

Portugal: A Paradox in Productivity

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ABSTRACT

Portugal has a lower level of productivity than advanced economies but, paradoxically, the recent improvement in several of its determinants did not lead to convergence in productivity levels. The objective of this paper is to better understand the larger slowdown in productivity growth in Portugal than the one occurring in those countries by considering its main determinants. It presents a set of different reasons for the divergence with developed economies since the mid-1990s that are associated with an increasing misallocation of capital, labour and skills both at a sectoral and firm level. Moreover, it outlines some policy proposals to enhance aggregate productivity growth in the Portuguese economy within a framework of growing integration in global markets.

Portugal is experiencing a slowdown of productivity growth, similar to the one occurring in advanced economies. Given that aggregate productivity growth is the main source of per capita income growth, this slowdown is associated with a slower improvement of living standards.

A number of hypotheses do explain the productivity slowdown: a decline in the birth rate of innovative firms able to deal with greater regulatory complexity (OECD, 2015a); insufficient investment in infrastructure, equipment, R&D and information and communication technology (ICT); weak aggregate demand (Sakellaris and Wilson, 2004; Jorgenson *et al.*, 2008; Adler *et al.*, 2017); a slower pace of technology diffusion (Andrews *et al.*, 2015); non-competitive product markets and capital misallocation (Isaksson, 2007; Dias *et al.*, 2015); rigid labour markets and rapid ageing of the population leading to skills

and labour mismatches and insufficient knowledge-based and human capital accumulation (Bloom *et al.*, 2012; Adler *et al.*, 2017; Aiyar *et al.*, 2016).

In a neoclassical world, Portugal, poorer than most developed economies, is expected to converge both in the level of productivity and in the average wealth of the population. That was the goal when Portugal became a European Community member.

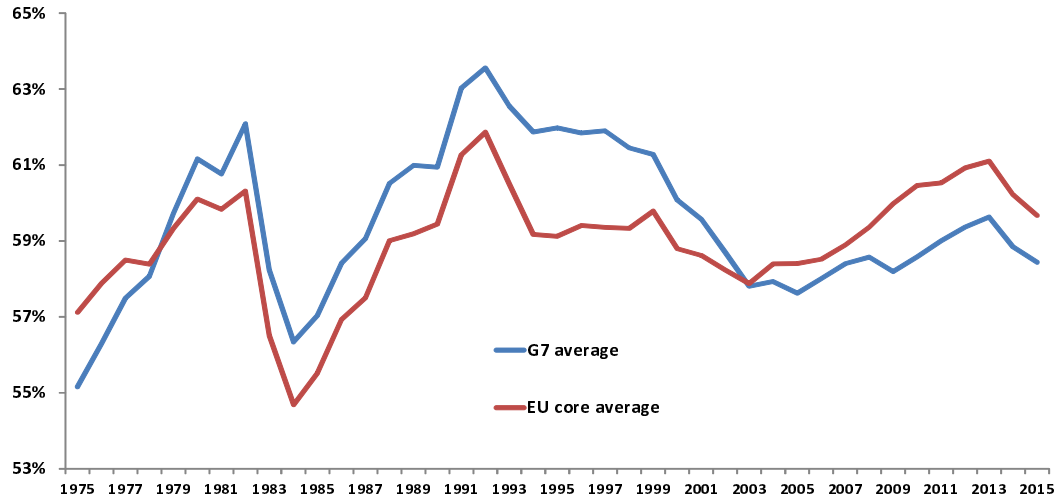
The objective of this article is to understand why this expected convergence has not happened. The article consists of four sections. The first section compares the recent evolution of productivity in Portugal and the most developed countries, the EU core and G7, confirming that the Portuguese economy is falling behind in productivity levels.² The second section examines the state of productivity determinants or

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2 EU core includes the following 15 countries that were members in 2003: Italy, Belgium, The Netherlands, Luxembourg, France, Germany, UK, Denmark, Ireland, Portugal, Spain, Finland, Sweden, Austria and Greece. Exceptions are explicitly stated in the charts. For example, Luxembourg is only included for LP but not in MFP. Austria and Greece are not included in both.

Chart 1: GDP Per Hour Worked - Portugal as a Proportion of the G7 and EU Core, 1975 - 2015

Employment-weighted averages, USD, constant prices, OECD PPP



Note: EU core is defined as the 15 EU member states in 2003 except Austria and Greece

drivers in Portugal to shed light on possible explanations for the slowdown. The article then discusses policies to enhance Portuguese productivity performance within a framework of integration in global markets. The final section concludes with a brief review of the main findings.

Productivity Developments in Portugal

Aggregate productivity (AP) reflects the efficiency of production. In an aggregate production function, productivity growth can be measured through the change in labour productivity, or the partial productivity of any other input, or in multifactor productivity.

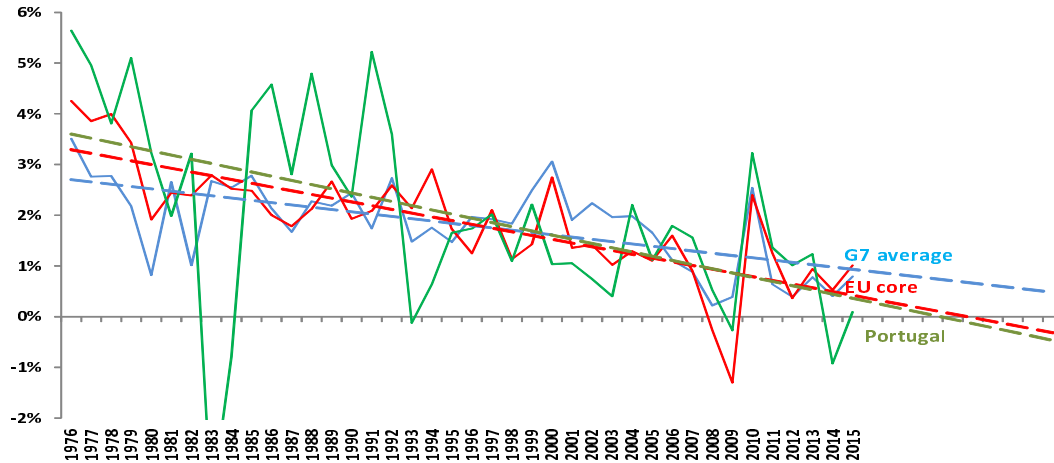
Labour productivity (LP) measures units of output produced per unit of labour input. LP growth reflects the gains from the use of the labour input and from multifactor productivity and capital, through its service per unit of labour. This same logic can be applied to capital or any other input. Assuming decreasing marginal returns, Portugal is expected to converge

in LP with developed countries, better endowed with capital and labour. Multifactor productivity (MFP) measures the residual in economic growth. MFP growth reflects the increase in output that is not explained by a change in the quantity of inputs. It can be interpreted as the change in the stock of knowledge applied in production. If everything else is equal, countries with a lower stock of knowledge will tend to imitate those with a higher stock and thereby converge.

Both LP and MFP growth in Portugal converged with developed economies from a very low base after the transition to democracy in 1974 until the 1990s. Improvements in the level of education and in the allocation of skills, a higher rate of investment in tangible capital and important reforms after EC entry help explain it. Since then productivity growth slowed and Portugal started to fall behind due to insufficient investment in ICT and R&D, labour market rigidity and the allocation of labour and capital to non-tradable industries,³ partly dominated by state-owned firms and less open to

Chart 2: Growth Rate of Labour Productivity in Portugal, G7 and EU Core, Actual and Trend Values, 1976 - 2015

Employment weighted averages, USD, constant prices, 2010 PPPs, OECD



Note: EU core is defined as the 15 EU member states in 2003 except Austria and Greece

competition. The evolution after the global financial crisis of 2008 is not yet clear given that MFP stagnated and the recovery in LP may be associated with a significant loss of employment up to 2013. Data since 2014, when employment started to grow again, show a negative change in the level of LP that is canceling the previous growth.

Labour Productivity

Charts 1 and 2 compare productivity in Portugal with the employment-weighted average for

G-7 countries, a proxy for globally developed markets, and the average for EU core countries. They show that LP grew faster in Portugal than in advanced countries up to 1992, except in the period 1982-1984 when the second oil shock and a balance of payments crisis led to a significant slowdown in real GDP growth but currency devaluation did prevent an enormous fall in employment.

Between 1985, the year before Portugal joined the European Community (EC), and 1992, there was a catching-up. LP growth was 3.8 per cent

Table 1: GDP Per Hour Worked - Compounded Annual Growth Rates in Portugal, the G7 and the EU Core, 1970-2015

	1970-1980	1980-1990	1985-1992	1992-2000	2000-2007	2007-2015
Portugal	3.2	2.2	3.8	1.5	1.3	0.9
G7	2.9	2.2	2.2	2.3	1.7	0.9
EU core	3.8	2.3	2.2	2.2	1.2	0.7

Source: OECD. USD constant prices, 2010 PPPs. G7 and EU core: employment weighted averages.

G7: Canada, France, Germany, Italy, Japan, UK and USA

EU core: 15 members in 2003 less Austria and Greece

3 Tradable industries are industries where exports are more than 15 per cent of sales. They include agriculture, mining, manufacturing, transports, tourism, consulting and other technical activities. The remaining industries, including the state sector, are non-tradable.

per year on average, significantly above that of the G7 countries and the EU core (2.2 per cent) (Table 1). This higher growth is associated with the implementation of important liberalization reforms after EC entry, improvements in human capital and a higher rate of investment that led to a higher capital-labour ratio (Freitas, 2012).

LP growth up to 1992 was also a result of better labour allocation. Employment did move from agriculture and agro-food, textiles and other traditional industries to service sectors such as trade, utilities, construction, real estate, business services, finance or tourism, where there were higher productivity levels (Laíns, 2008).

After 1992, however, LP growth started to progressively slow down (Chart 1), registering an annual growth rate of 1.2 per cent for the 1993-2014 period. As a consequence, LP in Portugal diverged up to 2003 with the EU core and up to 2007 with G7. Worse, Portugal was expected to grow faster in terms of LP but the underlying trend is of a tiny divergence with the EU core (dashed lines in chart 2), with whom Portugal is economically more integrated, and a stronger divergence with G7 (seen in the higher decreasing slope of Portugal).

Labour was allocated to smaller firms and non-market entities in trade and services sectors, which represented 72 per cent of total employment. Non-structural factors such as deficient capital allocation to protected industries and to state-owned firms, distorted competition and rigid labour markets also explain the slowing down of LP (McKinsey, 2004).

Further trade liberalization with the creation of the World Trade Organization in 1995, reinforced by China's accession in 2001, the end of the multi-fiber agreement and the EU enlargement to Central European countries in 2004, opened the European market for developing

economies. It had two consequences for traditional exporting industries (textiles, footwear, pulp, etc.) in Portugal: a reduction in employment due to business closures, because low relative wages were no longer a comparative advantage, and further improvements in LP in the remaining firms in these industries (Laíns, 2008).⁴

But LP gains in manufacturing were not sufficient. Overall LP divergence is evident since 1992, initially in trade and market services, and in the 2000s even LP growth in manufacturing became lower than in the EU core (Sondermann, 2012). Compared to most developed economies, manufacturing was always a relatively small sector in Portugal in gross value added terms (GVA) because there was a direct transition of resources from agriculture to low LP growth activities such as construction, trade and market and non-market services.

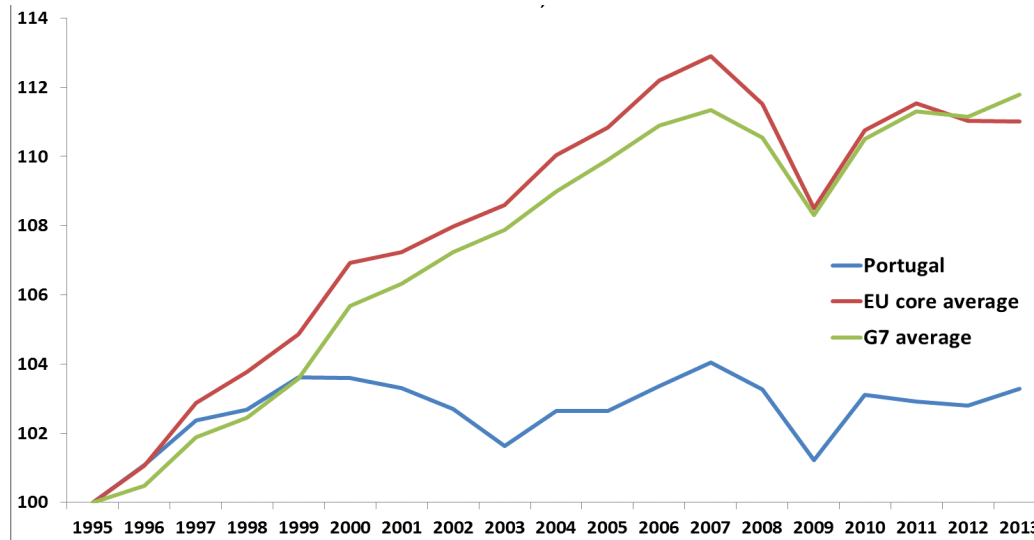
A consequence of the low LP growth in Portugal, together with a higher increase in Portuguese real wages, the increasing consumption levels financed externally at Euro-related low interest rates and with permanent deficits in the current account (Blanchard, 2007) was an unsustainable level of debt owed by households, firms and the Portuguese state. This situation ended in a near-bankruptcy in 2011.

The relative level of LP in Portugal recovered after 2007. Despite the important reforms recently introduced in the labour market and the catching-up in the level of education (section 3), it is difficult to know if this trend is sustainable. The stock of capital per person employed has decreased since 2013 and recent employment growth is likely bringing back to the labour market low skilled and less productive workers who became unemployed after 2000. If this is the case, and the latest available information up to 2016 seems to confirm it, this will negatively

4 Bloom *et al.* (2015) explain the same effects in 12 European countries with Chinese import competition after its accession to the WTO.

Chart 3: Multifactor Productivity Growth - Portugal, EU Core and G7, 1995 - 2013

1995 = 100, OECD



EU core: 15 members in 2003 less Austria, Luxembourg and Greece

Table 2: Multifactor Productivity - Compounded Annual Growth Rates in Portugal, the G7 and the EU Core, 1995-2013

Yearly compounded growth rates

	1995-2000	2000-2010	2010-2013
Portugal	0.7	0.0	0.0
EU core*	1.3	0.4	0.1
G7	1.1	0.4	0.3

Source: OECD.stat

EU Core: (the above EU countries and Belgium, Denmark, Finland, Ireland, Spain, The Netherlands and Sweden). Unavailable data for Greece, Austria and Luxembourg.

affect LP growth in the near future and reinforce its decreasing trend.

Multifactor Productivity

Multifactor productivity (MFP) growth was also higher in Portugal than in most other developed economies between the 1970s and the beginning of the 1990s. According to Eckaus (2008), the average annual growth rate of MFP in Portugal was 0.4 percentage points higher than in the EU core between 1975 and 1985 and 2.1 points higher between 1985 and 1990. After 1990, the rate of growth fell off but it was still above the EU core average by 0.2 points in

1990-1995. Throughout this period MFP in Portugal also grew faster than in the United States and Japan.

Eckaus explains this situation through catch-up from a very low base, improvements in human capital due to a doubling of the average years of education for the working age population, and foreign investment (both private and EU funds) in non-traditional sectors such as the auto industry and ICT sector. Liberalization reforms after the entry to the EC in 1986 most probably helped.

However, MFP growth slowed at the end of the 1990s,⁵ falling below that of the G7 and EU

core countries (Chart 3 and Table 2). Multifactor productivity grew by 0.2 per cent per year between 1995 and 2013, with no growth between 1999 and 2013. Portugal was not converging in MFP with most advanced countries.

Balta and Mohl (2014), using a different methodology, find that the TFP-based technological gap between advanced and "laggard" economies (Portugal, Spain and Italy) within the Euro area persisted or widened (depending on the industries) in the decade preceding the global financial crisis. In some non-tradable industries (utilities, construction and some services) that grew substantially in Portugal during this period, there was even negative MFP growth partly due to insufficient investment in R&D and ICT, or, during the crisis, due to capital misallocation (Gopinath *et al.*, 2017).

The insufficient investment in intangibles is consistent with the consumption-based model of economic growth in Portugal after 1995. An external inflow of money associated with low interest rates from Euro membership, together with wage growth in non-tradable sectors, led to growing consumption levels. This situation in turn led to a deterioration in the current account and a substantial increase in external debt. Resources were misallocated to non-tradable and protected industries where MFP declined and total investment was not boosted by the surge in domestic demand (Reis, 2013). The share of GVA in wholesale and retail trade, state services and construction was, in 2000, more than 10 percentage points greater in Portugal than in the Euro core countries.

Distributional Features

In OECD countries, the productivity growth slowdown is associated with a widening dispersion of productivity gains in each sector and with higher wage dispersion (Berlingieri *et al.*, 2017; Andrews *et al.*, 2015). Neo-Schumpeterian growth theory states that firms at the frontier are able to innovate and adopt new technologies and knowledge, thus maintaining a higher rate of productivity growth. The remaining firms, however, may face a slowdown in productivity growth when there are frictions in technology and innovation diffusion through learning or catching-up.

This is observed in many markets where the effects of digital technologies and globalization led to winner-take-most dynamics and is more pronounced in industries where recent product market reforms were less pro-competition, suggesting that policy decisions are limiting the diffusion process (Andrews *et al.*, 2016).

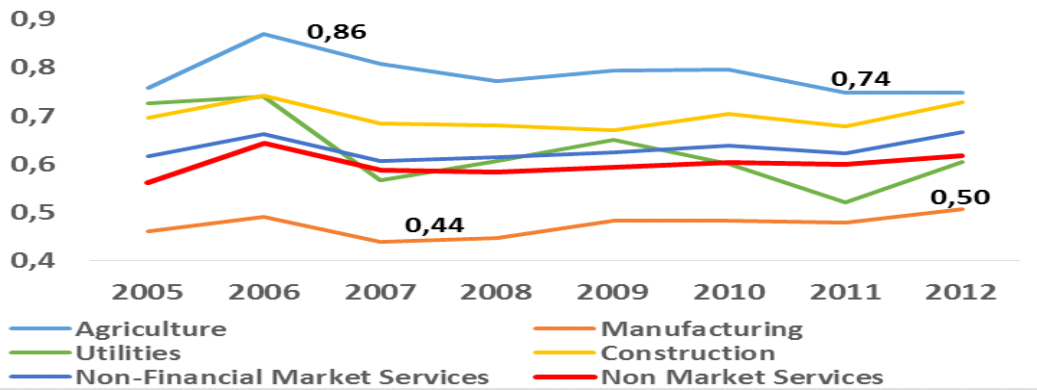
A question, then, is whether this is happening in Portugal. Chart 4, based on the OECD's Multiprod output shows the sectoral evolution of the standard deviation of LP and MFP growth rates between 2004 and 2012. In most industries a stabilization or a reduction in the dispersion can be observed. The dispersion of LP growth rates in the manufacturing sector has increased, but that was not the case for MFP. The standard deviation at a 3-digit industry level also shows stability in the degree of dispersion.⁶ An explanation would be that, in global terms, none of the Portuguese firms are at the global frontier and the data only compare firms at the national frontier with the laggards, where productivity convergence seems to be easier (Bartelsman *et al.*, 2008). However, at least some Portuguese

5 From this point on these are OECD numbers, while those presented in Eckaus (2008) are estimates for the EC.

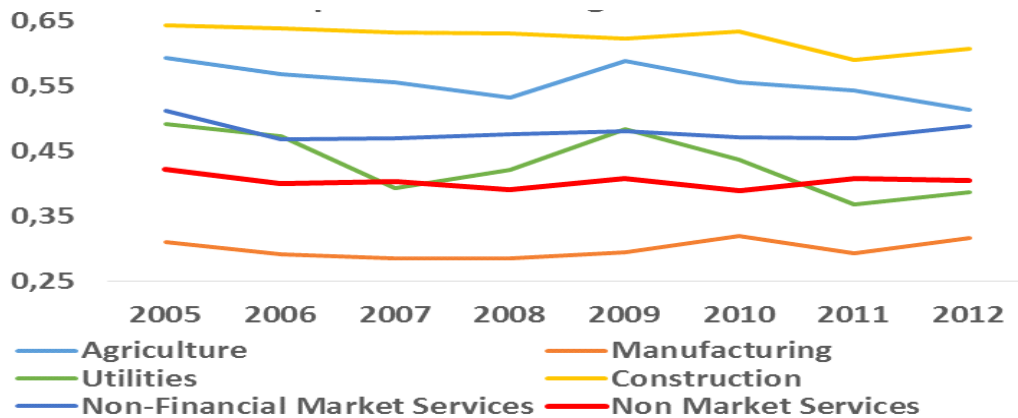
6 With certain exceptions the industries where an increase in the standard deviation includes: pharmaceutical products, chemicals, wood and paper, rubber and plastics, electrical equipment, furniture, accommodation and food services, legal and accounting services, and advertising and market research. Industries with a decrease include: computers, electronic and optical products, publishing, audiovisual and broadcasting activities, IT, electricity and gas, real estate, and telecommunications.

Chart 4: Dispersion of Growth Rates in Portugal, 2005-2012

Panel A: Labour Productivity



Panel B: Multifactor Productivity



Source: based on OECD's Multiprod output. MFP computed as a Solow residual.

Note: Market Services: Wholesale and retail trade, transportation and storage, accommodation and food services, Publishing, audiovisual and broadcasting, telecommunications and IT; Real estate, Legal, accounting, head offices and management consultancy activities, technical, testing and analysis, advertising, market research, veterinary and administrative service activities, repair of computers and household goods.

firms are integrated into global value chains and are either leading their specific field (e.g. Amorim for cork appliances in aerospace industry, CGC genetics or Via Verde for road tolls) or are multinationals where higher productivity levels justify the operation in Portugal.

Moreover, Santos *et al.* (2017) present evidence of spillovers from recently introduced structural reforms in the Portuguese business environment and product markets that impact MFP at a firm level. These spillovers are both related to diffusion from the frontier through learning and innovation by laggards and catching-up by other firms via the adoption of exist-

ing technologies or imitation of production processes.

The stability in dispersion, then, may be due to the low number of Portuguese SMEs connected to GVCs. These are benefiting from the diffusion and catching-up mechanisms but most of the Portuguese firms are not. This is consistent with the low competitive pressure in some product markets highlighted in section 3.

A consequence from a widening dispersion of productivity gains at the OECD level was higher wage dispersion due to skill biased technology enhancements, resulting in a job polarization

Table 3: Dispersion Measures of Wages (per worker)

Sectors	90/10	90/10	90/50	90/50	50/10	50/10	Gini Coefficient	
	(2006)	(2014)	(2006)	(2014)	(2006)	(2014)	2006	2014
Agriculture	4,41	4,46	1,91	1,83	2,31	2,43	0,32	0,31
Mining	3,62	3,79	1,86	1,80	1,95	2,10	0,29	0,30
Manufacturing	3,17	3,12	1,88	1,82	1,69	1,71	0,29	0,27
Utilities	5,82	5,12	2,40	2,35	2,43	2,18	0,42	0,40
Construction	3,88	4,09	1,95	1,91	1,99	2,14	0,33	0,31
Market Services	4,64	4,66	2,23	2,17	2,08	2,14	0,36	0,35
Total	4,24	4,41	2,12	2,06	2,00	2,14	0,34	0,33

Source: IES, firm level data.

where middle income workers become unemployed.

Firm level data shows that the distribution of average wages in firms became less unequal between 2006 and 2014. Table 3 presents different measures of dispersion that confirm lower wage dispersion. The ratio between the 90th and 10th percentiles slightly increased in some sectors (agriculture, market services, construction) but decreased in others (manufacturing, utilities). The increase was fully explained by the evolution in the ratio between middle and low-wage workers (50th and 10th percentiles), given that there was a decrease in the dispersion between wages in the 90th and 50th percentiles. Moreover, Gini coefficients decreased in all sectors except in mining.

Therefore, it seems that distributional effects of the slowdown in productivity growth in Portugal do not match those observed in other OECD countries. Lower productivity growth in Portugal is neither associated with a dispersion of productivity gains between firms in the same sector nor with higher wage dispersion between high and low skilled workers due to skill biased technology enhancements. Consequently, public policies to improve productivity in Portugal may not need to be constrained by equality concerns, as sometimes it is argued (OECD, 2016).

The difference between the Portuguese case and the OECD thesis may arise from the economic crisis, which resulted in a huge increase in unemployment in Portugal, but wage modera-

tion policies were highly progressive (OECD, 2017a). The increase in income inequality was due to higher unemployment (peaked at 17.5 per cent in the first quarter of 2013), not greater wage inequality, given that average earnings for the total economy became more equal. The S90/S10 ratio decreased from 7.1 to 6.4 between 2006 and 2013 (Arnold and Rodrigues, 2015).

Indeed, it was low-wage earners, young and less-skilled workers who were more affected by the increase in the unemployment rate since 2000 and by the worsening of economic conditions that followed the 2008 financial crisis and the near-bankruptcy of 2011.

Productivity Determinants

A way to understand the deceleration of productivity in Portugal is to consider the determinants of LP and MFP growth. Syverson (2011) reviews the productivity literature and presents evidence of very significant effects on aggregate productivity from physical capital investment in information technology, R&D, and human capital accumulation. Moreover, the business environment can affect firm incentives to apply the above factors to raise their own productivity level through a better resource allocation from higher product market competition and knowledge and technology spillovers. Gonçalves and Martins (2016) broadly confirm these determinants for Portuguese manufacturing firms.

Some of the productivity determinants have recently registered a positive evolution —

investment in R&D, ICT capital growth, formal education, birth rate of new firms or increasing integration on global markets. Thus, other reasons must explain why Portugal is not converging in terms of productivity.

Investment in Equipment and Infrastructure

Portugal benefited from a huge inflow of foreign capital after EC entry in 1986. This included both private and official EU funds, and purely financial and FDI flows and it resulted in an increase in the net stock of capital per person employed. According to OECD data, the inflow resulted in capital intensity growth of 4.6 per cent per year between 1995 and 2013, significantly above the EU core (2.7 per cent) and G7 (2.4 per cent) averages.⁷

However, this growth in capital intensity was accompanied by a decrease in both LP and MFP growth rates, as noted earlier in the article. Capital services from this inflow appear not to have been of a sufficiently "high quality" nature to have had a significant positive impact on productivity (e.g. Sakellaris and Wilson, 2004). Capital productivity fell 46 per cent in Portugal between 1995 and 2013.⁸

The unproductive use of capital in the Portuguese economy is also confirmed by the decreased, almost to nil, of the capital per worker contribution to trend labour productivity growth (adjusted for cyclical effects) in Portugal between 2000 and 2015 (Ollivaud *et al.*, 2016).

The weak effect of this capital inflow on productivity is unexpected given the low relative level of capital per worker in Portugal, half of the EU15 core. But capital misallocation and

excessive consumption of imported goods and services explain this situation.

A between-sector misallocation of capital since the 1990s can be seen in the growth of non-tradable sectors and in investment in infrastructure and housing. Reis (2013) hypothesizes that the financial integration after 1995 was not reflected in 'financial deepening' in the tradable sector but through the expansion of less productive private and state firms in the non-tradable sector.

Indeed, a significant part of capital was channeled to state and/or 'protected' industries such as wholesale and retail trade, real estate or construction, which registered higher profits but lower LP (OECD productivity indicators).

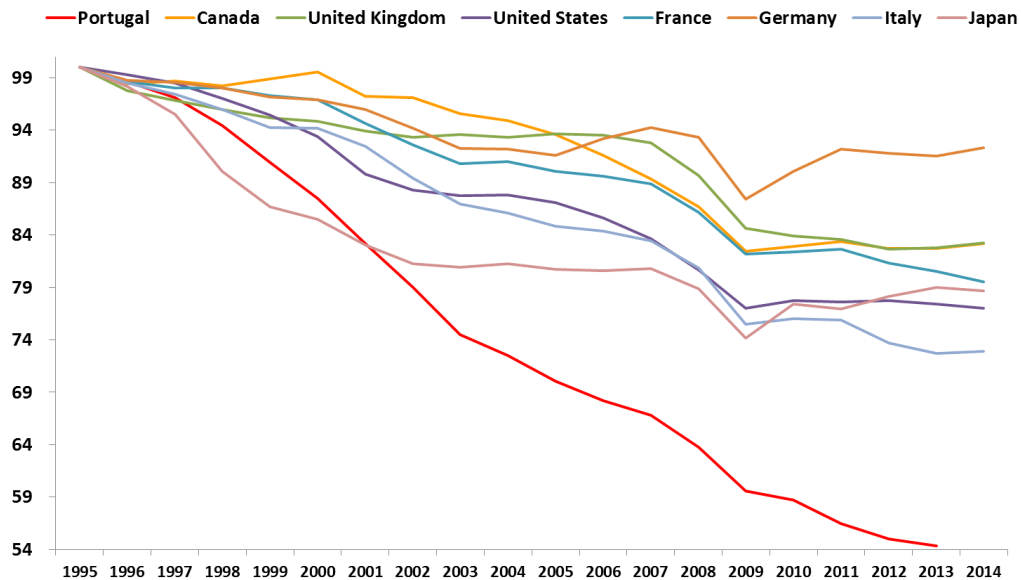
Moreover, there was considerable investment in infrastructure and housing during the 1990s, when the stock of capital in structures was 257 per cent of GDP while the stock of transportation and other equipment was only 78 per cent of GDP. This difference, although partially reflecting the longer life-time of structures, shows that investment in Portugal was too concentrated. Even when capital inflows started to slow down after 2000, structures still represented 60 per cent of total new investment, well above other EU countries and despite the dubious economic (but not political) rationale for such investment. The construction sector represented 11.5 per cent of total employment in 2000, well above that of the EU core countries (6.2 per cent). For example, part of a third highway between Lisbon and Porto (urban areas with 2.8 and 3.6 million people, respectively) was built, when the second highway had a very low level of traffic. Many road investments were made under badly negotiated public-private

7 Capital intensity is the ratio of capital services (the flow of productive services that capital delivers in production) per hour worked.

8 Capital productivity is measured as the ratio between the volume of GDP and the volume of capital input, defined as the flow of capital services. Capital services are estimated by the OECD using the rate of change of the productive capital stock, which considers the reduction in the productive capacity of fixed capital assets. A common computation method for all countries ensures comparability.

Chart 5: Capital Productivity in Portugal and Developed Economies, 1995-2014

1995 = 100, OECD



partnerships where the risk was entirely borne by the Portuguese state. Investment in housing led to a situation in which there were 5 million residential units for a population of 10 million. But because the rental market has not been working since the 1970s, the physical condition of many houses is deteriorated. Most of the residential investment was in new houses in city outskirts and not in refurbishing the old houses in city centers.

These poorly thought out policy decisions contributed to a rapid increase in the level of Portuguese debt but had limited influence on productivity growth. The construction boom was financed by the banking sector, resulting in a credit misallocation that still exists today. Despite being the hardest hit industry in the last fifteen years and its very low profitability, construction still remains the sector accounting for the largest share of bank loans (17 per cent of the total), with the highest non-performing rate, 28 per cent (IMF, 2015).

Finally, excessive consumption is seen by the external financial inflows that were channeled through the banking system to fund imports of

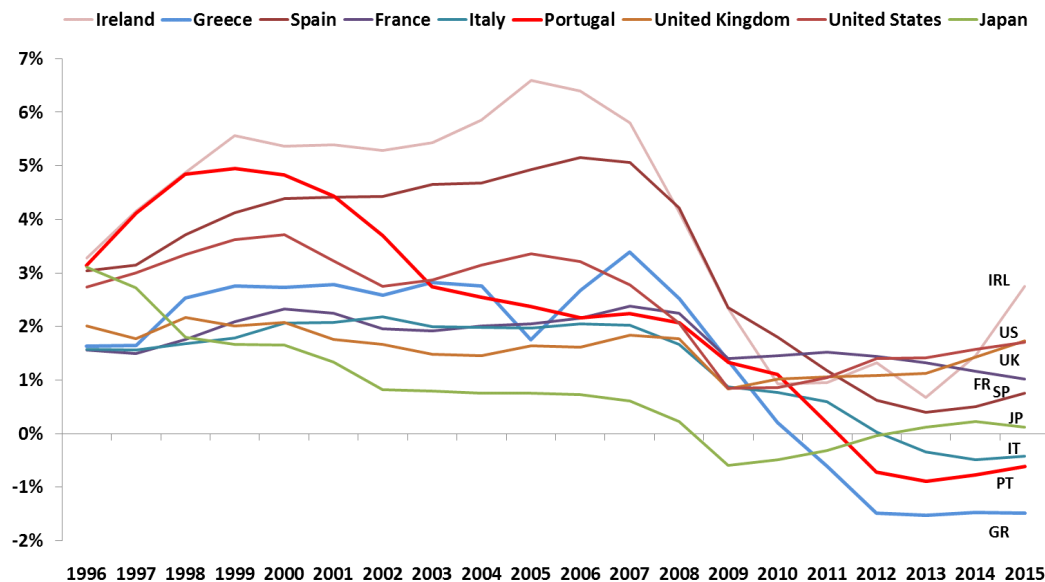
goods and services such as cars or tourism. These flows were reflected in an average deficit of 8.4 per cent of GDP in the Portuguese current account during the decade of 2000.

An increasing mis-allocation of capital via an over-focus on non-tradable sectors (OECD, 2017b), bad investment decisions in infrastructure and housing when capital was abundant, together with a low level of capital per worker and a recent financing constraint to the whole economy has resulted in investment growth below the level needed to replace the capital stock. This is a very important bottleneck to productivity growth.

R&D, ICT and Innovation

Gross domestic expenditure on R&D in Portugal was 1.3 per cent of GDP in 2014, up from 0.7 per cent in 2000. The number of researchers per thousand employed is now higher than in the OECD or the EU28. Moreover, and according to the OECD, Information and Communication Technology (ICT) capital services per hour worked grew an average of 11.3 per cent

Chart 6: Net Capital Stock Growth Rate in Selected OECD Countries, 1996-2015



Source: AMECO. Note: Growth rates of net capital stock (constant prices): 2014-2015: provisional data

between 1995 and 2013, above that of the United Kingdom, the United States and Japan.

Furthermore, Portugal is seen as a moderate innovator and is ranked 18th in the European Innovation Scoreboard 2016 (EIS), presenting an innovation performance only slightly below the EU average. In the mostly perception-based Global Competitiveness Report 2015, Portugal ranks (out of 140 countries) well in some indicators: technological readiness 26th (32nd in 2008); innovation 28th (35th in 2008); availability of scientists and engineers 21st (48th in 2008); availability of new technologies 18th (28th in 2008); and quality of scientific research institutions 21st (33rd in 2008);

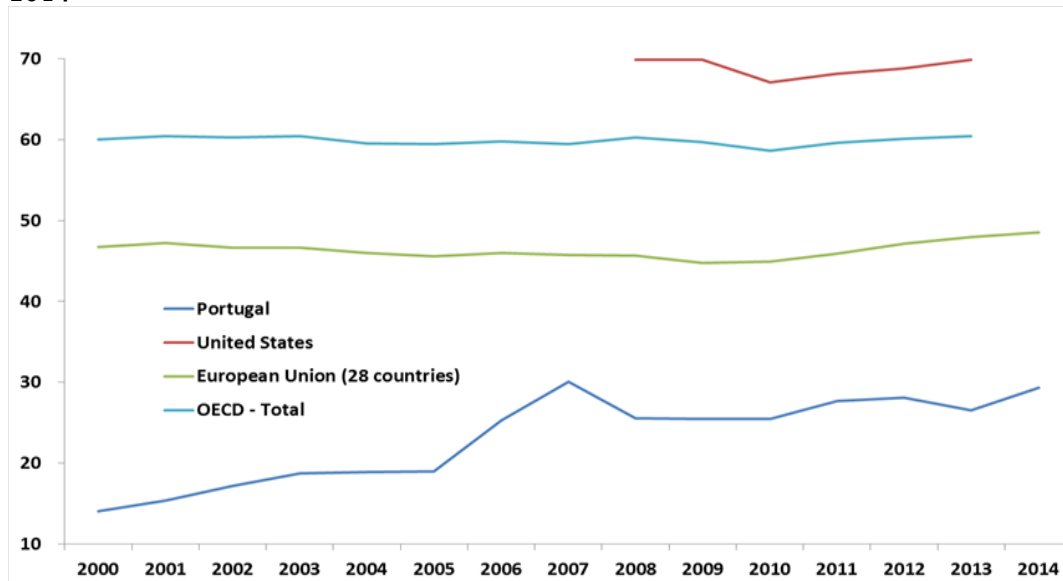
These improvements in innovation performance are the outcome of public policies that aimed to increase the stock of knowledge produced in the Portuguese scientific community. However, they did not lead to higher LP or MFP growth because these policies targeted mainly non-market research. R&D is still too concentrated in the state sector, mainly in uni-

versities, and is mostly of a fundamental and not of an applied nature (Heitor *et al.*, 2014).

The rankings mostly reflect the level of R&D expenditure but do not consider the efficiency or the market usage of these investments. Business oriented policies were based on tax credits and subsidies to investment in R&D and innovation. But these were insufficiently evaluated, were partly targeted at non-tradable industries and achieved limited success. Other policy efforts, such as the placement of PhDs in firms, failed.

Investments in information technology and R&D benefit productivity growth through the improvement of production processes and better products and services (Jorgenson *et al.*, 2008; Balasubramanian and Sivadasan, 2011). Furthermore, such investments may generate productivity spillovers through the diffusion of innovation knowledge (Gersbach and Schmutzler, 2003) and technology transfer (Bloom *et al.*, 2007) from firms in the global or national productivity frontier. The question is to what degree did this happened in Portugal?

Chart 7: Business Enterprise Researchers Per Thousand Employed (% of total), 2000-2014



Source: OECD

The low number of researchers in business, the low total expenditure in R&D or the low number of patent applications by Portuguese firms indicates that these positive effects on productivity growth were limited.

The number of researchers per 1,000 employees who work in businesses in Portugal in 2014 are still half of the OECD and U.S. average and 60 per cent of the EU28 average (Chart 7). In a similar way, expenditure on R&D in Portugal is almost half of the OECD average (2.4 per cent of GDP in 2014). Business expenditure on R&D in total R&D spending is growing (from 28 per cent in 2000 to 50 per cent in 2014) but partially due to lower state spending. It still is below that of most developed economies (the OECD average is almost 70 per cent).

Patent applications per 1,000 researchers in Portugal are also very low, at one tenth of the OECD average. The number of Portuguese patent applications filed under the Patent Cooperation Treaty per 1,000 researchers (FTE) was 4 in 2014 (2 in 2000), well below the OECD average of 38 (21 in 2000).

R&D and innovation resources were excessively allocated to non-market sectors, significantly limiting the potential positive effects on productivity growth. Significant incentives were destined to increase the stock of knowledge but were not sufficient in encouraging more efficient and innovating producers to replace less efficient ones, exposing a lack of coordination between science and innovation policies in this area.

The small number of medium and large firms with financial strength for long term investment and the relatively large percentage of firms in services, where R&D and technology are less important, help explaining why a growing share of incentives were channeled through the state sector and not via businesses. Portugal needs to improve the market orientation of R&D and to evaluate public policies in order to benefit productivity growth.

Human Capital Accumulation

Portugal is rapidly converging with the EU15 average in formal education. The gap on the

workforce with tertiary education was reduced by 5 percentage points in the last 15 years (to 8.2 percentage points). In secondary education, 12 years of formal education is legally required in Portugal. The recent results of PISA and TIMSS tests show that this convergence is not only a question of formal educational attainment but also of educational performance.

However, this convergence in education attainment toward the EU average coincided with the slowing down of productivity growth. Human capital accumulation arising from increased education and training is expected to accelerate LP and MFP growth (Fox and Smeets, 2011). In the case of Portugal, it was not sufficient. Three reasons may explain why: wasted resources, poorly-aligned incentives and insufficient policy evaluation.

Primary and secondary education in Portugal is still too centralized and schools have little autonomy. Financing is too dependent on the state and is not associated with school performance. Real expenditure grew by 33 per cent since 2008, the largest increase among OECD countries except Turkey (OECD, 2016). Because the number of students fell by 6 per cent, the growth in expenditure per student was even higher. Overall, Portugal has spent 6.1 per cent of GDP in education in 2013 (4.6 per cent in 2008), above the OECD average of 5.2 per cent.

An increase would be justifiable if the goal was to improve adult education, where the gap in education is wider and long-term unemployment is concentrated. But this seems not to be the case because only 0.3 per cent of persons 25 and over were enrolled in upper secondary education in 2014.

Training and vocational programs oriented toward the needs of employers improve skills of employees and help the unemployed re-enter the labour market. But the effectiveness of these policies varies considerably and has room for

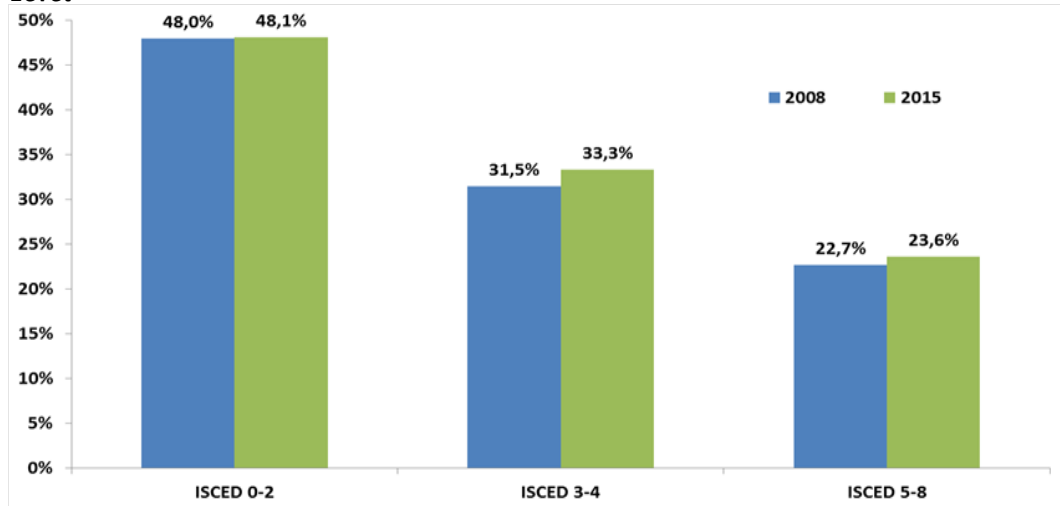
improvement. The number of graduates in vocational programs is growing rapidly although it is still below the OECD average. In 2014, 41 per cent of 25-34 years-old with upper secondary education had graduated from a vocational program, below the OECD average of 59 per cent (OECD, 2015b). The employment rate for this group was around 80 per cent, indicating a high level of effectiveness.

Training policies benefited from a recent attempt to increase on-the-job training and to integrate employers and other stakeholders in their design. But although Portugal received financial support from the EU in the last 30 years for these policies, their use was seldom duly evaluated, often resulting in a waste of resources with no sustainable effects for the beneficiaries.

Poorly-aligned incentives do not help. Education funds are allocated to the Ministry of Education while vocational and training funds are divided between the Ministries of Education and Labour. In practical terms, several government branches compete for these centrally managed funds, presenting a long and often confusing range of policy measures and programs. Moreover, both unions and employers saw frequently EU funds as a way to finance their activities and governments usually felt obliged to spend them to avoid the perception of not taking advantage of their availability, independently of the expected return.

A second point is that employment-friendly labour market institutions facilitate a better matching between supply and demand. Despite recent improvements — the reduction in the regulatory differences between permanent and temporary contracts and in severance payments, and a review of the definition of fair dismissal (OECD, 2017a) — Portugal still remains the OECD country with the strictest employment protection legislation for individual dismissals (OECD, 2017b).

Chart 8: Employment in Tradable Industries as a Share of Total Employment in Each Skill Level



Source: Portugal Statistics Labour Force Survey. ISCED 0-2 corresponds to lower level of education and ISCED 5-8 to higher.

Note: Tradable industries presented in footnote 2 above.

Furthermore, the Portuguese labour market has two important segmentations. The first segmentation is between permanent and temporary employees, where the first group consists of two thirds of the labour force that are highly protected from individual dismissals, while the remaining are either under short-term and unstable contracts or are free-lancers, in the private sector, and often with weaker incentives for training to improve their skills. The second segmentation crosses the first and is between permanent public employees, with a better-paid (the wage differential may reach 14 per cent or more after adjusting for qualifications, according to Mercer (2013), job-for-life guarantee, from the remaining workers with temporary contracts (in the state and private sectors) and with permanent ones in the private sector (better protected but with no job-for-life guarantee and vulnerable to collective dismissals).

These two segmentations progressively benefited the non-tradable sector, more sheltered from competition and with lower productivity, attracting workers from manufacturing and better-paid skilled workers. Tradable industries are

still too dependent on low-skilled workers while high-skilled ones are mostly on non-tradable industries (Chart 8). The growth of these sectors led to a misallocation of labour and skills thus hampering LP and MFP growth.

The recent improvement in formal education may also strengthen Portuguese firms with better-skilled managers. However, it does not necessarily affect all firms. Bloom *et al.* (2012, 2014) show that manufacturing firms in Portugal have one of the lowest scores in management practices, associated with weaker market competition, more regulated labour markets and lower worker skills and conclude that management explains a very significant share (up to half of it) of MFP differences across countries. Moreover, managers in state-owned companies or business owners still tend to centralize decisions more frequently, thereby preventing changes from workers' learning-by-doing that benefit labour productivity growth (Benkard, 2000).

Finally, the ageing of the Portuguese population is another reason for a slowdown in productivity growth. A quarter of the workforce is expected to be more than 55 years old very soon

and this age group may be less able and willing to effectively use new technologies, dampening innovation. Aiyar *et al.* (2016) find Portugal as one of the worse affected countries by labour force aging in terms of future MFP growth. This result should be seen cautiously because it is assumed that human capital at that age will not improve. However, the percentage of Portuguese youth (20-24 years old) with a degree is now similar to the EU15 average and, even if it will take some time, the younger Portuguese workers will be more productive when growing older.

The remarkable progress in formal education in the last 15 years has been associated with wasted resources, non-aligned incentives and increasing labour and skills misallocation to low-productivity sectors due to double labour market segmentation. These must be improved so that productivity growth can accelerate, even with an ageing population.

Business Dynamism

Policy incentives for new firms to be created, grow and thrive were in place for many years: venture capital, business angels, seed financing and an entrepreneurial ecosystem. These incentives were complemented by a friendly business environment where new laws were implemented in a way intended not to be harmful for economic activity. Important legal simplifications and cost reductions for the establishment of new firms were implemented in the last 10 years thus reducing barriers to entry.

Portugal was one of the countries with the greatest improvement in OECD's Product Market Reforms indicator between 2008 and 2013. It now ranks 9th among the EU countries and 12th out of 33 OECD countries. In a similar way, Portugal has the 25th most favourable business environment among 189 economies in the World Bank's Ease of Doing Business Index (World Bank, 2017)

Moreover, the country has a high birth rate of firms (number of new firms as a percentage of existing firms). In 2013, it was 14.3 per cent, the fourth highest among 26 European countries. As in other countries, there is a on-going trend where young entrepreneurs create internet-based firms.

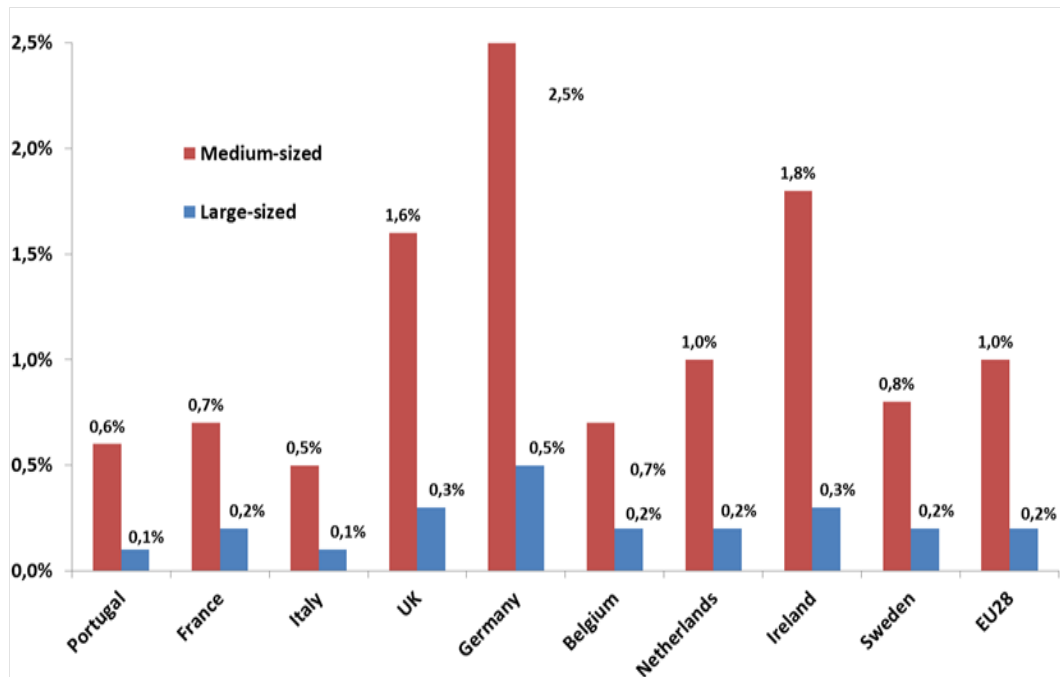
The examples of business dynamism highlighted above may indicate that the Schumpeterian process of creative destruction is in place in Portugal. However, its effects are not being felt in terms of productivity growth because two main problems are affecting business dynamism.

The first is that new Portuguese firms have also a high mortality rate. Despite the high birth rate, the number of firms have decreased 4% between 2008 and 2012, recovering afterwards. This is not a problem if the new firms, with a higher productivity level, are replacing old and stagnant ones. However, most of these start-ups are not able to grow. Between 2009 and 2013 only 6 per cent of the Portuguese firms were less than 2 years old (OECD, 2017b). This requires an evaluation of policy incentives.

Moreover, half of the small firms are more than 10 years old (OECD, 2017b) but some continue to exist despite being in a near insolvent situation. In the period 2010-2014, 41 per cent of Portuguese firms had interest payments that exceeded the cash-flow they could generate in at least one fiscal year. Around 20 per cent of firms paid more in interest than the generated cash-flow in every one of those 5 years. Their survival, even considering tax evasion, indicates that barriers to exit are more present than the high mortality rate might imply and confirm a within-industry resource misallocation (Dias *et al.*, 2015).

Braguinsky *et al.* (2013) also show that Portuguese firms, in contrast to firms in other developed countries, are even shrinking and that several labour laws discriminate against medium and large firms, a disincentive to grow. This

Chart 9: Share of Enterprises by Size in 2015



Source: European Commission

explains why there are too few firms with more than 50 employees in Portugal, half (as a percentage of the total) of the EU28 average, one third of the UK and Ireland or one fifth of Germany (Chart 9). The existence of large firms is important because it may facilitates the integration of SMEs into global value chains.

EU data confirms that large and medium-sized Portuguese firms also account for a lower share of employment (37 per cent) than in France (52 per cent), United Kingdom, (63 per cent) and Germany (58 per cent), indicating both an inefficient labour allocation and an insufficient reallocation of labour. Therefore, creative destruction is not occurring and a misallocation of resources exists because they are not moving from firms with lower productivity into new and innovative ones, with a higher level of productivity (Lentz and Mortensen, 2008; OECD, 2015a).

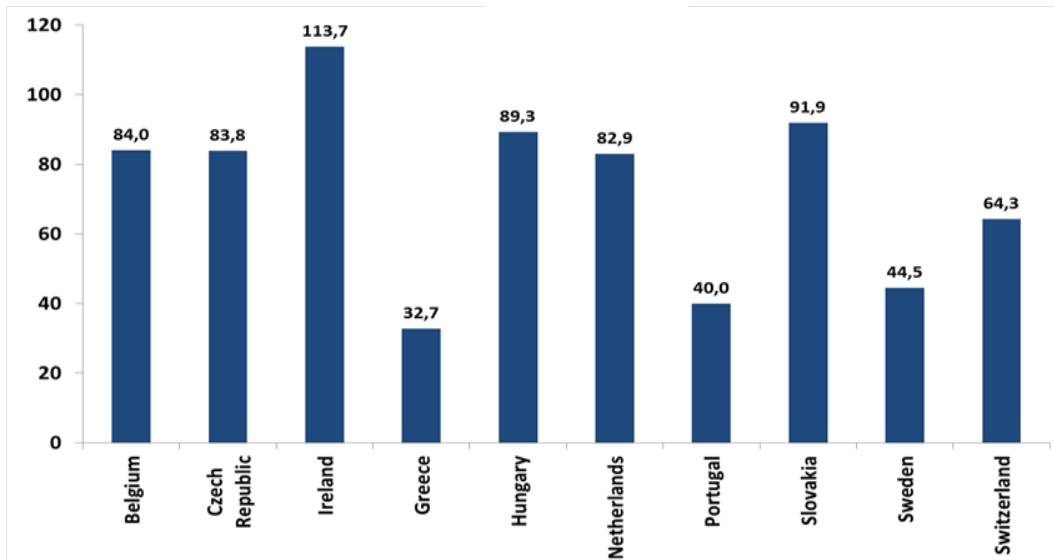
The second is that obstacles still negatively affect the growth of firms. Despite the simplifi-

cation efforts of the last decade, firms still complain about excessive regulations, a justice system characterized by long delays, an arduous environmental licensing regime and an unstable legal environment, where tax conditions are permanently changing and new levies being introduced (Portugal Statistics, 2015).

Furthermore, excessively low levels of equity capital, incomprehensible and unstable financial policies where alternative financing has a limited impact on firms, and a stricter environment that reduces the access to financing, especially for new firms, are also barriers to business dynamism.

The level of debt of Portuguese firms reached almost 180 per cent of GDP in 2012. After considerable deleveraging, it still was 150 per cent of GDP by mid-2016. This represents one of the highest business debt levels in the EU, 20 percentage points above the Euro area average. Most Portuguese firms face liquidity problems and financing difficulties and, according to

Chart 10: Exports as a Proportion in Middle-Size European Countries, in % of GDP, 2014



Source: Eurostat

Banco de Portugal, almost 30 per cent have non-performing loans.

Finally, the difficulty for new firms to survive increases the market power of incumbents thus reducing product market competition. A consequence is that firms, when facing less competition, have a reduced incentive to bear the temporary but "disruptive" costs of introducing productivity-enhancing technology or change production practices (Foster *et al.*, 2001, 2006; Bloom *et al.*, 2015). This is more relevant for non-tradable industries, protected from external competition. Furthermore, it may limit the efficiency of knowledge and technology diffusion mechanisms, thus explaining why there was stability in the dispersion of productivity growth rates since 2005.

Higher productivity growth requires a business environment where more firms survive and scale-up their activity so that product market competition is increased, resource misallocation is minimized and incentives for firms to invest in enhancing-productivity technology and production practices are acted upon.

Openness and Internationalization

The international trade literature shows that more open countries experience faster productivity growth (e.g. Edwards, 1998, for empirical evidence).

Portugal is a small and not particularly open economy, at least compared with countries of similar size and level of development. Export flows confirm this picture. Between 1995 and 2008, when resources were mostly allocated to non-tradable sectors, exports as a percentage of GDP increased 0.77 percentage points annually, from 22 per cent to 32 per cent of GDP.

Since 2009 exports as a share of GDP have risen almost three times faster, an annual average of 2 percentage points, attaining 41 per cent in 2015. This is because Portuguese firms faced a domestic recession and had no alternative than to focus on external markets. But the export share of GDP still is well below those of other middle sized European countries such as Belgium, Czech Republic, Hungary, Slovakia and Ireland (Chart 10).

After 2010 a growing number of Portuguese firms benefited from a reduction in unit labour costs, gaining market share, looking for new

markets and increasing the internationalization of their activities. The number of exporting firms grew 6 per cent per year from 2010 to 2014, when 1 in 5 Portuguese companies exported goods or services.

Although the economics literature usually finds that more productive firms are the ones that start exporting, some research shows firms experiencing productivity growth after entering foreign markets (De Loecker, 2007). Moreover, an increase in competition abroad can also raise the incentive of firms to engage in innovative activities and induce them to make difficult productivity-enhancing investments, such as quality upgrading in plants, leveraging the benefits of productivity gains across larger markets and leading to aggregate productivity growth via the "within" firm component (Syverson, 2011).

Export developments show that the Portuguese economy is improving its external competitiveness but from a low base. Portuguese firms are slowly adapting to a context where developing countries have almost free access to the EU market. Given that Portuguese exporters are more productive than non-exporters, pay better wages, invest more on human capital and generate larger spillover effects (Correia and Gouveia, 2016), a higher growth in exports would help to reallocate resources to these sectors and minimize the inefficient allocation to non-tradable industries.

The idea of a relatively closed economy is confirmed by the low level of FDI stocks in Portugal, 51 per cent of GDP, below most of the EU middle-size economies and of EU28 average (80 per cent). Part of it may be associated with its peripheral location in the EU single market and the comparative disadvantage related to production costs, skilled labour and productivity relative to Eastern European countries. The EU entry by these countries in 2004 negatively

affected the Portuguese economy by deviating FDI flows from countries such as Germany or Italy to the new EU members. These investments are usually export-oriented and thus allocate resources toward tradable sectors. Moreover, FDI driven spillovers may account for a substantial portion of productivity growth, especially in high-tech sectors (Keller and Yeaple, 2009).

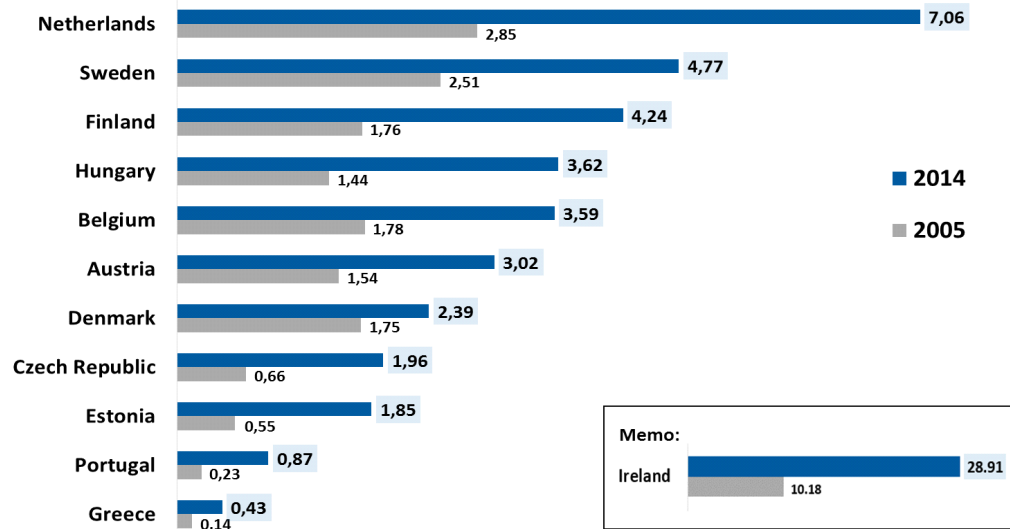
A low degree of openness is also seen in Portuguese receipts from the sale and use of patents, non-patented knowledge, drawings and models, brands and technical consulting services. A four fold increase in technological receipts as a proportion of GDP took place between 2005 to 2014. But receipts are much lower than in other countries (Chart 11). Given that tradable sectors such as ICT, electronics, machinery or pharmaceuticals are the largest investors in R&D, higher and growing receipts may be associated with a better allocation of capital and labour.

The level of participation in global value chains also confirms that Portugal is not as open as it is usually referred to as a small-open economy (Chart 12).⁹ The progressive fragmentation of international trade is making Portuguese firms more integrated in global value chains and improving the value added of their production, but at a slow pace when compared with Eastern European countries. Portugal is below countries of similar size such as Sweden, Ireland, Hungary or the Czech Republic, and more so in forward linkages, thus delaying potential benefits for productivity growth (Crisuolo *et al.*, 2016).

Although the Portuguese economy is becoming more open, the level of openness is still insufficient when compared with similarly developed economies. More openness, and more competitive firms operating in global markets, is a way to improve resource allocation and reverse the sluggish productivity pace in Portugal.

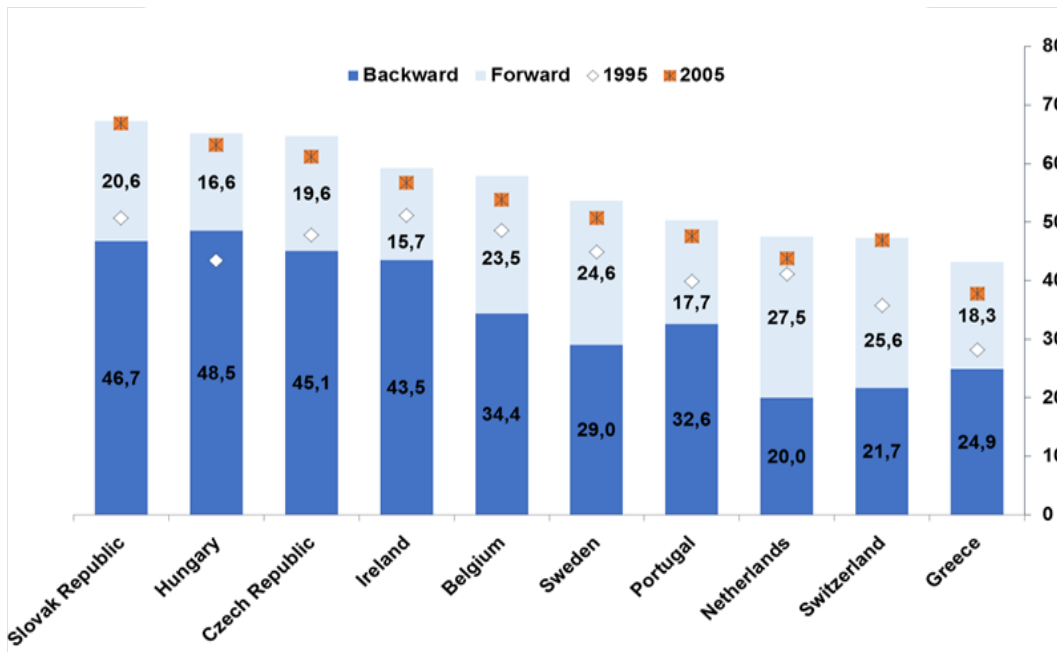
9 The GVC participation index adds up backward linkages, the import content of exports, and forward linkages, the domestic content incorporated in the exports of other countries.

Chart 11: Technological Receipts as a Proportion of GDP in EU Countries, 2005 and 2014



Source: OECD

Chart 12: GVC Participation Index, as a Proportion of Gross Exports, 2011



Source: OECD - Trade in Value Added (TIVA), October 2015

Policies to Improve Productivity Growth

The above assessment of the Portuguese situation indicates that there are different reasons for the slowdown in productivity growth and a lack of convergence with developed economies

since the mid-1990s. Five types of resource misallocation can be identified:

- Between-sector misallocation of capital in non-tradable sectors and via the insufficient market orientation of R&D investments;

- Between-sector misallocation of labour and skills in non-tradable, including state, industries where workers are better paid but the level of productivity is lower;
- Within-sector misallocation of capital and labour related to the survival of excessively indebted and economically non-viable zombie firms;
- Between-firms resource misallocation arising from the insufficient number of firms able to grow and become large; and
- Within-firms resource misallocation from low competitive pressure to innovate in non-tradable sectors

Given that the potential return of policy reforms is significant (e.g. Bouis and Duval, 2011), improved public policies are needed to change incentives, reduce market inefficiencies, and enhance aggregate productivity growth (Albrizio and Nicoletti, 2016).

Markets

Greater product market competition is necessary in oligopolistic sectors such as wholesale trade, wholesale banking, professional services, energy and other network industries, by removing institutional barriers to entry and to growth. Tax and other targeted policies to attract FDI, in areas such as health or tourism, could improve capital utilization, raise the capital per worker ratio and facilitate the up-scaling of firms and productivity acceleration.

This enhanced competition would reduce mark-ups and rent-seeking, and increase physical and human capital stocks in tradable industries, including foreign and private investment in equipment and ICT, thus diminishing between-firms and within-firms misallocation.

An evaluation of policies to implement a transparent and simple set of public incentives that promote a change of resources from sheltered to tradable sectors is needed. In this way, the insolvency of non-viable and excessively

indebted zombie firms is achieved by cancelling credit lines, subsidies and other public policies that sustain their survival while helping to reduce credit misallocation in the banking sector (McGowan *et al.*, 2017). Such action would accelerate the replacement of zombie firms by freeing the portfolio of lenders in order to reorient financing to growing firms with higher productivity levels, thus reducing within-industry and between-sector inefficiencies.

Formal education, specific training and learning-by-doing should improve human capital in accordance with the expected needs of employers. Secondary and tertiary education curricula can include on-the-job training, access to tertiary education can be complemented with detailed information about future job prospects and graduate courses should be less compartmentalized so that students can have flexible choices when deciding their future careers.

This is important due to the expected positive effects on LP through better between-sector skills allocation and because formal education is associated with a higher employment rate and with a wage premium. Tertiary education in Portugal produced, in 2012, a wage premium of 68 per cent over upper secondary education, above the OECD average of 55 per cent.

Coordinated policies in the areas of education and employment are also required so that incentives are aligned and oriented to improve the skills of workers and to prompt managers in family and state owned firms to correct practices that negatively affect productivity growth (Bloom *et al.*, 2014).

Human capital accumulation should be complemented with a less segmented labour market that reduced upon the currently highly restricted allocation of skills and workers between tradable and non-tradable activities and the state and private sectors. This is achieved by establishing the same laws throughout the economy so that asymmetric employment guarantees

are dismantled, learning-by-doing potential is enjoyed, performance-based bonuses and promotions are available and labour market matching is improved. The attraction of specialized migrant workers may compensate for a lack of skills and help minimize the effects of an aging and declining population.

A flexible labour market would prevent hysteresis effects caused by unemployment from hampering structural change thus facilitating the transfer of resources from low to high productivity activities while reducing labour slack and long-term unemployment. This can be reinforced by decreasing economic rents in certain non-tradable sectors in order to balance relative wages with tradable sectors and by wage setting institutions to ensure wages reflect differences in labour productivity.

Third, the last decade has shown that the simplification and deregulation of administrative procedures are not sufficient if the number of new laws and regulations is not reduced. These laws are currently promulgated by too many jurisdictions at the local, national, EU and international level, including regulatory agencies at different layers. The principle that all situations ought to be anticipated by the legislator should be replaced with regulatory predictability based on common sense and general principles so that organizational slack is limited.

The business environment can be improved in an array of ways: less corruption, stronger public entities, better defined property rights, lower requirements to investment and for enforcing a contract, and a lower tax burden and compliance costs (Julio *et al.*, 2013; Arnold and Barbosa, 2015). Furthermore, market distortions such as legal requirements that create negative incentives to becoming larger should be eliminated and an excessive and confusing number of taxes, subsidies and policy programs to be made simpler and manageable by small firms so that between-firms allocation is bettered.

Firms

Portuguese firms are too small and too indebted. Favourable conditions are needed for firms to scale-up and to enter international markets. Public policies can help by targeting new and innovative firms and by removing barriers for zombie firms to exit.

One way is to improve the effectiveness of the different financing policies by simplifying the institutional setting and to close the gap between their medium and long term needs and the willingness of lenders to provide it. The difficulty of firms to grow and the small number of large firms indicate that alternative sources of financing are not truly effective. Policy incentives should be changed so that firms may reach a sustainable debt-to-equity ratio: elimination of the tax debt bias and promotion of profit reinvestments by entrepreneurs. Moreover, the tax system should reward those that are more prone to take risks and initiative.

Dynamic firms operating in liberalized markets are keener on taking advantage of policies that support R&D spending and technology developments. This is a way for firms to increase the number of researchers, patent applications and investment in other intangible capital, thus benefiting from diffusion mechanisms, prompting applied R&D and improving within-firm resource allocation.

Too many firms are exclusively focused on the domestic market. For productivity to accelerate, the relatively small size of the Portuguese economy requires access to larger markets to achieve scale economies.

SMEs may also take advantage of global value chains by adjusting their activity to external demand. This can be done by developing incentives to supply larger exporting companies with differentiated products and services. It is a way to survive and to achieve efficiency gains from higher integration in global markets.

As long as firms grow and develop their connections to international markets, technology diffusion can more easily cross borders, thus creating better conditions to benefit from knowledge spreading externalities and promoting the attraction of foreign investment in R&D and a widespread use of digital technologies to improve productivity in production processes (IMF, 2016).

Moreover, if these internationalization efforts were also directed to academic and scientific stakeholders and if labour market segmentation between the state and private sectors is mitigated, domestic knowledge and technology diffusion could be reinforced and skills become allocated to industries with higher level of productivity.

Some of the above policies are being implemented. But often there is a loss of continuity in public policies when a new government takes office. Moreover, policy evaluation is not undertaken on a regular basis, thus hurting the ability to continuously learn and improve public policy. Therefore, evaluation from a productivity perspective can lead to better policies.

The best option may be to establish an independent productivity council, similar to those in Australia and New Zealand (Banks, 2015). This advising body would have the aim to evaluate and to identify and underline the benefits of pro-productivity policies, thus being useful in counterbalancing interests opposed to reforms.

Conclusion

The growing integration of the Portuguese economy into global markets was expected to lead to a convergence in productivity to the most developed countries. Paradoxically, this has not happened. After 40 years of democracy and economic integration Portugal still has almost the same gap in labour productivity with developed countries.

Since the 1990s, inappropriate incentives increased resource misallocation at industry and firm levels, exacerbating market inefficiencies. Insufficient policy evaluation explains why it is taking so long to correct them.

The recent improvement in some productivity determinants has not been sufficient. Economic policy was too focused on creating jobs independently of their sustainability while ignoring reforms to improve resource allocation and productivity growth.

The policy proposals in this article may help to enhance resource allocation, to improve competitiveness and to achieve a higher economic return. More is needed from the public sector, namely stable and effective policies that are continuously evaluated.

More is also needed from the private sector. Portuguese firms are still too small, too indebted and structurally too dependent on domestic demand. But firms are the key for the Portuguese economy to become better integrated into global value chains so that the global productivity frontier is more frequently reached.

References

- Adler, G., R. Duval, D. Furceri, S. Kiliç Çelik, K. Koloskova, and M. Poplawski-Ribeiro (2017) "Gone with the Headwinds: Global Productivity," IMF Staff Discussion Note 17/04.
- Aiyar, Shekhar, Christian Ebeke and Xiaobo Shao (2016) "The Impact of Workforce Aging on European Productivity," IMF Working Paper 238.
- Albrizio, Silvia and Giuseppe Nicoletti (2016) "Boosting Productivity: A Framework for Analysis and a Checklist for Policy," presented at the Global Forum on Productivity, Lisbon.
- Andrews, D., C. Criscuolo and P. Gal (2015) "Frontier Firms, Technology Diffusion and Public Policy: Micro Evidence from OECD Countries," OECD Productivity Working Paper.
- Andrews, Dan, Chiara Criscuolo and Peter Gal (2016) "The Best versus the Rest - The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy," OECD Productivity Working Paper.

- Arnold, Jens, Natália Barbosa (2015) "Structural Policies and Productivity: Evidence from Portuguese Firms," OECD Economics Department Working Papers, No. 1259, Paris.
- Arnold, Jens, C. Farinha Rodrigues (2015) "Reducing Inequality and Poverty in Portugal," OECD Economics Department Working Paper No. 1258, Paris.
- Balasubramanian, Natarajan, and Jagadeesh Sivasadan (2011) "What Happens When Firms Patent? New Evidence from U.S. Economic Census Data," *Review of Economics and Statistics*, Vol. 93, No. 1, pp.126-46.
- Balta and Mohl (2014) "The Drivers of Total Factor Productivity in Catching-up Economies," in *Quarterly Report on the Euro Area*, Vol. 13, issue 1, April.
- Banks, Gary (2015) "Institutions to Promote Pro-Productivity Policies: Logic and Lessons," paper presented at "Global Dialogue on the Future of Productivity Growth: Towards an OECD Productivity Network," Mexico City, July 6-7.
- Bartelsman, Eric J., Jonathan E. Haskel, and Ralf Martin (2008) "Distance to Which Frontier? Evidence on Productivity Convergence from International Firm-Level Data," Centre for Economic Policy Research Discussion Paper 7032.
- Benkard, C. Lanier (2000) "Learning and Forgetting: The Dynamics of Aircraft Production," *American Economic Review*, Vol. 90, No. 4, pp. 1034-54.
- Berlingieri, Giuseppe, Patrick Blanchaney and Chiara Criscuolo (2017) "The Great Divergence(s)" OECD Science, Technology and Innovation," Working Paper, forthcoming.
- Berlingieri, Blanchenay, Calligaris and Criscuolo (2017) "Firm-level Productivity Differences: Insight from the OECD's Multifactor MultiProd Project," *International Productivity Monitor*, Vol. 32, pp. 97-115.
- Blanchard, Olivier (2007) "Adjustment within the Euro: The Difficult Case of Portugal," *Portuguese Economic Journal*, Vol. 6, pp. 1-21.
- Bloom, Nicholas, Mark Schankerman, and John Van Reenen (2007) "Identifying Technology Spillovers and Product Market Rivalry," NBER Working Paper 13060.
- Bloom, Nicholas, Christos Genakos, Raffaella Sadun, and John Van Reenen (2012) "Management Practices Across Firms and Countries," NBER Working Paper 17850, February.
- Bloom, Nicholas, Renata Lemos, Raffaella Sadun, Daniela Scur, and John Van Reenen (2014) "The New Empirical Economics of Management," NBER Working Paper 20102, May.
- Bloom, Nicholas, Mirko Draca, and John Van Reenen (2015) "Trade Induced Technical Change? The Impact of Chinese Imports on Innovation, IT and Productivity," *Review of Economics Studies*, Vol. 83, No. 1, pp. 87-117.
- Bouis, R. and R. Duval (2011) "Raising Potential Growth After the Crisis: A Quantitative Assessment of the Potential Gains from Various Structural Reforms in the OECD Area and Beyond," OECD Economics Department Working Papers, No. 835, (Paris: OECD Publishing).
- Braguinsky, Serguey, Lee G. Branstetter, and André Regateiro (2013) "The Incredible Shrinking Portuguese Firms," NBER Working Paper 17265.
- Correia, A.L., Gouveia, A.F., (2016) "What Determines Firm-level Export Capacity? Evidence from Portuguese Firms," GEE Papers No. 57, April, <http://www.gee.min-economia.pt/>.
- Criscuolo, Chiara and Jonathan Timmis (2017) "The Relationship Between Global Value Chains and Productivity," *International Productivity Monitor*, Vol. 32, pp. 61-83.
- De Loecker, Jan. (2007) "Do Exports Generate Higher Productivity? Evidence from Slovenia," *Journal of International Economics*, Vol. 73, No. 1, pp. 69-98.
- Dias, Daniel, Carlos Marques, and Christine Richmond (2015) "Misallocation and Productivity in the Lead Up to the Eurozone Crisis," *International Finance Discussion Papers* 1146.
- Eckaus, Richard (2008) "Portugal: Then and Now," in *Challenges Ahead for the Portuguese Economy*, Francesco Franco ed., ICS.
- Edwards, Sebastian (1998) "Openness, productivity and growth: what do we really know?" *Economic Journal*, Vol. 108, (March), pp. 383-398.
- Foster, Lucia, John Haltiwanger, and C. J. Krizan (2001) "Aggregate Productivity Growth: Lessons from Microeconomic Evidence," in *New Developments in Productivity Analysis*, Charles Hulten, Edwin Dean, and Michael Harper, (eds.), (Chicago: University of Chicago Press), pp. 303-363. University of Chicago Press.
- Foster, Lucia, John Haltiwanger, and C. J. Krizan (2006) "Market Selection, Reallocation, and Restructuring in the U.S. Retail Trade Sector in the 1990s," *Review of Economics and Statistics*, Vol. 88, No. 4, pp. 748-58.
- Fox, Jeremy T., and Valérie Smeets. (2011) "Does Input Quality Drive Measured Differences in Firm Productivity?" National Bureau of Economic Research Working Paper 16853.
- Freitas, Miguel L. (2012) "O Capital," chapter 3 in *História Económica de Portugal 1700-2000, volume III*, Orgs. Pedro Lains and Álvaro Ferreira da Silva.
- Gersbach, Hans, and Armin Schmutzler (2003) "Endogenous Technological Spillovers: Causes

- and Consequences," *Journal of Economics and Management Strategy*, Vol. 12, No. 2, pp. 179-205.
- Gopinath, Gita, S. Kalemli-Ozcan, L. Karabarbounis and C. Villegas-Sanchez (2017) "Capital Allocation and Productivity in South Europe," *Quarterly Journal of Economics*, (Forthcoming).
- Gonçalves, Daniel and Ana Martins (2016) "The Determinants of TFP Growth in the Portuguese Manufacturing Sector," GEE Papers Vol. 62, <http://www.gee.min-economia.pt/>
- Heitor, Manuel, Hugo Horta and Joana Mendonça (2014) "Developing Human Capital and Research Capacity: Science Policies Promoting Brain Gain," *Technological Forecasting and Social Change*, Vol. 78, No. 8, pp. 1299-1309.
- IMF (2015) "Portugal selected issues," *IMF Country Report* No. 15/127, May.
- IMF (2016) "Fiscal Policies for Innovation and Growth," *Fiscal Monitor* Chapter 2, April.
- Isaksson, Anders (2007) "Determinants of Total Factor Productivity: A Literature Review," Staff Working Paper, UNIDO.
- Jorgenson, Dale W., Mun S. Ho, and Kevin J. Stiroh. (2008) "A Retrospective Look at the U.S. Productivity Growth Resurgence," *Journal of Economic Perspectives*, Vol. 22, No. 1, pp. 3-24.
- Julio, P., R. Pinheiro-Alves and J. Tavares (2013) "Foreign Direct Investment and Institutional Reform: Evidence and an Application to Portugal," *Portuguese Economic Journal* Vol. 12, pp. 215-250.
- Keller, Wolfgang, and Stephen R. Yeaple. (2009) "Multinational Enterprises, International Trade, and Productivity Growth: Firm Level Evidence from the United States," *Review of Economics and Statistics*, Vol. 91, No. 4, pp. 821-31.
- Lains, P. (2008) "The Portuguese Economy in the Irish Mirror, 1960-2004," *Open Economies Review*, Vol. 19, pp. 667-683
- Lentz, Rasmus, and Dale T. Mortensen. (2008) "An Empirical Model of Growth through Product Innovation," *Econometrica*, Vol. 76, No. 6, pp. 1317-73.
- McGowan, Müge Adalet, Dan Andrews and Valentine Millot (2017) "The Walking Dead? Zombie Firms and Productivity Performance in OECD Countries," OECD Economics Department Working Paper No. 1372
- McKinsey Global Institute (2004) "Portugal 2010. Increasing Productivity Growth in Portugal."
- Mercer (2013) "Análise Comparativa das Remunerações Praticadas No Sector Público e No Sector Privado," February.
- OECD (2015a) "*The Future of Productivity*," OECD Publishing, Paris.
- OECD (2015b) "OECD Skills Strategy - Diagnostic Report Portugal," Paris.
- OECD (2016) "The Productivity-Equality Nexus: A Concept Paper," (Paris: OECD Publishing).
- OECD (2017a) "Labour Market Reforms in Portugal 2011-2015," (Paris: OECD Publishing).
- OECD (2017b) "Economic Survey of Portugal," (Paris: OECD Publishing).
- Ollivaud, P., Y. Guillemette and D. Turner (2016) "Links between Weak Investment and the Slowdown in OECD Productivity and Potential Output Growth," OECD Economics Department Working Papers 1304.
- Portugal Statistics (2015) "Custos de Contexto - a Perspetiva das Empresas," October, Lisboa.
- Reis, Ricardo (2013) "The Portuguese Slump and Crash and the Euro Crisis," *Brookings Papers on Economic Activity*, Spring.
- Sakellaris, Plutarchos and Daniel J. Wilson. (2004) "Quantifying Embodied Technological Change," *Review of Economic Dynamics*, Vol. 7, No. 1, pp. 1-26.
- Santos, S, A. Gouveia and I. Gonçalves (2017) "The Short-term Impact of Structural Reforms on Productivity Growth: Beyond Direct Effects," GEE paper 65, <http://www.gee.min-economia.pt/>.
- Sondermann, David (2012) "Productivity in the Euro Area: Any Evidence of Convergence?" ECB WP series Vol. 1, pp. 431, April.
- Syverson, Chad (2011) "What Determines Productivity?" *Journal of Economic Literature*, Vol. 49, No. 2, pp. 326-365.
- World Bank (2017) "*Ease of Doing Business Index*," World Bank Group.