evaluated on the number of active companies in each year for the sectors of activity B-K;

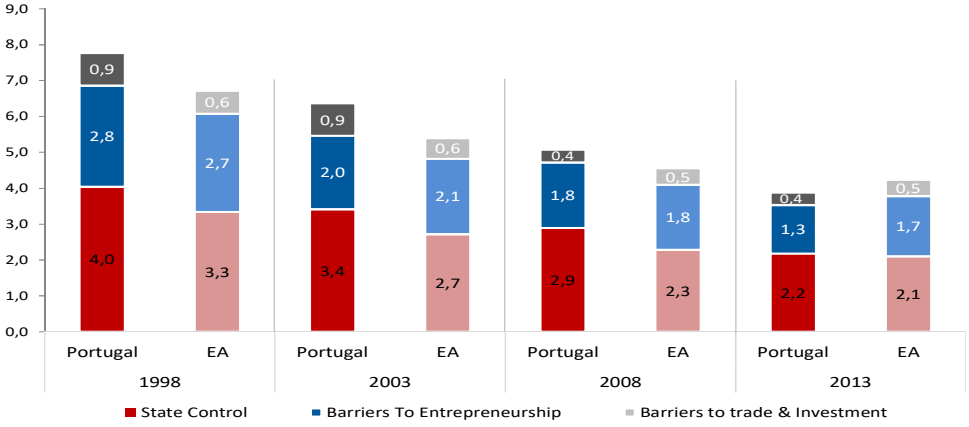
Figure III.2 . FDI Restrictiveness Index



Source: FDI *Restrictiveness Index*, OECD | Note: Database does not include Malta and Cyprus

Barriers to market flexibility also appear to have registered a significant decline assessed by the market regulation indicator, as computed by the OECD, which examines a broader set of regulation and barriers to competition such as barriers to entrepreneurship, trade or the degree of state intervention (figure III.3)[14]. Notwithstanding the general improvement in all indicators, particularly significant were: the reduction of distortions related to state involvement, due to the reduction of price controls; and the reduction of barriers to entrepreneurship, through the simplification of legislative procedures and the improvement of the licensing systems in various sectors.

Figure III.3 Market Regulation Indicator – Product Market Regulation



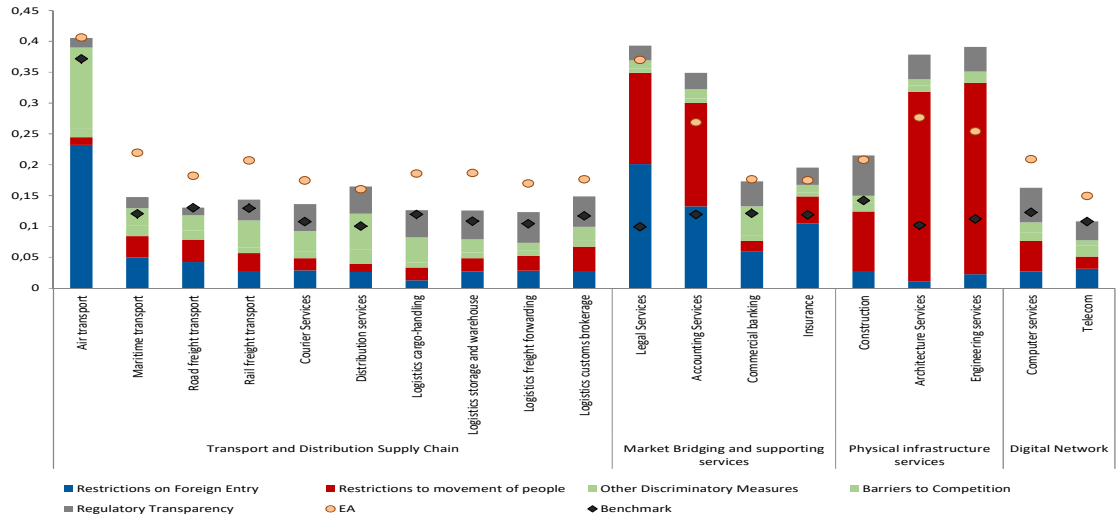
Source: OECD

There are, however, sectors still constrained by distortions to competition, such as support services (*e.g.*, legal advice and accounting) and services associated with physical infrastructure (*i.e.*, construction, architecture and engineering). These sectors are particularly affected by

[14] Product Market Regulation is an indicator developed by OECD every five years that assesses the efficiency of each country's economic regulations to promote competition in product markets. The PMR indicator for each country is composed by the average of three indicators: State Control, Barriers to Entrepreneurship and Barriers to Trade and International Investment. The indicators assume values between zero (least restrictive) and six (more restrictive).

restrictions to movement of people and restrictions on foreigner entry (in the case of support services) - figure III.4.

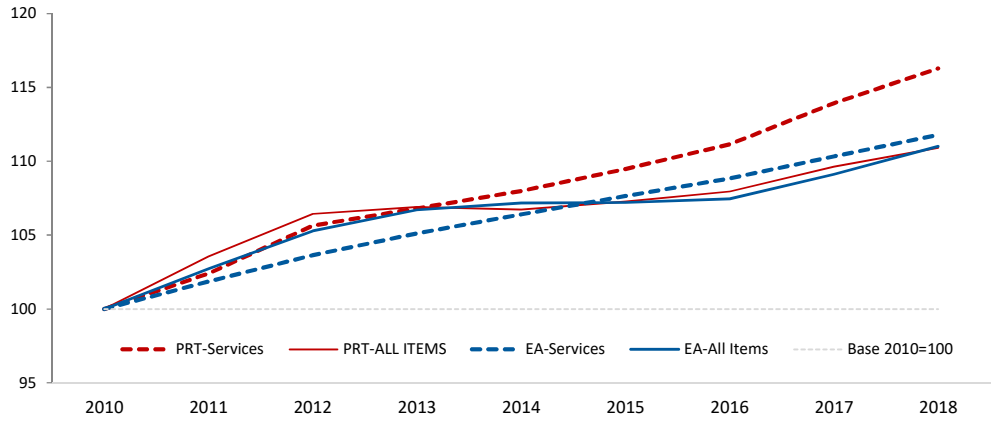
Figure III.4 Restrictions on competition, by sector and type of restriction [15] – 2017



Source: OECD

The costs of these services are an important factor for the competitiveness of the economy, not only in this sector, but also in the industries that uses them as inputs. As shown in Figure III.5, the prices of services in Portugal have increased at a faster pace than the other prices and the prices of services in the euro area, which may reflect a low level of competition resulting from the restrictive regulation in these sectors.

Figure III.5 Prices of services



Source: Eurostat

Bureaucracy and associated administrative costs are also an important obstacle to the proper functioning of the market and hamper the competitiveness of enterprises.

According to the *Doing Business* indicator of the World Bank, which assesses for several countries (based on composite indicators), the costs to companies resulting from bureaucracy,

[15] STRI indicator assumes values between 0 and 1 (where 1 corresponds to a market with greater restrictions on competition.

Portugal achieved a positive evolution in the reduction of the time and costs associated with the interactions between the firms and the State, approaching the average of the Euro Zone partners (figure III.6). In the period between 2010 and 2019, improvements in the processes of obtaining construction licenses, in international trade, in getting electricity, in property registration and in the payment of taxes stand out positively. This positive evolution could be associated with the implementation of the SIMPLEX and SIMPLEX + programs, in a context of administrative modernization.

However, despite the progress accomplished, there are still important obstacles to the Portuguese business environment, highlighted by the ranking of Portugal in some of these categories. In particular, in what regards the legal framework on corporate credit[16], Portugal takes the 112th place in a ranking of 190 countries. The inefficiencies identified in the legal framework hinder the acquisition of credit by companies, with negative effects on investment and on the allocation of resources in the economy.

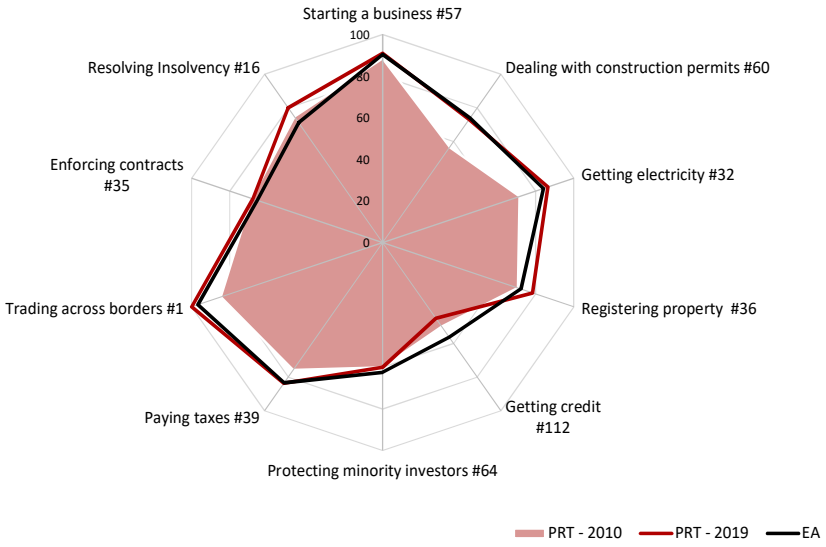
Another important obstacle to the proper functioning of the Portuguese economy is the functioning of the judicial system. Although Portugal is not ranked poorly globally in the composite indicator on compliance with contracts (35th position), a more detailed analysis shows that the resolution of a dispute requires on average more time than in the Euro zone (755 days in Portugal compared to 661 days in the euro area).

Finally, the complexity of the Portuguese tax system with negative implications for the companies' operating costs is also highlighted. Portugal is the Eurozone country whose companies report the highest estimated time to comply with tax procedures.

These results are consistent with the latest data by INE on context costs (bureaucracy), with the judicial system, licensing and tax system being identified by companies as areas of greatest obstacles to business activity. According to the results of an estimation exercise on the determinants of gross value added per worker, the variable associated with the context costs faced by the companies has a significant negative impact on labour productivity (INE, 2018).

Figure III.6 Restrictions on the operation of markets (*Doing Business*)

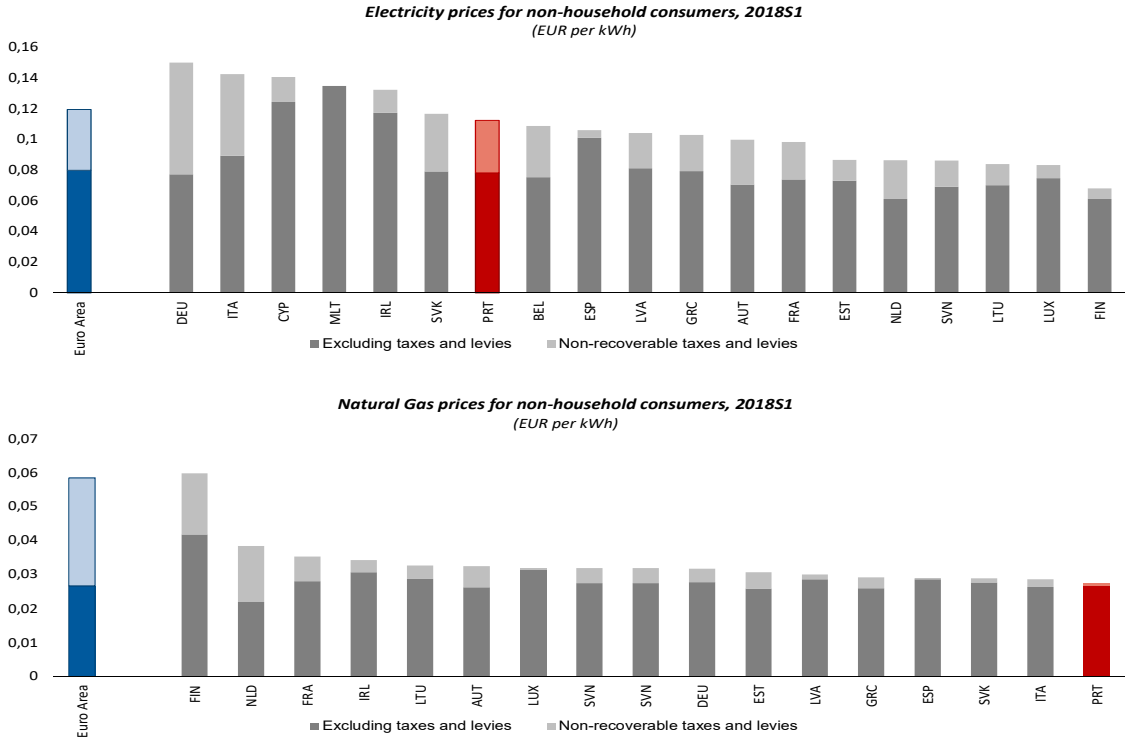
[16] This indicator assesses whether the legal framework has certain specifications (defined by the World Bank) that facilitate the acquisition of credit by companies; and the sophistication, scope and application of national credit registries.



Source: Doing Business, World Bank

Energy costs have a particularly significant impact on the competitiveness and production costs of the most energy-intensive industries. Electricity costs are particularly penalizing for Portugal, which is the 7th euro area country with the highest price for the industry (figure III.7). The highest price is essentially due to taxation (around a third of the price is attributed to VAT and other taxes and fees not recoverable by the company), as the base price is more competitive (11th and below average). Regarding natural gas, Portugal is the country with the lowest prices for the industry.

Figure III.7 Energy prices



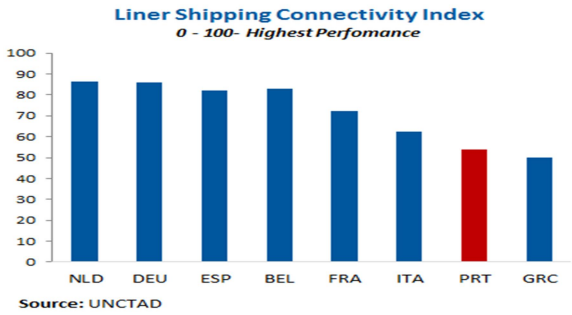
Fonte: Eurostat | Definição de non-household consumer segue o critério do Eurostat

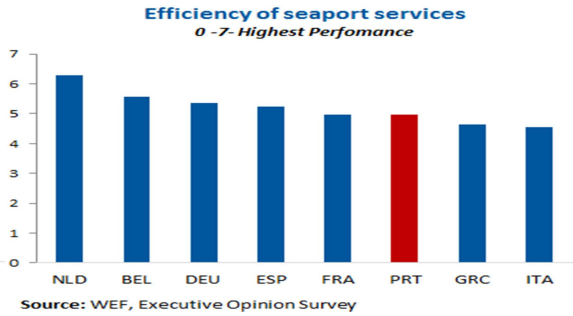
The quality of the infrastructures, in particular transport, is also important for the productivity and internationalization of enterprises.

In order to assess the capacity of transport infrastructures to meet the internationalization needs of Portuguese companies, two types of indicators are considered: (i) an objective indicator that assesses the capacity and accessibility of transport; and (ii) an indicator on the perceived quality of infrastructures, based on a survey of the business community. As illustrated in Figure 8, Portugal compares relatively well with the more competitive countries in the field of road infrastructure, however, problems persist in other modes of transport that suggests the need for reform, particularly in rail and maritime transport. In particular, with regard to maritime transport, Portugal does not appear to be taking advantage of its strategic geographical position as an entry point on transatlantic routes.

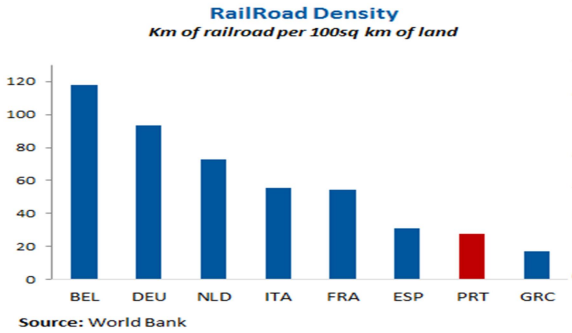
Figure III.8 Quality of infrastructures

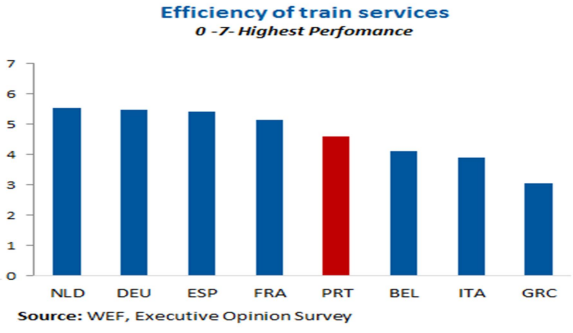
Sea Transport Infrastructures



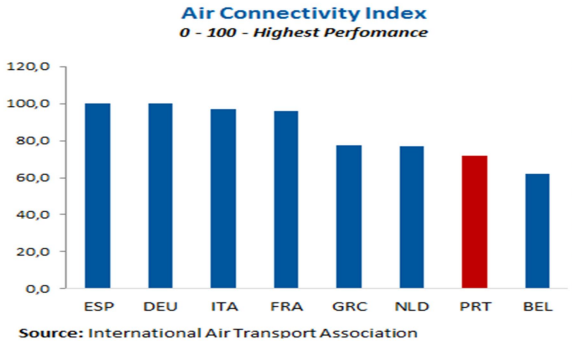


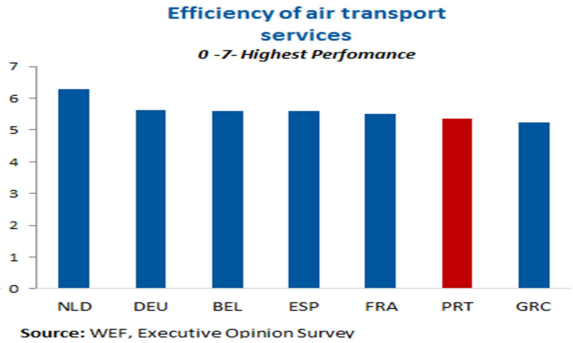
Railroad Transport Infrastructures



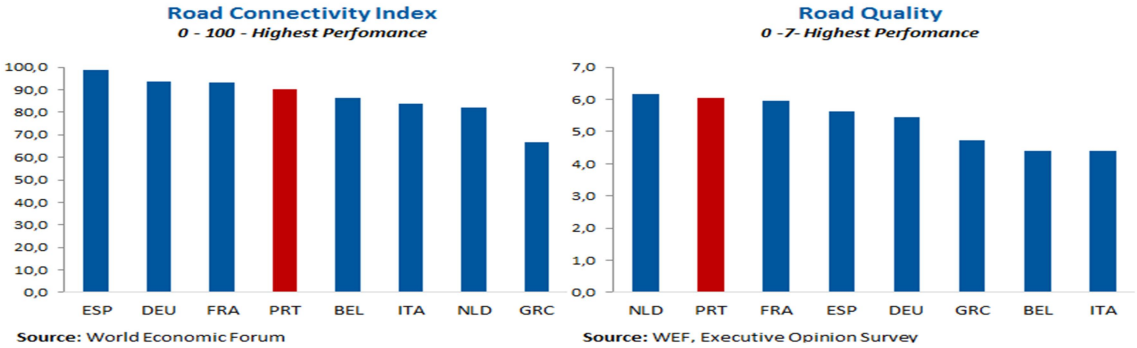


Air Transport Infrastructures





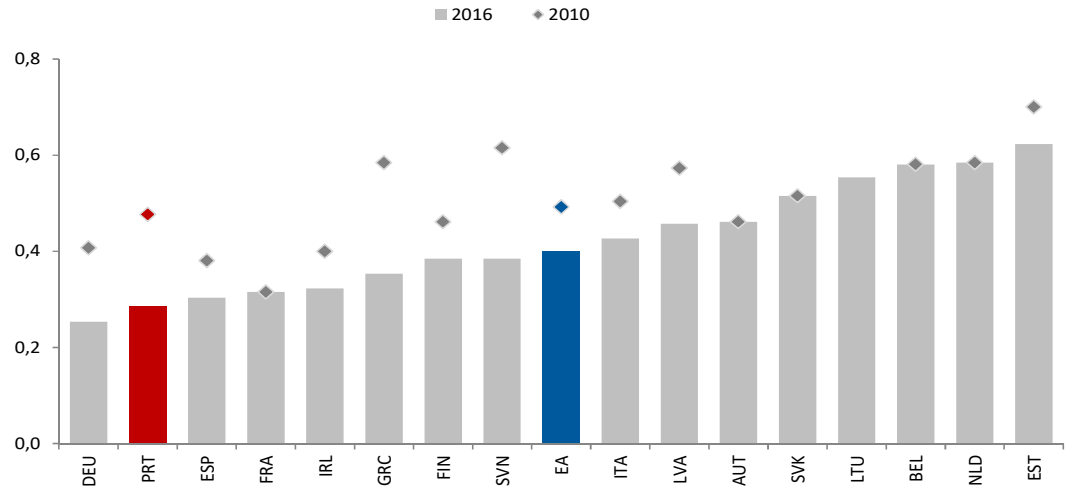
Road Transport Infrastructures



The exit barriers constitute another common barrier to market competition. These barriers tend to hinder the exit of companies in difficulty, or operating for several years with negative profitability, thereby negatively affecting productivity. There are several studies that attribute part of the observed decline in productivity and a deficient allocation of resources to the prevalence and the continued bank financing to this type of companies (*zombie firms*)[17].

The efficiency of the insolvency regime is often used to assess the existence of these types of barriers, and according to this indicator, the improvement in Portugal over the last years is also visible. This result may be associated with measures implemented in the context of the economic and financial assistance program that involved the reform of the insolvency code, the implementation of the Special Revitalization Program (PER) and the Extrajudicial System for the Recovery of Companies (SIREVE).

Figure III.9 Insolvency regime indicator (OECD)[18]



The impact of competition on innovation and productivity is a subject of abundant analysis, without, however, a great consensus in the economic literature on the causality of these effects.

[17] See for example, Gouveia and Osterhold (2018), Andrews and Petroulakis (2019) and Osório de Barros *et al.* (2017)

[18] *Insolvency Regimes Indicator* assumes values between 0 and 1; 0 corresponds to an efficient legal insolvency regime..

In theory, the incentive to efficiency resulting from increased competition should also have an effect on innovation, which allows the introduction of new products the market, the improvement of quality and the reduction of production costs and prices. However, these effects may not be linear, depending on the initial level of competition and innovation.

For Schumpeter (1934) the positive relationship between competition and innovation would only exist for low levels of competition (some market power). When competition is high, companies would be discouraged from innovating. Arrow (1962), on the other hand, considered that in a monopoly situation incentives to innovation would be lower because the incentive to supplant competitors ceases to exist. For Aghion *et al.* (2005), a greater degree of competition would lead companies closer to the technological frontier to innovate in order to outperform competitors, while companies further away from the technological frontier would be discouraged from doing so. Boone (2001) also considers the existence of a non-linear relationship between competition and innovation: a low level of competition, by allowing less efficient firms to exist, reduces the incentive for innovation. On the contrary, with a more aggressive level of competition, only the most efficient companies survive, with more incentive to innovate as competition intensifies.

Santos *et al.* (2018) in an analysis based on Portuguese companies found a non-linear (U-shaped) relationship between competition and innovation, consistent with Boone (2001). These results imply that from a given degree of competition, intensification of competition would lead firms to innovate to overcome the resulting pressures. Regarding productivity, the analysis showed a negative relationship between competition and labour productivity, but positive when the total factor productivity was considered - this effect was not, however, immediate, but observed with a 1 year lag. This lag results from the fact that factor productivity, because it is less dependent on the endowment of a given productive factor, is more directly related to technological progress, whose development and implementation takes time. The negative effects of innovation on labour productivity can be explained by the fact that innovation at product level (rather than innovation at the level of the production process) generally has a lower impact on labour productivity and may even have a negative effect if the production of new products implies a greater change in work practices.

The agglomeration of companies and the impact on productivity is also a subject of extensive literature. This impact would explain the existence of industrial clusters or the concentration of several industries in the same location. Agglomeration economies are the result of economies of scale and network/interconnection that occur when companies are located nearby.

The concept of agglomeration was introduced by Alfred Marshall and would result mainly from three factors: (i) greater availability of skilled workers (as the increased concentration of firms in certain sectors in a region would encourage workers to specialize in this area), (ii) greater supplier specialization (as cluster suppliers would be more likely to make appropriate investments in the industry), and (iii) greater information flows between competitors resulting from the diffusion of technology and knowledge.

According to Jorge and Rocha (2018), this impact of agglomeration on productivity can be seen as the result of two types of externalities: specialization (between companies of the same industry) or urbanization or diversification (between different industries in the same region). The externalities of specialization would essentially result from the diffusion of technologies

and knowledge and from the concentration of suppliers and skilled workers in the region, thus allowing a reduction of transport costs and the training of workers. Externalities associated with urbanization or diversification may result from sources of diffusion of knowledge outside the industry, the existence of a transport network, communication and other quality infrastructures, proximity to other markets and access to specialized services in a diversified area.

The effects of these externalities are not, however, uniform across firms or within a time horizon. Specialization externalities tend to have short-term effects, while the externalities arising from urbanization tend to be more relevant in the long term.

Holl (2004), in an analysis with data on the birth and displacement of companies in Portugal between 1986 and 1997, concluded that the factors that determine the location of companies differ according to their type, in particular, age. Start-ups would be particularly influenced by the size of the market, workforce qualification, labour costs and a diversified business environment. Existing companies would prefer the existence of specialized services and greater access to the national market.

The advantages of agglomeration are also evident in the strategy for competitiveness supported by clusters, defended by Michael Porter in the 1990s and applied to several countries, including Portugal. According to this strategy, increased competition and the presence of several companies in the same market would provide an incentive for innovation and higher productivity.

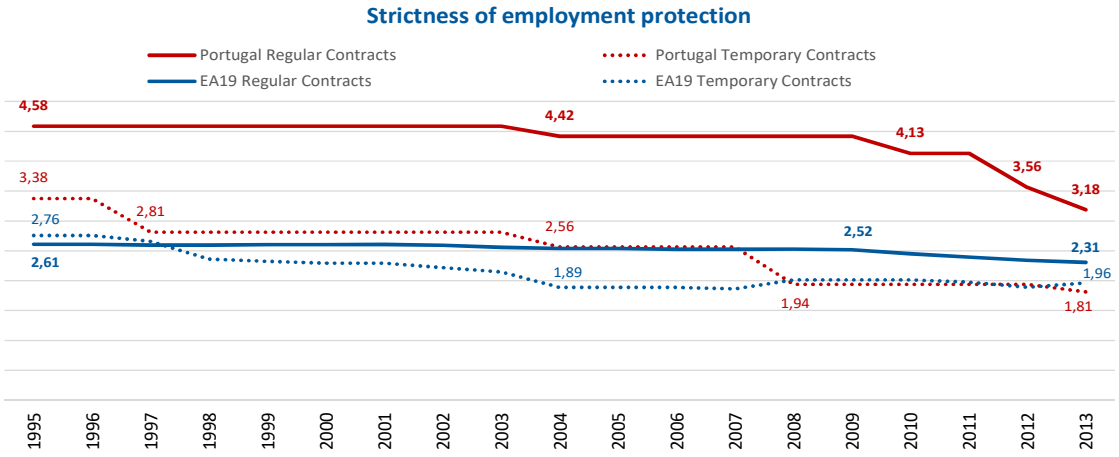
III.2.2 Labour market

Regulation of the labour market, especially with regard to employment protection, is generally considered to be an important determinant of productivity. In theory, a more flexible (less regulated) labour market can promote an efficient allocation of resources and reduce existing mismatches between supply and demand, taking into account the needs of each company and the qualifications of the workers. However the empirical evidence is not always very conclusive about the impact of regulation on productivity. Betcherman (2013) analyzed the effects of labour market regulation in 150 countries, and concluded that the effects of less regulation on efficiency are uncertain, can occur in any direction, and even when observable, are generally modest. However, as pointed out by the author, this conclusion may result from the fact that the regulatory changes did not always address the market imperfections that were aimed at or from the inefficiency of the institutions responsible for their implementation.

On the other hand, it should also be considered that not all sectors or companies are exposed to regulation in the same way. In particular, exposure to employment protection legislation depends on the degree of labour intensity of the firm and on the propensity to fire in response to supply or demand shocks.

The labour market in Portugal exhibits a relatively high segmentation, marked by the coexistence of workers with permanent contracts, and a level of employment protection much higher than the euro area average, and workers with temporary contracts (22% of the total in 2017) and with a more precarious employment situation..

Figure III.10 Restrictiveness in employment protection



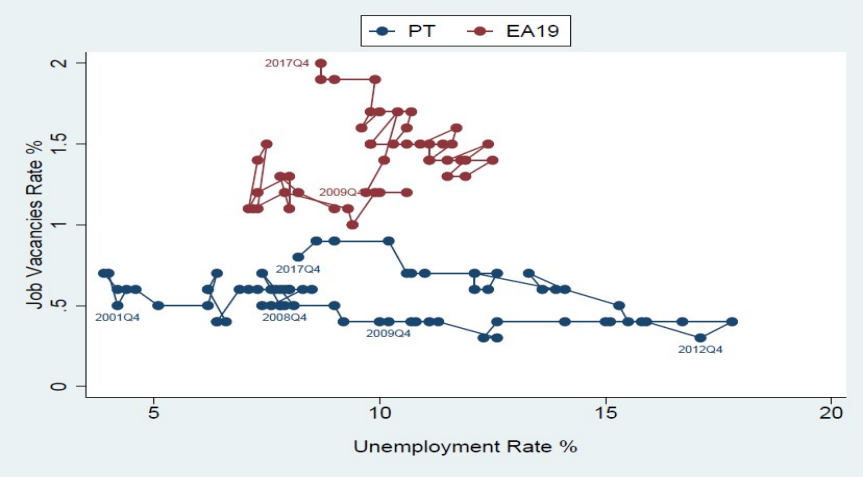
Source: OECD

Segmentation in the labour market can have consequences for equity and efficiency. Much of the adjustment needed due to demand shocks is usually made at the expense of the least protected market segment[19]. In addition, segmentation can be a barrier to labour mobility and affect incentives to workers' qualification.

The gap between the availability of unfilled jobs and unemployment is an important indicator of market efficiency in resource allocation. This relationship is illustrated through the Beveridge curve. Under normal conditions, the curve should have a negative slope, as it would be expected that a further expansion of economic activity would result in a greater demand for work by firms and, consequently, a reduction in the unemployment rate and an increase of available jobs; by contrast, a recession would lead to the opposite situation. However, in markets with distortions this correspondence between job availability and hiring may not function properly due to information gaps or a mismatch between the characteristics (qualifications) of workers and the demands of the market. As can be seen in Figure III.11, the period between 2012 and 2017 seems to illustrate an evolution more compatible with the expected slope of the Beveridge curve, compared to the previous period, when the supply of jobs remained low and relatively stable despite significant variations in the unemployment rate. In the euro area, the relationship between the two variables is more normal over time, except in the period near the financial crisis.

Figure III.11 Beveridge Curve

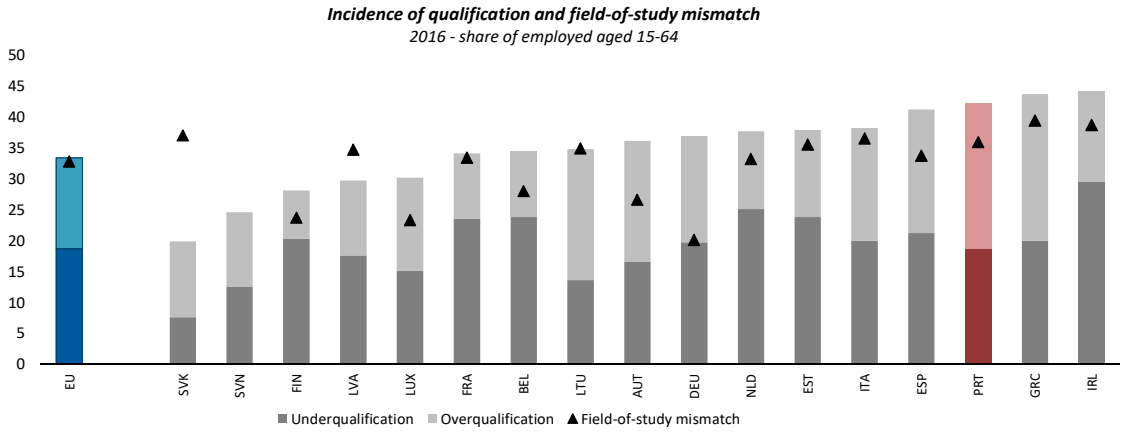
[19] As unemployment increased as a result of the financial crisis, the proportion of temporary employment in the total working population fell from 22.7% in 2008 to 20.5% in 2012, implying a proportionally higher adjustment costs for that segment of the labour market.



It should also be noted that, regardless of the period considered and the observed unemployment rate, the rate of available and unfilled jobs in Portugal is always lower than the rate in the euro area. Although a curve closer to origin is indicative of greater efficiency (as it illustrates smaller mismatches between excess demand and supply of labour), it may also be a reflection of the market size (across the euro area, mobility of workers is naturally lower allowing higher mismatches between supply and demand) or of the lower requirement standards to allocate workers with specific qualifications to each job.

In fact, Portugal is the third country in the Eurozone with the greatest gap between the qualifications of human resources and the demands of the job (figure III.12). In particular, 23.6% of workers are considered to be overqualified for their functions. The Portuguese labour market also presents one of the highest percentages of workers with mismatches between areas of qualification and the job requirements. The high segmentation in the labour market, as it constitutes an obstacle to mobility, contributes to these mismatches, harming the efficient allocation of resources.

Figure III.12 Labour market mismatch

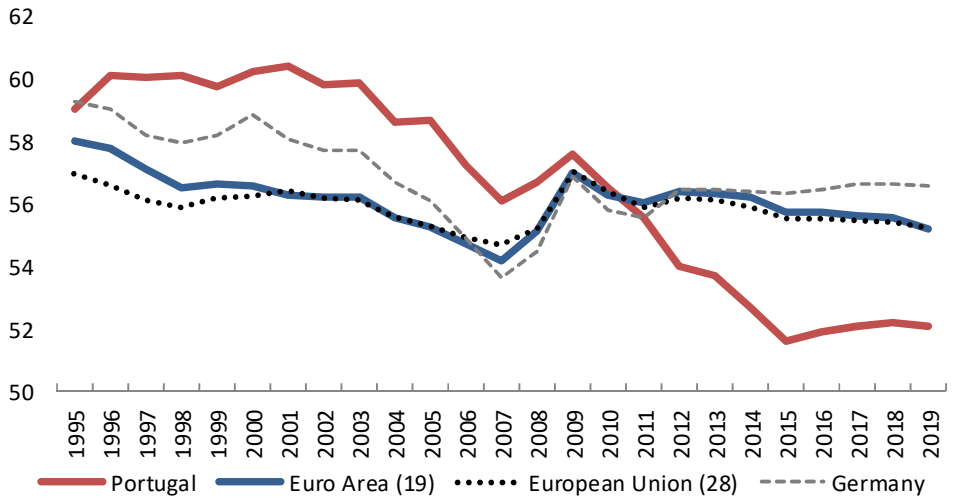


Source: OECD

The overall trend of decoupling between productivity growth and wages has also been particularly significant in Portugal, with a sharp drop in the GDP component allocated to labour in the last two decades: more than 7 percentage points higher than in any other euro area

country (figure III.13). Between 2000 and 2016, the largest cumulative reduction in unit labour costs occurred in Portugal - the only country to have a real reduction in remuneration per worker (European Commission, 2018).[20]

Figure III.13 Labour income (adjusted) as a percentage of nominal GDP



Source: AMECO.

Based on administrative data from companies in Portugal between 2010 and 2016, Azevedo and Mergulhão (2019) analyse the determinants of the gap between apparent labour productivity and wages. The study shows that deregulation of the labour market, the percentage of atypical contracts (*i.e.* temporary, part-time and self-employed) and the remuneration of the corporate bodies over total wages tend to widen the gap. The authors argue that labour market deregulation did not correct segmentation (*i.e.* differences in the level of protection between permanent and temporary contracts), encouraging the use of atypical contracts and leading to an increase in the gap due to negative effects on wages with no apparent effects on productivity. On the other hand, the increase of the minimum wage tends to reduce this gap (for companies in the first half of the distributions of productivity and wages) by means of a higher increase of wages than of productivity.

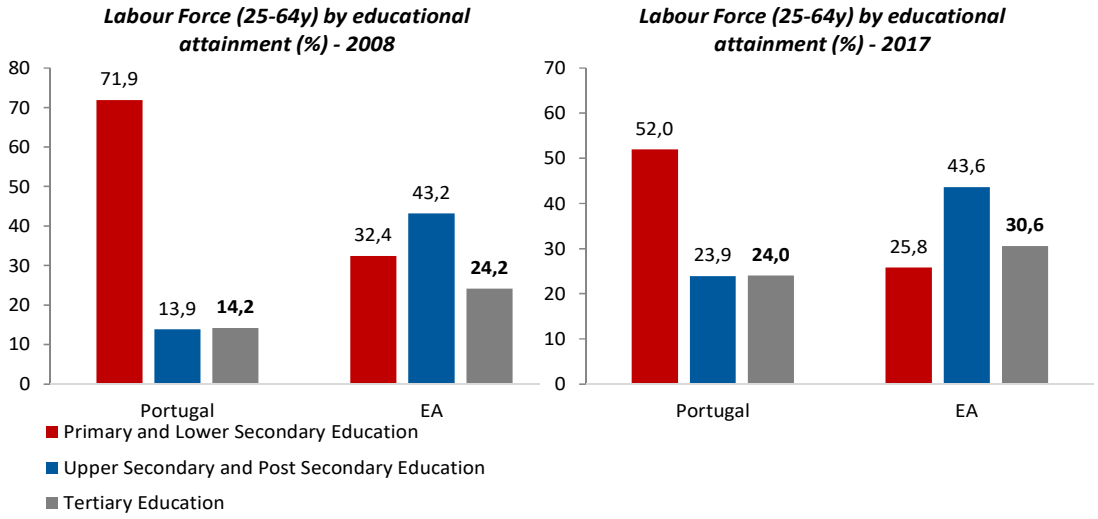
III.2.3 Intrinsic business determinants

The qualification of workers is usually pointed out as one of the main determinants of productivity. In fact, more skilled workers are more able to use more sophisticated technologies and adjust to technological changes. This is particularly relevant in the current international context, characterized by a process of globalization and technologies conducive to greater substitution between labour and capital. As a result, countries with more skilled human resources would be less affected by the overall downward trend of the work component in value added. Several empirical studies have shown a positive impact on productivity associated with improvements in the qualification of human capital (e.g, Gouveia *et al.*, 2017 and Badescu *et al.*, 2011)

[20] For the last two figures, we must bear in mind that Ireland should not be considered, since it suffered a series break in 2015, where the change in the calculation of GDP resulted in an annual increase of 25%

Although the qualification of human resources in Portugal, evaluated by the level of school education, is lower than the average of the European Union, this differential has been reduced (figure III.14). In fact, the differential is essentially persisting in the higher age groups, with the percentage of young people with higher education in Portugal closer to the average of the euro area (figure III.15). Regarding the qualification fields, the high percentage of Portuguese graduates in areas particularly relevant to productivity in industry, such as science and engineering, is noteworthy (figure III.16). However, Portugal has a percentage of adults with basic digital skills (50%) below the EU average (57%) (European Commission, 2018a).

Figure III.14 Education Level (% Pop. 25-64)



Source: Eurostat

Figure III.15 % Population (25-34 years) with a higher educational level

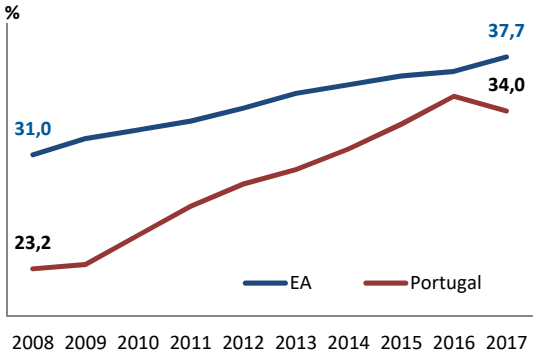
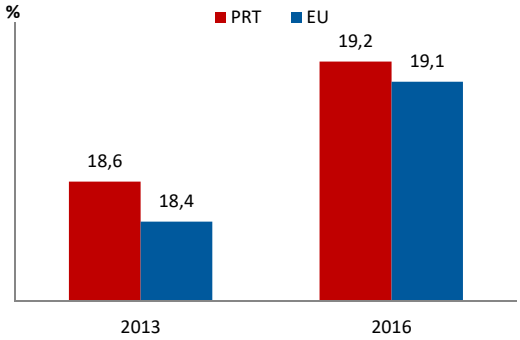
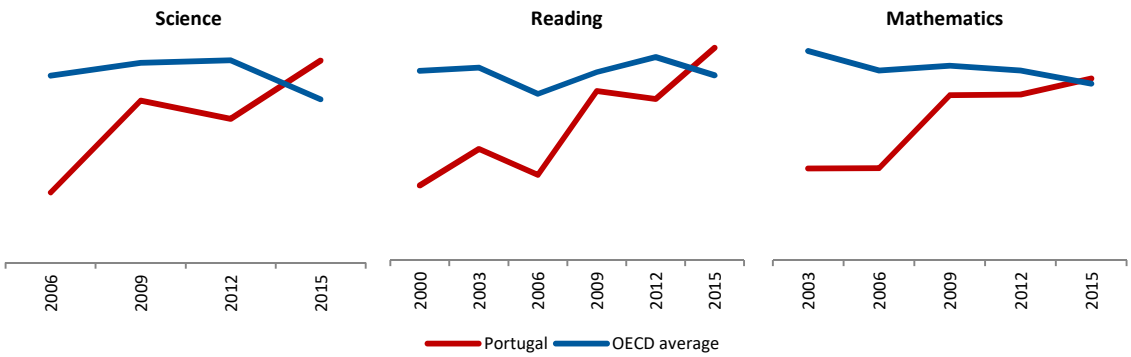


Figure III.16 Graduates in Science, Technology, Engineering and Industry (% of total graduates)



Source: Eurostat | Note: Figure 15, data for EU correspond to 2015.

Figure III.17 PISA test results



Fonte: OECD

The results of the *Program for International Student Assessment* (PISA) also indicate significant progress in education at the secondary level. This test, organized by the OECD, analyses and compares, in several countries, the levels of knowledge of 15 year old students in three areas: reading and comprehension, mathematics and natural sciences. In the test carried out in 2015 (last year with published results) the Portuguese students' scores surpassed the OECD average in the three areas of knowledge (figure III.17).

In addition to formal education, several other factors can contribute to the qualification of workers, from professional training, experience or seniority in the company. However, an analysis of the relative contribution of these factors to productivity is usually limited by the availability of information. Most of the existing empirical studies use wages as a proxy for workers' qualification, thus not allowing distinguishing between the contributions of the various components. Segmentation of the labour market is a factor that may inhibit vocational training, both by workers with a high level of employment protection, who would see few associated benefits, and by term workers, whose labour uncertainty would discourage training very specific to their professional function.

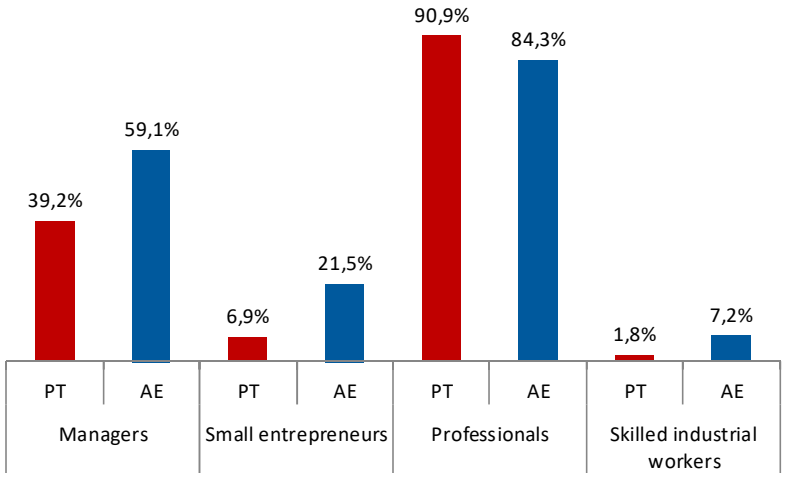
The human capital of entrepreneurs and managers is also considered an important determinant of productivity. These agents are responsible for choosing the optimal combination of factors and intermediate inputs in the production process, technology and investments. Efficient production also requires adaptation to technological change and more skilled entrepreneurs are usually more apt to adapt. In Portugal, the levels of qualification of managers and entrepreneurs, assessed by the percentage with university level education, are much lower than the European average, especially concerning managers of small companies (figure III.18).

Francisco Queiró (2018), based on information on Portuguese companies, concludes that the initial size of the company, the growth cycle and productivity are determined by the level of qualifications (education) of entrepreneurs. In particular, an additional year of schooling for entrepreneurs would be associated with a productivity increase of 5%. The positive relationship between entrepreneurs' schooling and productivity is more significant for higher levels of schooling. According to this study, the educational level of workers in general seems to be a less important determinant.

Bloom at al. (2012 and 2014), analysing several countries including Portugal, also found a strong association between training of entrepreneurs and productivity and that this correlation increased significantly after training actions for entrepreneurs. In particular, the qualification of

managers could account for about half of the differences in total factor productivity across countries. According to Van Reenen (2017), about 30% of productivity differentials between firms can be explained by management practices.

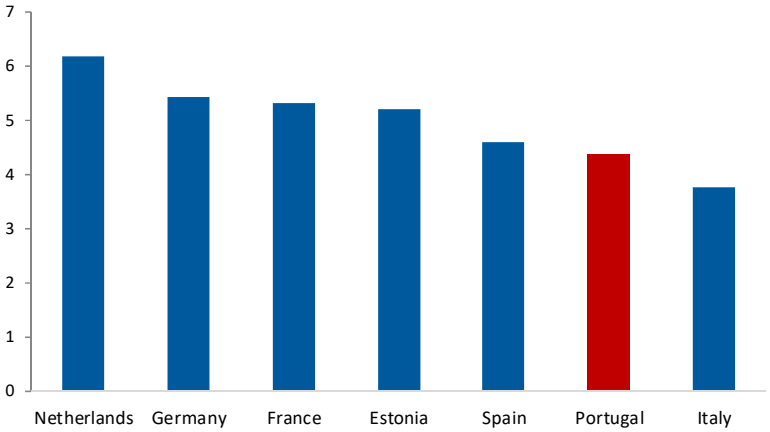
Figure III.18 Level of university education of entrepreneurs and managers



Source: Eurostat

Besides to academic training, it is often difficult to assess management practices. An indicator used is the degree of reliance on professional management, calculated by the *World Economic Forum* through a survey about the selection criteria for management positions: from qualifications and professional merit (classification 7) to family and friendship relations, regardless of the merit (classification 1). According to this indicator, the degree of professionalism of Portuguese businessmen would be comparatively low (Figure III.19).

Figure III.19 Use of professional management | 7 - higher performance



Source: Business Economic Survey, WEF

Innovation and Research and Development (R&D) are, according to several studies, key determinants of productivity gains. Innovation allows more efficient technologies, both in the production process and through improvements in the quality of products and services. In addition, innovation may have positive externalities through the diffusion of knowledge and technology transfer to other sectors or companies. Despite the recognized importance of innovation, there is some difficulty in accurately measuring the magnitude of its impact or the

channels through which it affects productivity. Typically, empirical studies in this area analyse the impact of expenditure on R&D investment, which essentially reflects the innovation-related effort, but not necessarily the result.

Despite the positive evolution in most of the indicators considered relevant to assess the technological progress of a country, the disparity between Portugal and the European Union countries is still visible (Figure 20). R&D expenditure (% of GDP) increased from 0.7% in 2000 to 1.3% in 2017. The number of researchers per thousand employees is higher than the OECD or EU28 average. Capital services in information and communication technologies (per hour worked) grew annually by 11.3% between 1995 and 2013, higher than in Japan, the United States or the United Kingdom (OECD)[21]. However, Portugal has a small number of patent applications, about one-tenth of the OECD average[22].

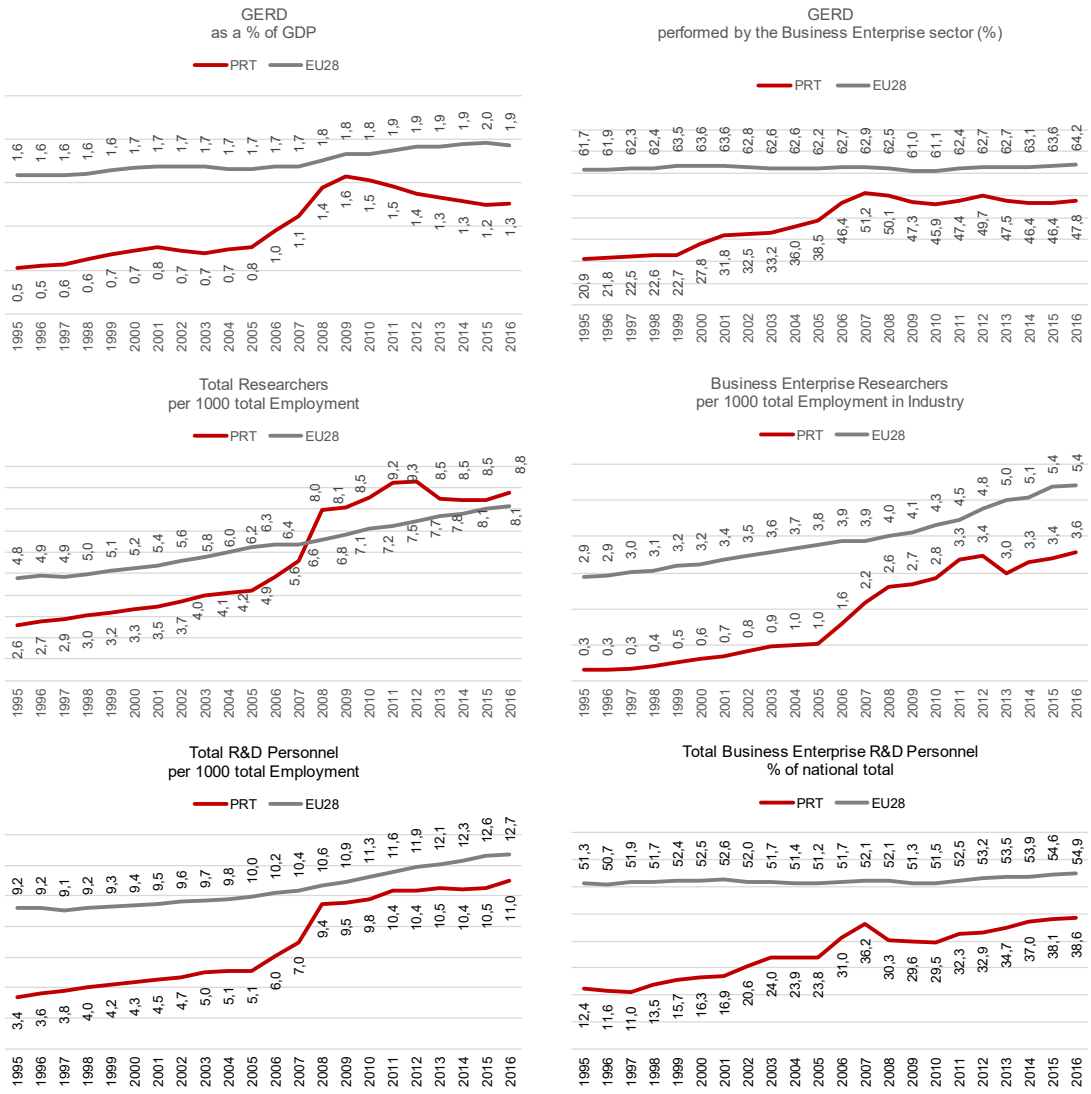
This disparity may be due to the fact that only a small number of Portuguese SMEs have the financial capacity to make such long-term investments and that a relatively large number of small businesses operate in the services sector, where research and technology are less determinant. According to Alexandre *et al.* (2018) more than 50% of companies' R&D investment is carried out by large companies, being very small in micro-enterprises. In sectoral terms, R&D activities concentrate mainly in the sectors of "Manufacturing" and "Information and communication activities", both representing 75% of the total in 2013, with the first experiencing an increase between 2010 and 2013.

Another relevant factor to take into account when analysing the impact of innovation on productivity has to do with the nature of the research and with the interaction between researchers and entrepreneurs. Research in Portugal is still very concentrated in the public sector, especially in universities that have been responsible for a third of patent applications since 2010, and is mostly of a fundamental nature and not applied (Heitor *et al.*, 2014). Collaboration in research activities, either between firms or between firms and universities or research institutions, is relatively low, particularly at the level of small firms (figures II.21 and II.22). However, this type of collaboration would allow for the diversification of funding sources and would steer the activity of the main research centres to the needs of companies.

Figure III.20 Research and Development Performance Indicators

[21] Portugal is still considered a moderate innovator, being the 18th country in the EU28 in the European Innovation Scoreboard 2016. In the perceptions published by the Global Competitiveness Report 2015, Portugal (in 140 countries) is the 26th in "Technological readiness", 21st in "Availability of scientists and engineers ", 18th in" Availability of new technologies ", or 21st in" Quality of scientific research institutions ".

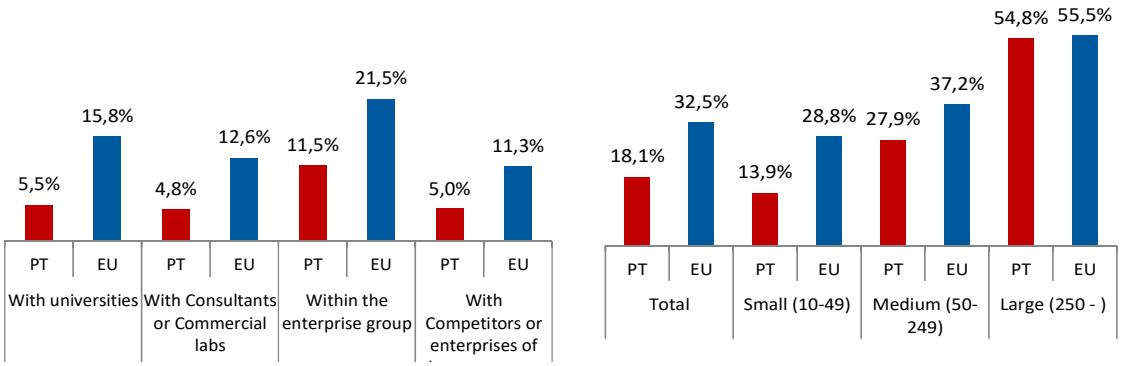
[22] The number of patent applications (by the Patent Cooperation Treaty) by Portuguese entities per 1000 researchers was 4, compared with 38 in the OECD average (values of 2014).



Source: OECD, Main Science and Technology Indicators

Figure III.21 % of companies involved in cooperation projects, by type of partner

Figure III.22 % of companies involved in cooperation projects, by size



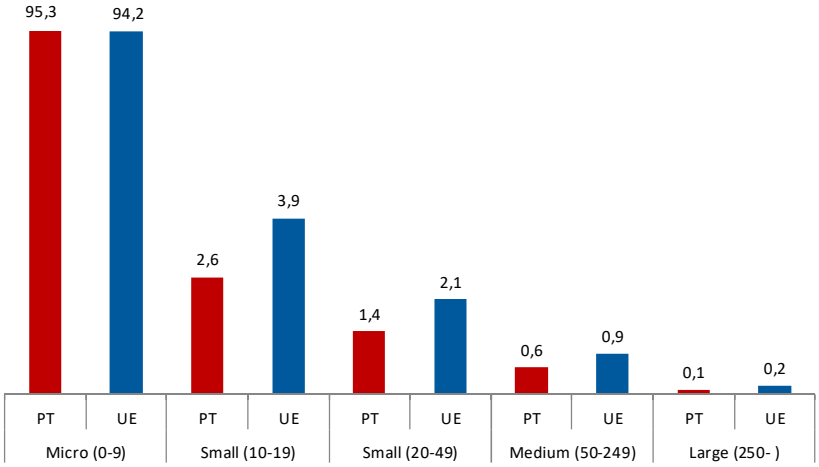
Source: Eurostat | Sectors of economic activity considered: B-M

The small size of companies in Portugal is often pointed out as a limiting factor to the benefits of economies of scale, investment, the adoption of new technologies and, consequently, the achievement of productivity gains. Amador (2011), based on a non-parametric analysis of

enterprise-level data across four different sectors of the Portuguese economy, found that larger firms (taking into account sales volume) tend to have higher levels of capital intensity and this, together with dimension, would determine a higher labour productivity.

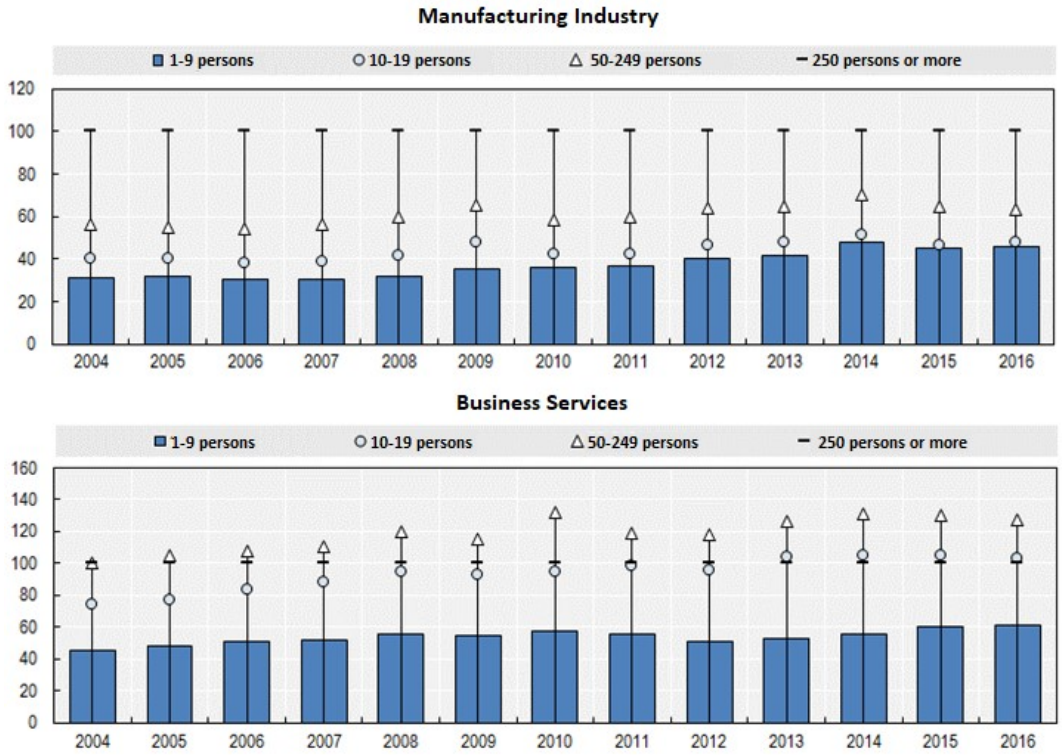
The Portuguese business structure is characterized by a large percentage of microenterprises suggesting the presence of obstacles to the growth of companies (figure III.23).

Figure III.23 Business Structure | 2015,% of total companies



Source: Eurostat

Figure III.24 Labour Productivity (GVA per worker) by size | 250 + = 100



Source: INE, SCIE microdata | 1 Manufacturing Industry: Section C; 2 Business Services: Sections G-N, excluding L.

As shown, size is a relevant factor for productivity in the Industry sector (figure III.24). In the services sector, this relationship is not as striking. The dimension factor seems to determine productivity gains among micro, small and medium enterprises. However, large firms generally have below-average productivity levels.

Difficulties in access to finance and levels of indebtedness condition the investment capacity and productivity of companies.

Corporate financing conditions have improved over the last few years as evidenced by the evolution of corporate debt levels and financial pressure, measured by the weight of interest payments on EBITDA (figures II.25 and II.26). This improvement is also reflected in the evolution of interest rates on new loans to non-financial corporations (from above 4% in 2015 to around 2.5% in 2018) and the percentage of companies with investment limitations (around 60% in 2015 to about 33% in 2018, according to the INE).

Nonetheless, the high level of indebtedness of non-financial corporations (99.7% of GDP compared to 88.3% in the euro area), and the consequent financial pressure, may still be a significant constraint on access to credit.

In this context, the firms' capacity of financing through equity is of particular relevance. Despite the positive evolution, Portugal remains one of the countries whose companies have a lower level of financial autonomy (ratio between equity and total assets - figure III.26). This factor can be explained by the weak development of the capital market in Portugal and by the small size of most companies.

Figure III.25 Financial Pressure (%)

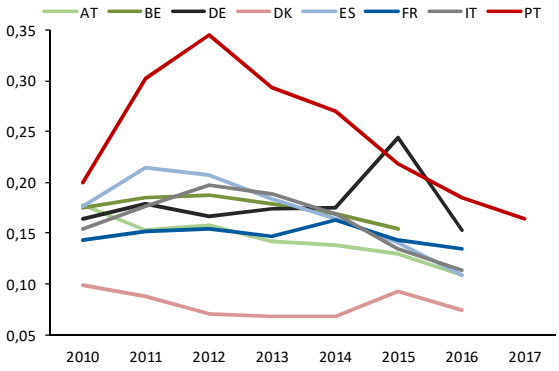
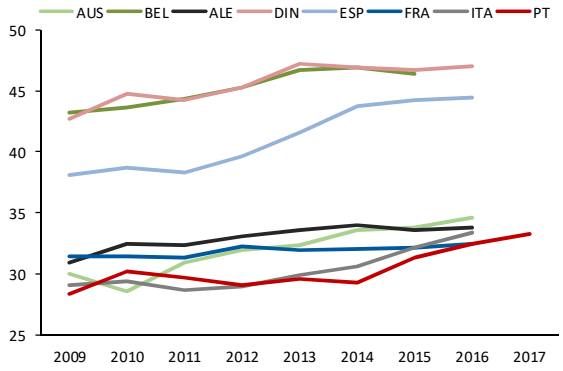


Figure III.26 Financial autonomy (%)



Source: BACH; 2017 data for Portugal: BdP | Notes: Financial Pressure = Interest Supported / EBITDA; Financial Autonomy = Equity / Total Assets

In addition to the financial pressures faced by Portuguese companies, their financing access is also determined by the credit supply conditions in the financial system. Notwithstanding the improvement observed in recent years in terms of the greater capitalization of the financial system and the reduction of the stock of non-productive assets, these factors may still condition the supply of credit. In this respect, it would be useful to examine to what extent the reduction in lending to non-financial corporations, observed over the last few years (figure III.27), is mostly attributed to demand side factors (*i.e.*, on the firms) or to supply side factors (*i.e.*, vulnerabilities in the financial system).

However, there is evidence of improvements in the access to credit of the export sector, which contributes to an allocation of resources to that sector, generally more productive given a higher exposure to international competition.

Given the constraints faced by firms, policy measures to attract foreign direct investment (FDI) may be an alternative to domestic investment.

III.3 Conclusions

In this chapter the main determinants of productivity have been analysed, together with a set of indicators that provide information on the respective stance of the Portuguese economy. As observed, Portugal faces greater constraints, compared to the euro area counterparts, on the qualification of human resources (workers and entrepreneurs), on the level of innovation and R&D investment and on the degree of market flexibility, particularly in the labour and service markets. In addition, vulnerabilities still exist in both the financial system and the financial situation of companies, which restrict the access to credit and the level of investment.

Although the various studies presented throughout this chapter provide a good starting point for understanding the productivity evolution of the Portuguese economy, further research is needed to better analyse the relative importance of the various determinants and the channels through which they affect productivity. These analyses, which allow the definition and evaluation of policies in a more precise way, should be a priority for the Productivity Council.

In this context, studies on the impact of R&D investment on innovation and productivity - by discriminating between type of innovation (*i.e.*, associated with new product creation or greater efficiency of the production process) and sectors - and on the impact of the various components of the qualification of human resources (formal education or vocational training) on productivity could allow a better targeting of existing policies.

In addition, it is important to assess the consequences of the high segmentation of the labour market in Portugal on labour mobility and on efficiency.

IV. Public Policies to promote Productivity Growth

The previous chapters have shown that productivity in Portugal continues to lag behind the average euro-area level. The recovery of the economy will require the improvement of the identified determinants of productivity and public policies can play a crucial role in this context.

Although the policies pursued in recent years have focused on some of the identified determinants, their effectiveness has not been systematically assessed and it is not clear into what extent and in what way were they able to achieve the desired goals.

The aim of this chapter is to identify public policy areas with direct or indirect effects on productivity growth that could benefit from a thorough evaluation. Particularly in the areas of market regulation, business dynamics, education and training, management skills, investment, and research and innovation.

It is important to consider that public policies have three main objectives - efficiency, equity and stability - and that in the context of productivity, the evaluation of public policies examines the better allocation of resources, that is, efficiency. Since the objective of this report is not to examine the effectiveness of policies on equity and stability, nor to establish priorities between the various policy goals, this chapter considers market failures as a starting point for identifying future areas of analysis by the National Productivity Board.

IV.1 Product and Service markets regulation

Market competition and a better business environment depend on a set of laws and regulations that provide adequate incentives in several relevant areas to economic activity[23]. However, excess regulation may also constitute an obstacle to economic dynamism. According to the European Investment Bank (2011) regulation has an important role in resource allocation and impacts productivity: countries and sectors where the regulatory weight is lower generally have higher rates of productivity growth and better allocation of resources. Arnold and Barbosa (2015) also present evidence of a significant relationship between the total factor productivity of Portuguese companies and a set of public policy variables[24].

Portugal regularly receives recommendations from international organizations (IMF, OECD or European Commission) to implement structural reforms aimed at greater flexibility in product markets, with the purpose of increasing the productivity and the competitiveness of the economy. Indeed, the Economic and Financial Assistance Program, following the euro area sovereign debt crisis, included an extensive set of reforms to liberalize the product and service markets and to improve the necessary conditions for market competition.

In Portugal there have been important changes in policies for the business environment in the last twenty years, reducing regulatory complexity and reducing legal and administrative burdens. This improvement stems essentially from the implementation of simplification and

[23] *E.g.* Justice, energy, licensing, taxation, or the labour market.

[24] In particular, greater administrative requirements to open a business, broader coverage of collective bargaining agreements, increased time requirements for tax compliance, and a higher number of processes required to enforce a contract are associated with lower productivity.

administrative modernization measures such as the Simplex, Simplex + programs, and *Licenciamento Zero*.

The reforms aimed to develop a favourable business environment, notably by reducing barriers to entry of new competitors and barriers to business growth. Portugal exhibited one of the highest recorded improvements between 2008 and 2013 in the OECD's Product Market Regulation indicator or, until 2018, in the World Bank's Doing Business.

However, according to the European Commission (2019) and Arnold and Barbosa (2015) there are obstacles to productivity growth, namely the level of regulatory tightness in services and construction, the delays in the judicial system, the complexity of the licensing requirements and the instability of the tax system - these areas were also identified by Portuguese companies as obstacles to the development of economic activity (INE, 2018) and by Júlio *et al.* (2013) as obstacles to foreign direct investment. The existence of too many jurisdictions, agencies, and other entities at regional, national, and international level that have the power to issue legal regulations, and the tendency of legislators to detail all situations rather than address general principles may be associated with these problems.

Obstacles to market dynamism and competition are also reflected in the level of business mark-ups. Between 2012 and 2016, the mark-up level of Portuguese companies remained high and stable, indicating that there was no significant increase in competition (Pinheiro Alves and Figueira, 2019). Mark-ups are particularly high in sectors less exposed to external competition, as are most services, which is reflected in the prices charged for providing services to the tradable sector.

Lack of competition benefits incumbent firms and hinders the growth of SMEs as well as the entry of new enterprises. In addition, it may also contribute to reducing incentives for investment in innovative and disruptive technologies, and to introduce changes in production processes (Foster *et al.*, 2001, Bloom *et al.*, 2015).

This evidence of lack of competition prevails in Portugal despite policies to reinforce institutions and regulations aimed at improving market competition and the liberalization of the energy, telecommunications and transport sectors.

Thus, it is not clear that the simplification, dematerialization, and acceleration of administrative procedures that occurred over the last two decades have been sufficient to allow significant productivity gains – which also require a business environment conducive to growth, investment and innovation. A more systematic assessment of the impact of these policies would make it easier to identify factors that may have contributed to hinder their effectiveness.

IV.2 Human capital and labour market

Human capital is one of the most important determinants of productivity in developed economies, where market applied knowledge is becoming the main source of competitive advantage. In that sense, the efficient allocation of human capital, through which human resources would be channelled into more productive activities and enterprises, is also one of the most relevant aspects for productivity.

IV.2.1 Education, training and experience

People's skills and abilities are increasingly important in an economy where research developments are applied to the market within a shorter time frame, disruptive technological change is faster and change in products and services is permanent, requiring continuous learning and adaptability. The level of education is essential to increase the required skills. As illustrated in the previous chapter, Portugal has converged in recent years with the EU28 average in terms of the educational level of the population, particularly in the younger segment[25].

Paradoxically, the greater convergence of the educational level between Portugal and its counterparts concurred with the slowdown in labour productivity growth. Although the educational difference of the younger population may indicate a convergence process, demographic evolution allows us to predict that it will still take some decades for the average level of formal education in Portugal to reach the average of the more developed countries[26].

The lack of financial resources, however, does not seem to have been one of the causes for the relative educational backwardness. Portugal spent 6.1% of GDP on education in 2013, above the OECD average of 5.2%. Real expenditure on education increased by 33% between 2008 and 2013 (despite a 6% decrease in the number of students), the highest growth in OECD, with the exception of Turkey[27].

The fact that education in Portugal is mainly centralized in the State, that schools have limited autonomy, and that their financing is decoupled from performance, may constitute major obstacles to the functioning of the education system[28].

Vocational and professional training geared to the needs of the labour market is another component of human capital and can increase qualifications as well as the likelihood that the unemployed, especially the young and long-term, will be able to find jobs.

Despite the fact that in Portugal the number of graduates in vocational programs in secondary education has been increasing[29], the number of companies providing training for their employees and the number of workers receiving training is still low compared to the OECD average, albeit measures such as *Cheque-Formação*[30]. In addition, there are specific programs for adult education and qualification, such as *Qualifica*.

The financial support for the training and qualification of workers has had a significant presence in all the European support frameworks to the Portuguese economy. However, companies spending on training has been decreasing since 2010, reaching its lowest value in 2016 (€224 million for 251 thousand companies, that is €891 per company).

[25] See also Gouveia and Coelho (2018).

[26] Gouveia *et al.* (2017) concluded that education and training reforms, quantified based on World Competitiveness Index, could be reflected in productivity gains in the long-run despite the eventual short-term costs.

[27] OECD, Education at a Glance, 2016.

[28] Lack of autonomy and accountability limits the better functioning of the education system (OECD, 2019a).

[29] OECD (2015a): greater enrollment in vocational training programs could contribute to an approximation of the values of trained workers: by 2014, 41% of workers aged 25-34 and with complete secondary education had been trained in these programs (and 80% had obtained employment), compared to 59% of the OECD average.

[30] The number of companies reporting training in 2015 and 2016 is around 20% of the total (unchanged from 2010 and 2011 – *Quadros de Pessoal*, Annex D on training). As the largest companies carry out the most training, the number of workers in companies annually covered is higher, 1 in each 3.

The fact that the increase in the educational level of the Portuguese population does not appear to be reflected on productivity growth may thus be associated with insufficient training of workers or less effectiveness of public policies in this area. The responsibility for the implementation of public policies focused on vocational and training areas is shared between different entities, possibly creating higher complexity and difficulties to companies and workers. A regular assessment of these policies would better identify distortions that could undermine their effectiveness[31].

Management practices can also have a decisive impact on productivity[32]. More structured management practices are associated with companies operating in more competitive sectors and in regions with a pro-market environment, which tend to have higher availability of graduates and are located near universities or a new and large company.

The recent improvement in formal education could have a positive effect on the qualifications of the managers of some Portuguese companies and through this channel their operational dynamics. The focus on learning throughout life for managers may also have an improving effect in the production processes of companies and consequently provide productivity gains in the future. This evidence is confirmed by the latest Survey on Management Practices conducted by Statistics Portugal, according to which companies with best management practices had improved economic performance between 2010 and 2016, measured by the profitability ratios, by the median rates of growth in turnover and gross value added, by the rate of investment and by the use of higher information and communication technologies.

However, in 2015 the professionalization of managers in Portugal was still much lower than the OECD average[33]. And in 2017, the average educational level of Portuguese employers and self-employed workers was lower than that of workers[34].

Bloom *et al.* (2012, 2014) also show that the industrial sector in Portugal had one of the lowest levels of management practices, associated with a weak level of competition, a more regulated labour market and lower qualifications of workers, and that management practices explains up to half of the differences in total factor productivity between Portugal and other countries.

In short, the evaluation of education and training policies, as well as the coordination of the incentives provided by different actors, can help to make policies more effective in increasing the qualifications of human resources and in meeting the needs of employers, facilitating the relocation of the unemployed and achieving greater labour productivity growth.

[31] Dias and Varejão (2012), analyzed the impact of training on the probability of employment, not directly evaluating the effects on productivity.

[32] For the US, see: https://voxeu.org/article/management-practices-and-productivity.

[33] World Economic Forum (2015).

[34] Self-employed/employer: 20.1% with higher education, 23.5% with secondary and 56.4% with basic education; Employees: 27.7%, 28.6% and 43.7%, respectively. *Estatísticas do Mercado de Trabalho, Inquérito ao Emprego*, (Statistics Portugal) in Cantante *et al.* (2018).

IV.2.2 Resource allocation

Public policies can also play an active role in reallocating resources in the economy by providing appropriate incentives for better matching of skills to business needs and facilitating access and mobility in the labour market.

According to the European Commission (2018a and 2018b), there was a deterioration in the efficiency of human capital allocation between sectors during the pre-crisis period[35].

This trend was reversed in the following period and coincided with the implementation of important reforms in the labour market, under the Commitment for Growth, Competitiveness and Employment, signed in 2012, and the recommendations of various international organizations. These measures included, for example, legislation on the protection of employment (*e.g.* reduction of compensation and inclusion of additional criteria for dismissal), collective contracting or the form of action of the public agency for employment and training with the creation of the *Gabinetes de Inserção Profissional (IEFP)*.

The increase in average labour productivity after 2008 may be related to the decrease in the number of workers operating in the less productive sectors of the economy due to the increase in unemployment (Banco de Portugal, 2016).

An efficient allocation of resources also depends on the adequacy of training and education to the needs of the labour market. In this respect, as evidenced in the previous chapter, Portugal is one of the euro area countries where there is a greater mismatch between the qualifications of workers and the job demands. Pimenta and Pereira (2019) show that for Portugal there was a significant reduction in the under-schooling of workers in the last 20 years in relation to professional occupations in companies. Under-schooling is particularly true for older workers, but also for some highly qualified professions of a technical nature, such as those related to information and communication technologies[36].

On the other hand, over-schooling is concentrated in workers with less than 10 years of experience, in the social sciences and humanities areas, evidencing a tendency of aggravation[37].

This fact demonstrates the potential of a more efficient allocation of human capital in the Portuguese economy, namely the better use of the educational and qualification improvements[38], and reinforces the need to evaluate the effect of public policies in this perspective.

Another important aspect to consider is how labour market segmentation influences the matching between supply and demand for labour. The level of segmentation in Portugal, both between permanent and temporary employment contracts and between public and private sector workers, can prolong an inefficient allocation of human capital by benefiting less exposed

[35] Before the crisis, the sectors that registered more productivity gains and more competition in international markets, and therefore required greater skills and abilities, had average earnings and lower skill levels than the protected sectors (Source: Bank of Portugal)

[36] https://skillspanorama.cedefop.europa.eu/en/countries/portugal. According to CEDEFOP, the most affected areas by the lack of qualifications are: information and communication technologies, engineers and technicians in the areas of physical sciences and process control.

[37] According to Statistics Portugal, entrepreneurs also indicate a greater difficulty in hiring skilled workers and technicians (INE, 2018a).

[38] In Portugal, the highest level of education is associated with higher employability and a wage premium that is still much higher than that of the OECD countries (68% for secondary level employees, against 55% for the OECD).

sectors to international competition, which often pay better wages and attract the more skilled human capital of industry and other tradable sectors[39].

Despite the recent reforms to reduce the differences in legislation applied to permanent and temporary employment contracts (both in terms of costs and reasons for dismissal) or financial support for geographical mobility, Portugal remains the OECD country with more restrictive legislation on employment protection in individual dismissals (OECD, 2017a and 2017b).

An additional indication of a poor allocation of resources is the small percentage of workers employed in the largest companies, which have higher productivity levels on average (OECD, 2015b) - Portuguese medium and large companies only employ 37% of all workers, a substantially lower value when compared with countries such as Germany (58%); the United Kingdom (63%) or France (52%).

IV.3 Investment Policies

In Portugal, the promotion of public and corporate investment in physical and intangible capital encompasses three sets of public policies: direct investment support, correction of financial market failures and the capture of external investment.

These policies are especially important in the case of the Portuguese economy, where the annual level of investment declined sharply between 2000 and 2013 (total GFCF fell from around 28% to less than 15% of GDP).

Despite its subsequent recovery, its level is still significantly below the Eurozone average[40], as well as the intensity of capital per worker (slightly more than half of the EU average for 15 countries)[41].

IV.3.1. Infrastructures

Investment in infrastructure depends partly on the state and is necessary to create conditions for the development of economic activity, in addition to other social functions such as health or education. European funds, together with the State Budget and the use of private investment in the form of public-private partnerships, have been the main financing sources of infrastructures in recent decades.

In Portugal, there were two infrastructure promotion programs in place this decade. The *Plano Estratégico dos Transportes e Infraestruturas (PETI3 +)*, consisting of 53 investment projects and based on three strategic objectives for 2014-2020: contributing to economic growth, supporting Portuguese companies and job creation; ensure the competitiveness of the transport sector and its financial sustainability for Portuguese taxpayers; promote social and territorial cohesion, ensuring the mobility and accessibility of people and goods throughout the country and environmental sustainability. More recently, the *Programa Nacional de Investimento (PNI*

[39] Statistics Portugal, Estatísticas do Emprego.

[40] In 2017, 16.2% of GDP in Portugal, and 20.5% in the average of the euro area.

[41] According to the OECD, in Portugal the average annual growth rate of capital intensity since 1995 was 4.6%, up from 2.7% in the EU15. Capital intensity corresponds to the ratio of capital services to output per hour worked.

2030) includes investments that were already foreseen in *PETI 3+* and are divided into four thematic areas: mobility and transport; energy; environment; and irrigation.

Public investment in infrastructure (11% of total investment in 2017) is well below its peak in 1997 (accounting for 21.4% of total investment and 5.6% of GDP). The recovery in 2017 (compared to 10% of total investment and 1.5% of GDP in 2016) does not seem to be enough to offset the public capital depreciation that has occurred in the last 20 years[42].

Policies aimed at strengthening this capital must be accompanied by a rigorous and continuous evaluation of investments in infrastructure, even by the limitations in obtaining financing and the large amounts involved in these projects. Pereira and Pereira (2017) made an assessment of the investments in infrastructure carried out in Portugal until 2011 and concluded there were beneficial effects on labour productivity, especially concentrated in non-tradable sectors, less exposed to external competition

IV.3.2. Physical capital

Investments in physical capital (machinery and equipment) are associated with the replacement of depreciated capital, increase in production capacity with the adoption of new technologies and manufacturing processes, and improvements in business models and in the quality of goods and services produced.

The capital invested in the Portuguese economy in the recent past does not seem to have always produced the desired return. As shown in Chapter 2, capital productivity in Portugal, despite the recovery in recent years, has fallen more than in the other euro area countries, especially since 1995.

This may be due to a poor **allocation of capital between sectors** since the 1990s, notably the excessive application in industries more protected of external competition such as real estate, trade, housing construction and public works.

As noted by Reis (2013), since the 1990s, the construction sector recorded a much higher weight in the Portuguese economy when compared with the other European countries in terms of GVA (10 percentage points above the European average), the stock of capital, employment, and credit granted by the financial system. Azevedo et. al (2018) confirm the poor allocation of resources - in 2013, 44% of the credit stock was granted to very low productivity companies, with a slow reallocation of credit to more productive sectors.

The financial constraint that the Portuguese economy has suffered since the beginning of the crisis and the low rate of household savings, an important internal source of capital, continue to constraint investment growth. In addition to the credit restrictions, Portuguese companies have been channeling a significant part of the capital generated by their activity to reduce indebtedness, limiting the possibility to carry out new investments.

Public investment policies can help overcome some of these constraints if they act in a correct way on existing capital allocation distortions and on market failures by facilitating access to

[42] The time-series of infrastructure investment since 1970 are available at https://www.gee.gov.pt/pt/.

finance and channelling them to more productive sectors, as well as by attracting foreign investment.

Direct support for investment is mainly based on European funds received in Portugal since the late 1980s, covering both private and public investment. These funds are very significant and the successive European Support Frameworks have provided around € 120 billion in support (2011 prices), an average of almost € 4 billion a year between 1989 and 2020, which corresponds to just over 10% of the average annual investment in the Portuguese economy.

In addition, there are several types of contractual fiscal benefits for domestic and foreign investment and for capital enhancement, usually based on corporations' tax credit, and different exemptions from municipal tax on real estate and stamp duty[43].

In this regard, the recent evaluations of the NSRF[44] Incentive Schemes, co-financed by the European Structural Funds for Investment (FEEI), are particularly noteworthy. The main conclusion is that the Funds had a positive and lasting impact on the performance of the companies supported, especially those experiencing financing difficulties. This impact was manifested in the level of investment in fixed capital, in the remuneration of workers in line with improvements in skills and productivity, in innovation, competitiveness and internationalization of the companies supported.

Another important policy includes debt and equity instruments, which have become more important with the intensification of credit restrictions.

Market failures in financing are usually related to the asymmetry of information between creditors and debtors, where financial institutions cannot objectively assess the risk of potential borrowers, or with adverse selection, when the fixed costs of assessing the financing of small equity are relatively high, making it too expensive, and often harming small businesses.

Funders tend to focus on a small number of enterprises and on relatively larger investments, usually to companies already established in the market (*e.g.* of lower apparent risk because they are protected from external competition), to the detriment of smaller firms or in the early stages of their life cycle, with greater potential for productivity growth.

The creation of the *Instituição Financeira de Desenvolvimento* and the implementation of the *Capitalizar* program, which includes lines of support for investment and capital funds of different natures, aimed precisely at overcoming the market failures that affect the supply of credit and the financing of SMEs, which do not have direct access to foreign funding.

Finally, given the constraints faced by firms, an alternative source of financing is **foreign direct investment**. Policies in this area should be selective, geared towards investments in sectors subject to external competition, that develop innovative activities with high national value added, and that contribute to the internationalization of the economy as well as to productivity growth.

[43] That can be complemented by support for training, installation and others.

[44] They include support for Innovation, Research and Technological Development, Qualification and Internationalization of SMEs implemented within the framework of the National Strategic Reference Framework for the period 2007-2013 (*Agência para o Desenvolvimento e Coesão*, 2018a and 2018b).

IV.3.3 Research and innovation

Investment in intangible capital, such as knowledge, information technology, digital or innovation, has a positive effect on productivity growth by improving production processes and developing better products and services (Jorgenson *et al.*, 2008; Balasubramanian and Sivadasan, 2011). This investment can lead to positive externalities and spillover effects through the diffusion of knowledge and technology transfer (Gersbach and Schmutzler, 2003; Bloom *et al.*, 2007).

Portuguese society has made a significant investment in R&D and innovation in the last two decades. Public policies in this area are based on tax credits for research and innovation (*SIFIDE* program), which in the Portuguese case can reach 80% of total expenditures, and refundable or non-refundable subsidies associated with European funds (*Horizont 2020*) aimed at the promotion of knowledge in companies and of collaboration networks between companies and knowledge centres, within the framework of the *Interface Program* and the clusters.

However, it is difficult to assess whether these policies have resulted in increased productivity. Indicators presented in international statistics or rankings usually reflect the level of expenditure on intangible investment, but rarely consider its efficiency or application.

R&D expenditure (as % of GDP) increased from 0.7% in 2000 to 1.3% in 2017, although it is still lower than the average for other European countries. The number of researchers per thousand employees is higher than the OECD or EU-28 average[45]. However, only a limited proportion of these resources are at the service of companies, which limits its effects on productivity[46]. Indeed, companies continue to have a low number of researchers, a low level of research expenditure (only half of total expenditure in Portugal) and a small number of patent applications, about one-tenth of the OECD average[47].

This may be due to the small number of medium and large Portuguese companies with the financial capacity to carry out long-term investments in research and technology.

In fact, research and innovation policies were aimed at increasing the stock of knowledge in the scientific community and the public sector but did not have sufficient application in innovation and development at the enterprise level[48].

In addition, business support tends to be concentrated in a few companies, which often operate in markets protected from international competition. According to Alexandre *et al.* (2018), more than 50% of R&D business investment is carried out by large companies, whilst in micro-enterprises these investments are very small. In sectoral terms, it focuses on manufacturing and

[45] Portugal is still considered a moderate innovator, being the 18th EU-28 country in the European Innovation Scoreboard 2016. In the perceptions published by the Global Competitiveness Report 2015, Portugal (in 140 countries) is the 26th in "Technological readiness", 21st in "Availability of scientists and engineers", 18th in "Availability of new technologies", and 21st in "Quality of scientific research institutions".

[46] Gouveia *et al.* (2017) conclude that despite innovation incentives have had positive productivity effects in the short-term for all firms, in the long-term these effects were only positive for highly productive firms (top 0.1%) as for others they were negative (effectively negative and not neutral).

[47] The number of patent applications (by the Patent Cooperation Treaty) by Portuguese entities per 1000 researchers was 4, compared with 38 in the OECD average (values in 2014).

[48] Heitor *et al.* (2014) states that research in Portugal is too concentrated in the public sector - universities have been responsible for a third of patent applications since 2010 - and is mostly of a fundamental nature instead of applied.

information and communication activities, accounting for 75% of total R&D business investment in 2013.

Although there are examples of dynamic and innovative companies, it is not clear into what extent they are sufficiently diffused by the Portuguese business community, given the low percentage of SMEs that innovate in processes or products (9%). Furthermore, support for technology transfer, for which two-thirds of the companies state that they would make such investments even if they did not receive any State support, does not seem to be enough for products and services that reach the market (AD&C, 2018b).

This evidence suggests the need to reflect on the effectiveness of some policies in this area and on the possible need for reform. The scheme of incentives for R&D, currently in the form of tax credits, could benefit the most profitable companies, which does not always coincide with the most innovative companies (OECD, 2019b). The concentration of R&D capacity in universities and in national research and technological development centers could be better oriented towards the productivity of the economy in order to act as a catalyst for the greater integration of Portuguese companies in international markets and in global value chains.

IV.4 Business Dynamics and Internationalization

Business dynamics are associated with the business environment and market competition, and thus have important effects on capital allocation. Public policies in recent decades have included a number of fiscal incentives and debt or capital support, such as the*Programa de Apoio ao Empreendedorismo* , the *Programa Semente*, the *Start-up Portugal*, or the business angels funding lines, which are designed to encourage the creation of new businesses.

In addition, public policies have also been aimed at facilitating the growth of more productive companies by their access to international markets and global value chains, with the consequent use of economies of scale. Exemples of these programmes are *Estratégia de Fomento Industrial para o Crescimento e o Emprego*, *Portugal Sou Eu*, *Agenda para a Competitividade do Comércio*, *Serviços e Restauração*, *Indústria 4.0* and *Internacionalizar*.

In Portugal, the birth rate of firms is among the highest in the EU[49], which indicates that barriers to entry do not constitute a problem, at least in part of the sectors. Some of the reforms implemented in the last decade have targeted precisely the reduction of entry costs[50].

However, the ease of entry of new companies into the market is not widespread to all economic sectors. In sectors such as banking, transport, professional services (lawyers, engineers, accountants, auditors, etc.), energy or information and communication technologies, there are still important barriers to entry or associated with the business model.

In addition, the entry of new companies is important if they grow and remain in the market. On the one hand, the number of fast-growing companies increased continuously until 2016 (Barros *et al.*, 2019). But on the other hand, the mortality rate of companies in Portugal is also among

[49] Growth rate of 15.4% in 2016, one of the highest in EU (number of new firms as a percentage of existing ones).

[50] For example, reduction of the initial minimum capital requirement to start a company from € 5,000 to € 1 per partner in 2011.

the highest in Europe and a relevant number of firms cannot survive long enough to grow (OECD, 2017).

In Portugal, a significant number of firms are still exclusively focused on the domestic market, are in general small in size and often very indebted. In addition, the sectors that gained weight in the total GVA of the Portuguese economy until the first decade of the 2000s - construction, energy, financial activities, and real estate - were among those that were less exposed to international competition. This situation has changed with the crisis and the recovery of the tradable sectors, industry, and tourism.

Removing **obstacles to business growth** is important because it reduces the inefficient allocation of resources. The most dynamic companies are able to make better use of policies to support research and technological development. This is a way for companies to increase the number of researchers, applications for patents or other investments in intangible capital, thus benefiting from mechanisms for technological diffusion and other externalities associated with better links to international markets (IMF, 2016).

Rapid growth in exports (accounting for 44% of GDP in 2018) and the largest number of firms operating in foreign markets (59 thousand firms in 2016, 15.5% of the total) evidence some potential for business growth.

The greater **internationalization** of firms also translates into a higher percentage of employment affecting exporting companies, which, due to exposure to international competition, are usually more productive.

The positive evolution of exports over the last few years arises not only from a favorable external demand but also from a series of reforms aimed at the greater internationalization of the Portuguese economy, namely through the greater integration of small and medium-sized enterprises in markets and chains of international value, the greater diversification of markets and the higher quality and added value embodied in the exported products.

The continuation of this process requires the signing of trade agreements that open markets for Portuguese companies, such as those recently signed by the European Union with Canada, Korea, Colombia, Peru and Ecuador, and Japan.

Finally, reducing barriers to exit and restructuring promote a selective mechanism, supporting the withdrawal of non-viable companies and the recovery of less productive ones. Also, in this area, public policies may play a role in improving the allocation of resources across sectors and, therefore, in improving aggregate productivity[51].

This was the intention of measures that involved the reform of the insolvency code: the implementation of the *Programa Especial de Revitalização (PER)* and the *Sistema de Recuperação de Empresas por Via Extrajudicial (SIREVE)*, which has recently been replaced by the *Regime Extrajudicial de Recuperação de Empresas (RERE)*.[52]

[51] The resources allocated to companies that are not economically viable, and their significant numbers, indicate a deficient capital and labour allocation, with negative consequences on aggregate productivity (Andrews and Petroulakis, 2019).

[52] A scheme whereby a debtor in difficult economic situation or imminent insolvency may negotiate a recovery agreement with his creditors and where creditors can propose the conversion of credits into capital.

The reduction of resources allocated to economically non-viable companies also depends on the greater selectivity of the financial system in lending as well as the strategy to manage and reduce non-performing loans in order to favor the most productive companies.

According to the OECD (2018a), Portugal was one of the countries that has made the most reforms in the area of insolvency, especially in the prevention, simplification and reduction of barriers to restructuring, which allows for a better allocation of capital and a lower prevalence of zombie companies (McGowan *et al.*, 2017)[53].

The evaluations carried out under this scheme present evidence that changes to the insolvency regime have led to the market exit of non-viable companies, while at the same time strengthening the restructuring of more productive enterprises (Gouveia and Osterhold, 2018) and that less productive companies are more likely to leave the market, while those who stay exhibit productivity gains (Monteiro *et al.*, 2017).

The continuation of these analyses is important to assess the extent to which more productive companies are replacing less efficient ones and if the policies and incentives lead to a Schumpeterian process of creative destruction in the Portuguese economy that contributes to a more productive application of resources.

IV.5 Conclusions

According to various analyses, the reforms carried out over the last few years have had a positive effect on productivity. However, these effects are still not sufficient to ensure the productivity convergence of the Portuguese economy to the average level of the European Union. The number of companies with low productivity is still significant and the allocation of human and physical capital across sectors and within sectors suggests that despite the observed progress, there is potential for growth through better resource reallocation.

This chapter enabled the identification of different areas in which the evaluation of public policies in the context of productivity should be carried out regularly, not only to confirm some of the results obtained in the works already developed on the Portuguese economy, but mainly to better understand the channels through which these policies have an impact on productivity, identify possible obstacles to their greater effectiveness and consequently advise in the design of better policies.

Among the main areas to be considered are the level of market competition; the accumulation of physical, intangible and human capital; the working conditions of the labour market, especially its relatively high segmentation and the obstacles in demand-supply matching.

In particular, it is necessary to examine whether the incentives for innovation, research and access to finance are geared towards benefiting firms which are more exposed to international competition and which are experiencing faster productivity growth; if the removal of barriers to exit translates into more effective market selection mechanisms; if labour segmentation inhibits

[53] In a simplistic way, a company is considered a zombie if its subsistence depends on the financial help of its creditors, despite low levels of profitability. There are several definitions present in the literature, but the most recent ones identify them as companies that registered operating results lower than interest charges for consecutive years.

the higher qualification of workers, their allocation to more productive sectors and the greater diffusion of technologies.

Finally, other areas of public policy not considered in this report - health, environment, social security, defence, internal administration - can also be analysed in the perspective of their contribution to productivity growth.

V. Final Conclusions

This report deepened the understanding of the underlying dynamics influencing the recent productivity developments in the Portuguese economy:

- **The recovery in economic activity in Portugal was accompanied by improvements in terms of competitiveness of the economy.**
- **The recent stagnation in labour productivity is, in part, associated to the upsurge in employment and to the lower level of capital intensity (capital per worker).**
- **In sectoral terms, this stagnation essentially results from the contraction of labour productivity in the services sector.**
- **In what concerns the combination of factors of production, there has been an asymmetric evolution with a sizable expansion of labour together with a limited accumulation of capital.**
    - The economic crisis originated strong financial obstructions which undermined investment, seriously affecting the stock of capital in the economy.
    - On the other hand, employment growth was relatively more markedly in services, without a proportional growth in gross value added (GVA).
- Over the last few decades, the rhythm of GDP growth in the Portuguese economy has been largely determined by employment developments (labour factor). This fact reflects the lower contribution of the investment (capital factor) to the growth dynamics.
- **On the sectoral level, the fall in productivity in services sectors constitutes one of the main drivers of the slowdown in total economy productivity, in the more recent years**.

However, the analysis also suggests important positive structural changes in the composition of contributions to economic growth:

- Total factor productivity, often used as a proxy to measure the total efficiency of the factors of production and their combination, **registers for the first time since the crisis a positive contribution to GDP growth in 2016 and 2017**.
- An **increased contribution of human capital** (labour quality factor) is observed along the period.
- **The composition of capital also registered positive changes, with a growing participation of information and communication technology products.**
- The **changes in the composition of investment** should also be highlighted due to its potential long-term beneficial effects: the share of **construction significantly decreased**, being partially **substituted by investment in more productive assets such as intellectual property and machines and equipment.**

Lastly, in order to further dig into the dynamics driving the evolution of productivity with more detail, the analysis focused on the sectoral and firm level:

- The Shift-Share examination allows one to recognize that productivity growth was dominated by within sector effects. That is, **intra-sectoral productivity gains were the dominant influence.**
- Nevertheless, the overall effect associated with structural changes in the economy was relatively larger in Portugal compared to that of other euro area members, which **is an indication of positive variations in terms of resource allocation.**
- The analysis of microdata shows that the dispersion of productivity among companies in the same sector is high and displays a growing trend. These sectoral data do not allow us to perceive the existence of a pattern or relation between dispersion and the level of productivity or capital intensity, making it difficult to understand their relevance or possible causal relation. However, this may suggest that intrinsic factors at the enterprise level (such as management efficiency, human capital, or investment level) are more relevant determinants of firm's productivity than factors related to market functioning or to the economic environment (framework conditions). On the other hand, it may also suggest that the transmission channels of technology and spillovers between companies are limited.

The analysis of the evolution of productivity was complemented by the evaluation of a set of relevant indicators to assess the situation of the Portuguese economy in relation to the main determinants of productivity. These determinants, according to empirical research findings, consist of human capital, enterprise size, financing, innovation, context costs, and economic regulation.

Human Capital: The disparity in the qualifications that still persists in the total active population, from which the qualifications of the Portuguese managers have particular relevance, constitutes a limiting factor for productivity growth.

- With the consensual importance of **human capital as a determinant of productivity**, data on workforce schooling show a **significant change in the qualifications paradigm of Portuguese workers**: Portugal managed to significantly blur the disparities in qualifications of the younger cohorts of the active population, registering higher education levels in line with euro area partners. The evidence of significant progress in the quality of education in Portugal is also evidenced by the very positive developments in the PISA tests.
- These results allow us to explain the more relevant contribution of human capital to GDP growth in Portugal.
- Nonetheless, for the total working population, **there are still significant disparities in the level of qualifications: with a higher proportion of workers with lower education** compared to the euro area.
- Particularly relevant is the level of schooling of **managers of Portuguese companies, which is substantially lower than the European average**, especially in small enterprises. According to empirical research, the qualification of managers largely determines **the ability of firms to adapt to technological changes and international competition**.

- It should also be noted that the high segmentation of the labour market and its consequences on equity and efficiency can be a barrier to labour mobility and affect the incentives to qualify workers.

Financing of Portuguese Companies: despite the progress made, Portuguese companies still have high levels of financial pressure and reduced levels of autonomy.

- The limited capital accumulation, partly determined by the constraints on corporate financing, has negatively affected the potential for productivity growth in Portugal.
- **The robustness of the financial system is thus a key factor in the growth of investment and economic activity.**

Dimension of Portuguese Companies: the differential of the Portuguese business fabric, based on a small proportion of medium and large companies, compared to our European partners, is a barrier to firm's productivity growth.

- The size of the company can play a fundamental role in its investment and financing capacities and in the utilization of economies of scale.

Innovation and R&D: despite the positive evolution in most of the indicators considered relevant to gauge the technological progress of a country, the disparity between Portugal and the countries of the European Union is still visible.

- **Investment in R&D has undergone a positive evolution over the last two decades, but is mainly concentrated in the public sector**, in particular research in universities, not sufficiently targeted to business needs.
- The OECD (2019) points to **the necessity of reform of the R&D incentives scheme**: currently being in the form of tax credits, these incentives benefit the most profitable companies, which do not always coincide with the most innovative companies.
- Another relevant factor to consider when analysing the impact of innovation on productivity is related to the interaction capacity between researchers and entrepreneurs. **Collaboration in research activities, both among companies as well as between them and research institutions, is comparatively low in Portugal vis-à-vis other European countries** and is mainly concentrated in large companies.

Framework costs: Portuguese companies face significant obstacles in the areas of mandatory interactions with the Public Administration and in higher costs of various inputs crucial to productive activity.

- Portugal has made substantial progress over the last decade towards administrative simplification;
- However, there are still significant obstacles for companies arising from the mandatory interactions with the Public Administration, the complexity of licensing systems and the slowness of the justice system.
- The comparative analysis of energy prices reveals that Portuguese companies support one of the largest electricity bills, negatively impacting the production costs of goods.

<u>Economic Regulation and Competition</u>: Despite significant progress in removing barriers to competition, some services continue to face significant barriers to entry.

- According to the OECD Product Market Regulation (PMR) indicator, Portugal stood out as one with of the most positive developments between 1998 and 2013, in the sense of reforming economic legislation conducive to a favourable competitive environment.
- Significant reductions in entry barriers in most sectors are highlighted, reducing bureaucratic complexity as well as the costs of stablishing a company.
- Still, the analysed indicators point to the existence of significant barriers to competition, in sectors related to some professional services (*e.g.* legal, accounting, architecture and engineering). Particular emphasis is placed on the significant barriers to access to these professions, both for new professionals and for the entry of foreign capital.

The evidence analysed throughout this report raises a major question: why has the progress in education, innovation and R&D and market regulation not been significantly translated into productivity gains in recent decades?

The evaluation of the policies implemented in several areas of the economy, by allowing better identification of transmission channels and possible obstacles to their effectiveness, could contribute to the clarification of this issue.

The continuous assessment of public policies allows for a better understanding of its short- and long-term effects, the appropriate timing for its implementation and aligning incentives in a simple and transparent way. In addition, it also allows easy identification of the associated benefits, thus acting as a counterweight to the interests that oppose the implementation of reforms.

Based on these conclusions, and taking into account the areas of work expressly defined in its mandate, the following areas were identified as priorities in the work agenda to be developed by the Productivity Council:

- **Evaluation of the impact of human resource's qualification (including entrepreneurs) on productivity.** This analysis should consider the various components of the qualification of human resources (education, vocational training, etc.) as well as their complementarity. Given the constraints on access to credit and the implications for business investment, the level of financial literacy of entrepreneurs - including the ability to formulate an appropriate financial plan, to properly assess risk and to explore alternatives to bank financing – constitutes an important component of the qualification of entrepreneurs and managers. The elaboration of a diagnosis about the level of financial literacy of entrepreneurs could help in the definition of training actions that would contribute to attenuate the current financial pressures of companies.
- **Evaluation of the effectiveness of policies to encourage investment, particularly in R&D.** Taking into account the lower levels of total investment that allow for a sustainable increase in the capital stock, it becomes important to evaluate the necessary incentives to attract productive investments, both ex ante and ex post. Also, in view of the disparity between Portugal and the euro area in relation to most of the indicators considered relevant for measuring a country's technological progress, evaluating the

effectiveness of R&D investment incentive policies should be a high priority in the Board's work. In this context, it is necessary to assess more rigorously to what extent the existing incentives are decisive for the level of R&D investment made and the impact of these investments on innovation and productivity. In addition, this study should allow the identification of the most relevant type of innovation (*i.e.* related to the creation of new products or the greater efficiency of the production process) and which areas or sectors would be associated with higher productivity gains. Furthermore, comparing the relative impact of policies based on tax incentive systems or other forms of financial support for research and development would also help in defining more effective policies.

- **Analysis of the impact of labour market segmentation and other distortions to competition on productivity.** The labour market in Portugal is characterized by high segmentation, categorized by the existence of groups of workers covered by very different levels of employment protection. This segmentation may contribute to inhibit labour mobility and incentives to further training, thus contributing to explain the low labour productivity in Portugal. It is important to analyse the impact of this segmentation and the channels through which it can affect productivity.

  In addition, the high intra-sectoral disparity observed in firm productivity can translate into potential productivity gains arising from better resources allocation or the correction of distortions that inhibit the functioning of market mechanisms that facilitate the transfer of knowledge and technologies from firms near the technological frontier to the remaining ones. It is therefore important to investigate the causes and consequences of this disparity and the feasibility of measures to mitigate possible constraints.

- **Assessment of the impact of changes in investment dynamics.** As discussed previously, the reduction in the capital stock of the Portuguese economy is one of the factors that negatively affect productivity. Given the importance of investment to increase the productive capacity of the economy, the qualification of human resources and R&D, it is relevant to study it more thoroughly. Hence, it is important to understand to what extent the recent changes undertaken in the financial system and the deleveraging process of Portuguese companies are structural, and, thus potentially productivity enhancing, or cyclical. To this end, it is desirable to draw up an *ex-post* analysis of the abovementioned and its impacts on investment.

Institutional collaboration is essential for the better performance of the National Productivity Board's functions. The availability of information is often the main obstacle to studies on the evaluation of public policies. Many of these analyses involve the crossing of information from the organizations that manage the incentive systems and the implementation of public policies with the information, broken down at the company level, of the static databases. Collaboration between the various bodies responsible for policy implementation, evaluation and statistical dissemination is therefore indispensable for the development of more informed analyses.

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