Romania

Systematic Country Diagnostic

BACKGROUND NOTE

Productivity

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Acknowledgments

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Romania's Firm-Level Productivity Dynamics: Key Results

(1) Romania's labor productivity growth after the 2008 crisis was positive and closer to the higher performers due to (mainly) vigorous capital accumulation and (some) total factor productivity (TFP) catchup.

(2) Both the median and the dispersion of revenue total factor productivity (TFPR) decreased in the sample of Orbis data for 2008–13.

(3) There is significant heterogeneity between subsectors within manufacturing and services.

(4) Evidence of the misallocation of capital (but not of labor) is widespread, as indicated by a growing dispersion on the marginal productivity of capital.

(5) Access to credit, customs services, and red tape seem to have statistically significant and large effects on TFPR.

(6) Long time periods to obtain construction permits and to get electricity, restrictive regulation of services, and state aid allocation concentrated in the declining industries may be preventing TFPR gains.

Introduction

1.   **Romania has not suffered the productivity slowdown and decline that affected most of EU15** (**Figure 1**). In the aftermath of the Global Financial Crisis the country experienced growth in labor productivity, which however hasn't been as strong as that of other EU12 countries. Latvia, Lithuania, and Poland showed a much stronger performance. On a path to catch up with Romania's productivity level, Bulgaria experienced an almost 50 percent higher growth rate in labor productivity.

Figure 1. Labor productivity growth, 2008–2013, annual percentage increase
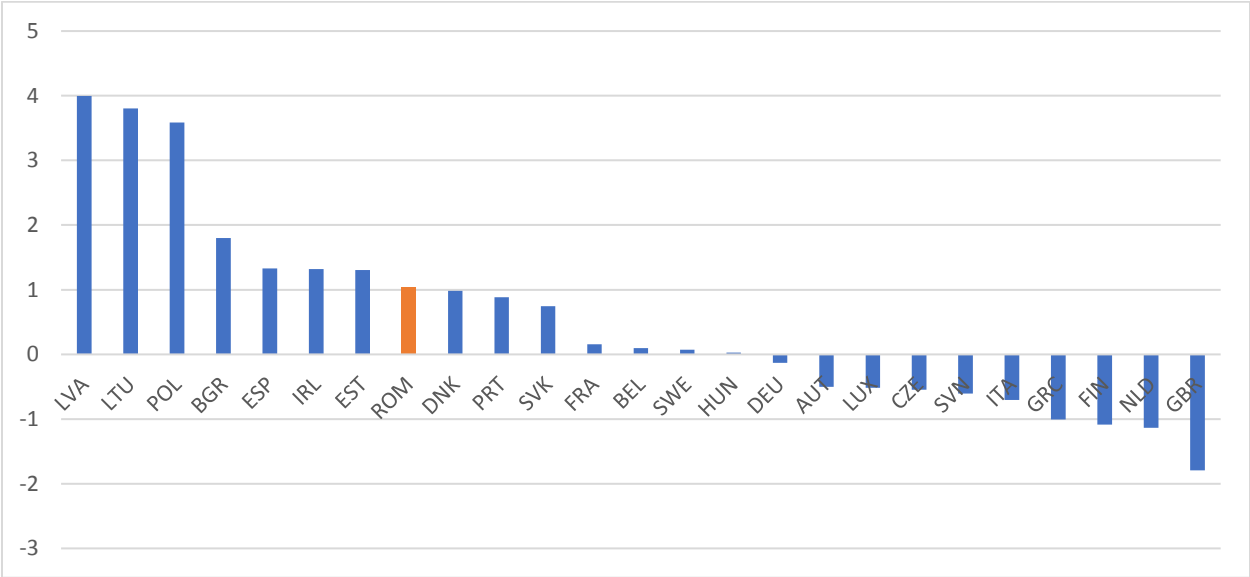
Source: Eurostat

2.   **Even though the country's labor productivity is still well below the regional average, Romania has been on a path of convergence toward US labor productivity levels since the mid-2000s.** The process has progressed at a slow and uneven pace, with labor productivity now being 40 percent of that in the US. Conversely, Romania has moved at higher pace toward convergence in terms of capital intensity. Despite the recent reversal, the Romanian ratio of capital to labor is at about 60 percent of that observed in the US. The overall the gap in TFP levels with the US has shrunk over the period considered, where temporary setbacks have been more than counterbalanced by subsequent improvements (**Figure 2**).

Figure 2. Romania labor productivity catching up
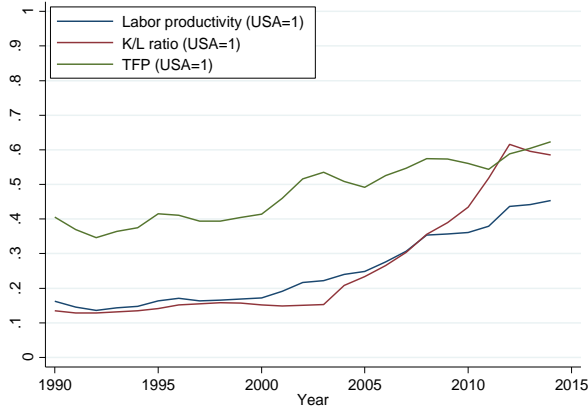
Note: Labor productivity is output-side real GDP at current purchasing power parities (PPPs, in millions of 2011 US$), divided by the number of persons engaged (in millions); the capital: labor ratio is defined as capital stock at current PPPs (in millions of 2011 US$) divided by the number of persons engaged (in millions); TFP is reported as TFP level at current PPPs (USA=1).

Source: Penn Table 9.0

3.   **The convergence in the capital: labor ratio reflects investments in manufacturing and construction that were several times higher than in all peer countries.** A comparison across countries suggests that the composition of investment in Romania (gross fixed capital formation as a proxy of net investment) is biased in favor of non-tradable sectors, rather than tradable sectors that are more likely to enhance productivity. Indeed, the ratio between investments in manufacturing and construction is much larger in any other peer country (**Figure 3**). This may be a source of misallocation of capital, as the construction industry typically ranks amongst the most corrupted industries (Kenny, 2007).

Figure 3. Average gross fixed capital formation (percent of GDP)
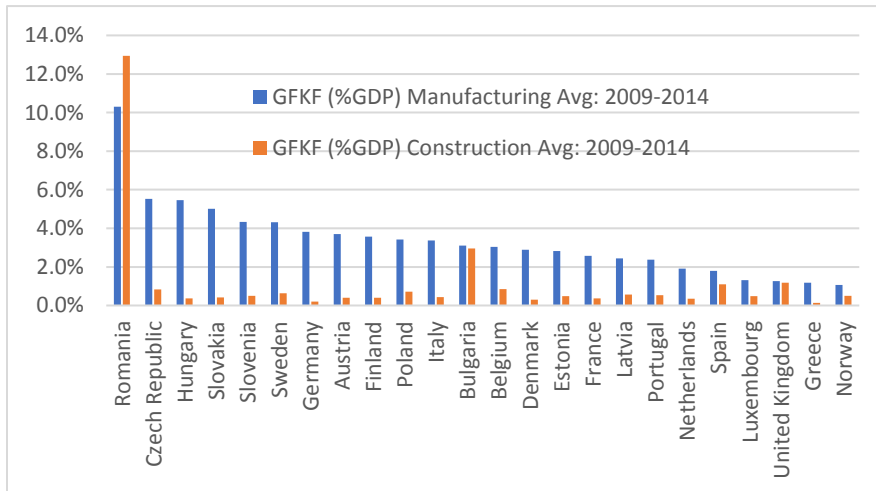
Source: Eurostat

Zooming in on the EU: What Can We Learn about Productivity from Firm-level Data?

TFP differences across countries

4.   **Firm-level data show that the TFP dispersion decreased between 2008 and 2013.** The reduction in TFP dispersion of firms in the Orbis sample in Romania was the fourth largest among the countries studied. This is in principle (and under restrictive hypothesis) a positive result, as it seems to indicate a reduction in misallocation of resources. Indeed, the story of the other top three countries—having both lower dispersion and higher median—is consistent with the 'cleansing effect of the crisis' hypothesis, in which less productive firms exit the market and the representative firms become more productive (**Figure 4**).

5.   **While not exclusive to Romania, the decline of the TFP median in the ORBIS sample is more difficult to interpret.** In fact, the combination of declining dispersion and median TFP is also present in Croatia, Czech Republic, and Bulgaria—indicating that the representative firm has become less productive in those countries. The picture appears particularly bleak, as Romania stands out for the larger decline in median TFP. Inspection of the TFP distributions in the two periods suggests that the results are driven mainly by movements of firms in the second and third quartile and not in the tails of the distribution. One possible explanation is market segmentation—with one part of the market being relatively insulated from the crisis, therefore granting firms a certain minimum level of revenue, thus mitigating the negative impact of the crisis experienced by firms operating in the unprotected segment.

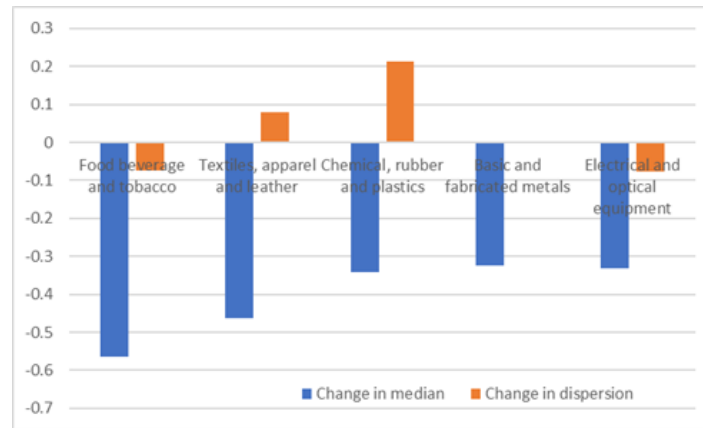**Figure 4. Evolution of TFP: Median and dispersion (2008–2013)**
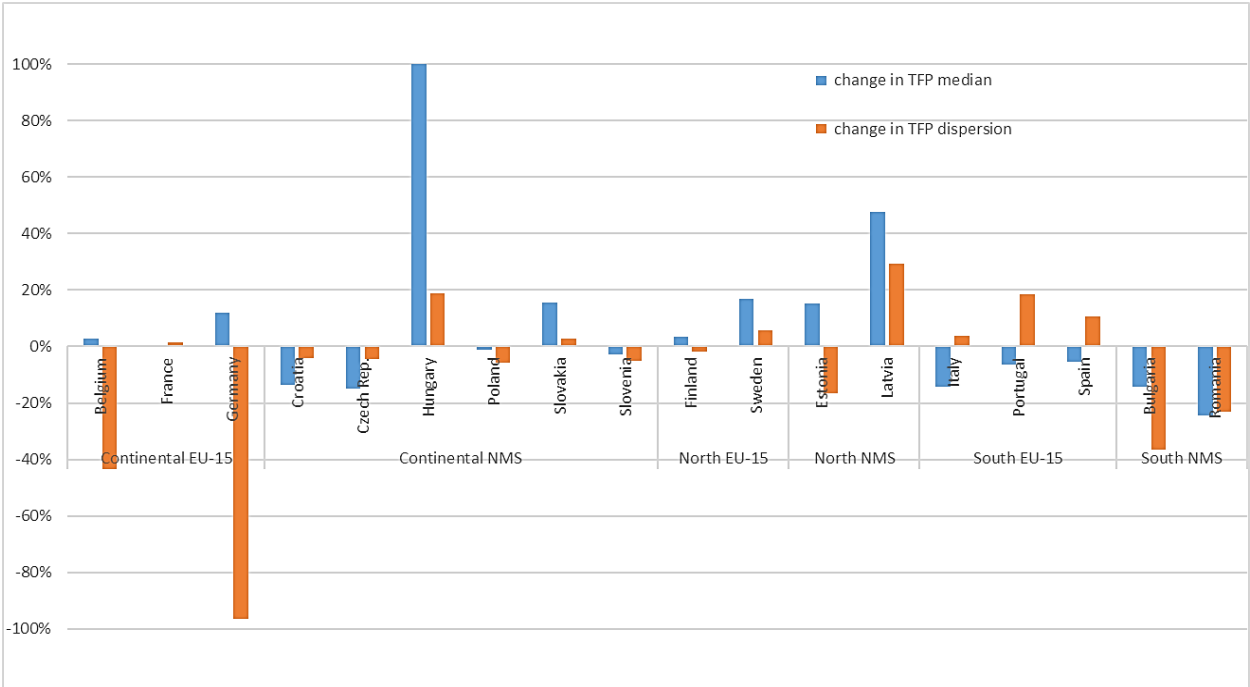
Source: Authors' elaboration with a balanced panel from Orbis. No entry and exit dynamics considered for the analysis due to lack of data

TFP differences across sectors

6. **Evidence from manufacturing is mixed, with some industries displaying signs of increased misallocation.** These signs are particularly evident for firms manufacturing textile or apparel and firms producing chemical, rubber and plastics which display a decline in the median and an increase in the dispersion of TFP levels in 2008-13 for the Orbis sample (**Figure 5**).

Figure 5. TFP median and dispersion in Romania (2008–2013): Evidence from manufacturing

Source: Authors' elaboration with a balanced panel from Orbis. No entry and exit dynamics considered for the analysis due to lack of data

7. **The evolution of the marginal product of capital (MPK) over time further corroborates the signs of increased misallocation in the manufacturing sector** (**Figure 6**). Higher dispersion in MPK since 2009 may reflect the presence of economic distortions or heterogeneous policy treatment at the firm level, leading to misallocation of the factors of production. Conversely, the reduction in the marginal product of labor (MPL) could be a sign of more allocative efficiency in labor. These findings are in line with a recent study by the European Central Bank (Gamberoni et al., 2016) and research from academics like Gopinath et al. (2017).

Figure 6. Evolution of marginal product of labor and marginal product of capital in manufacturing

Source: Authors' elaboration with a balanced panel from Orbis. Hsieh and Klenow (2009) methodology

8.   **Some evidence of misallocation is also available for the service sector**. This is characterized by negative TFP growth rates, and a spike in MPK dispersion since 2009. Although MPL dispersion slowed down over the period, it remains at levels above those observed in the manufacturing sector. Signs of misallocation appear stronger for firms in transport and among professionals where TFP dispersion increased. Firms in trading sectors seem to suffer particularly from the inability to upgrade their capabilities (Figure 7 and Figure 8).
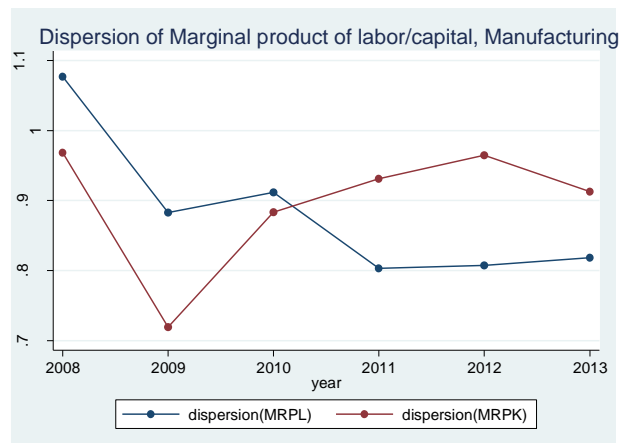
Figure 7. TFP median and dispersion in Romania (2008-2013): Evidence for services

Source: Authors' elaboration with a balanced panel from Orbis. No entry and exit dynamics considered for the analysis due to lack of data
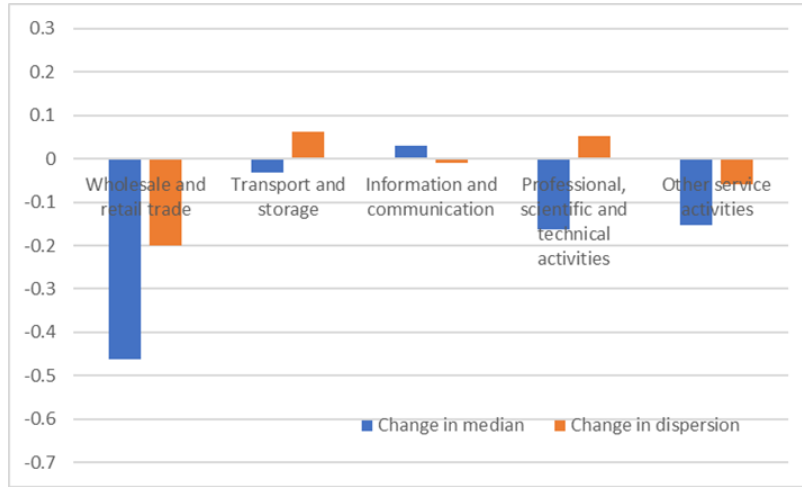
Figure 8. Evolution of marginal product of labor and marginal product of capital in services

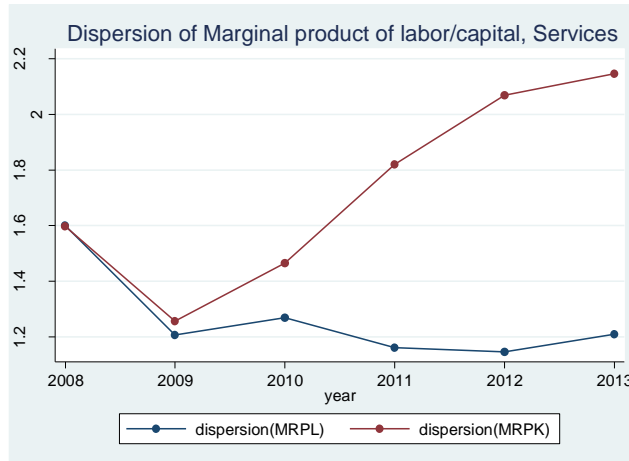Source: Authors' elaboration with a balanced panel from Orbis. Hsieh and Klenow (2009) methodology

Identifying the sources of intra-regional variation in aggregate TFP performance by looking at TFP differences across different types of firms

9.   **We explore the three theoretical main potential scenarios that could help explain intra-regional variation in aggregate TFP performance. Under the first scenario,** firms' attributes such as size, age, ownership, and location are related to TFP performance in various ways across different countries (for example, TFP top performers are small in some countries but large in others; TFP top performers are young in some countries but mature in others). This hypothesis would be validated if firms' attributes affected TFP performance in different ways across different countries.

10.   **Yet, Figure 9 shows a similar picture across countries.** The main binding constraints to enhancing TFP at the firm level are often the same for all types of firms (access to finance, access to skilled workers, technology, equipment, business environment, etc.). Nonetheless, the ability to overcome the challenges associated with post-entry growth usually varies with firms' attributes and characteristics. Like other EU countries, in Romania micro, foreign-owned, and city-located firms appear to be the most productive ones.

11.   **Under the second scenario,** firms' attributes are related to TFP performance in the same way across different countries in the EU, but the universe of firms is composed by firms with different attributes across different countries (for example, young firms are for all the countries the most productive, but the countries with the largest proportion of young firms are the ones displaying a higher aggregate TFP performance). However, **Figure 10** shows that there aren't significant compositional differences across countries for each of the examined firms' attributes. A notable exception is the size attribute, where we can observe some heterogeneity across countries, with Romania displaying a sizeable share of micro firms.

12.   **Under the third scenario**, firms' attributes matter in the same way across different countries, and countries have predominantly the same relative composition of firms within each attribute, but they have different initial framework conditions and there is intra-regional variation in economic policies, which creates an intra-regional gap in the structure of economic incentives and the economy's ability to reallocate resources in an efficient way.

13.   **Conclusion**: The evidence presented above suggests that differences in framework conditions and economic policies are probably the most important reasons behind aggregate TFP differences across countries in the EU.

Figure 9. What kind of firms' attributes matter for TFP?
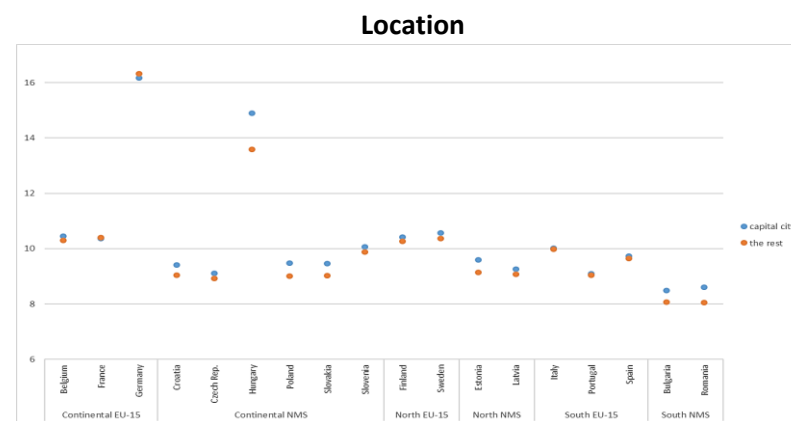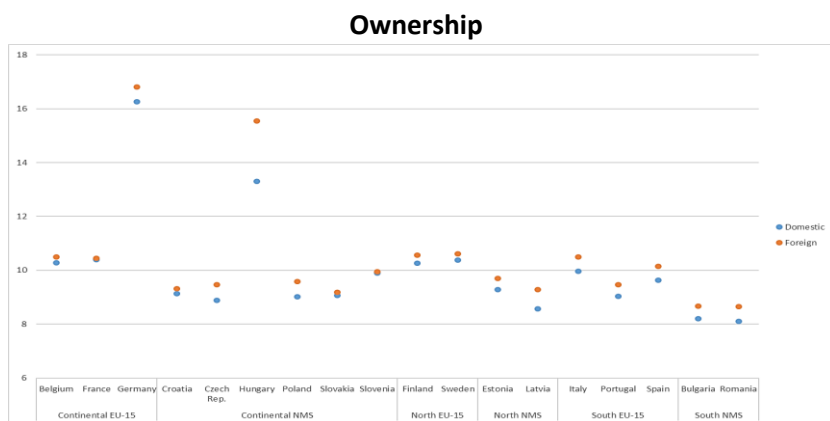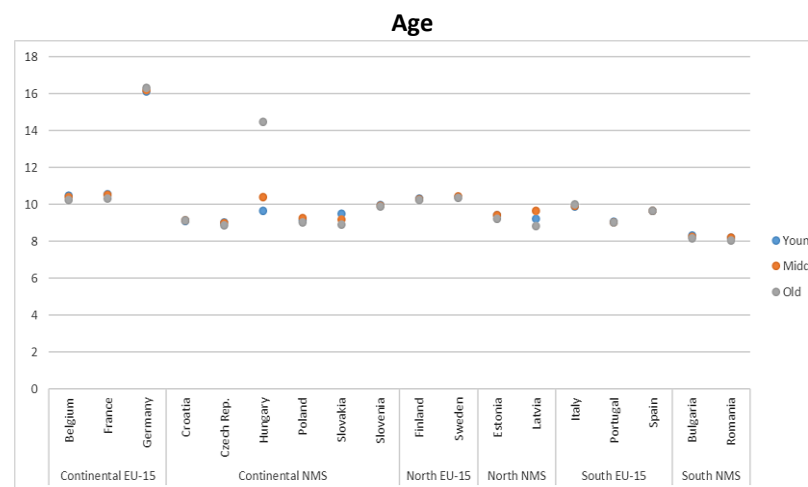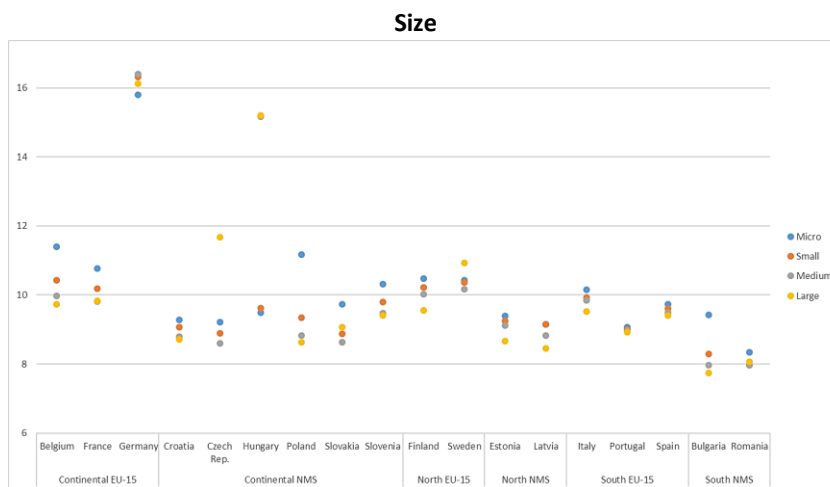
Source: Authors' elaboration with a balanced panel from Orbis

Note: "Size" categories are divided in the following way: micro firms have 1–9 workers, small firms have 10–49, medium firms have 50–249, and large firms have more than 250 workers. "Age" categories are divided in the following way: young firms are 1–4 years old, medium aged firms are 5–9 years old, and old firms are older than 10 years, where the age is determined in 2008. "Ownership" categories are divided into domestic and foreign firms. "Location" categories are divided into firms in the capital city and those in the other locations.

Figure 10. Composition of the sample of firms across attributes
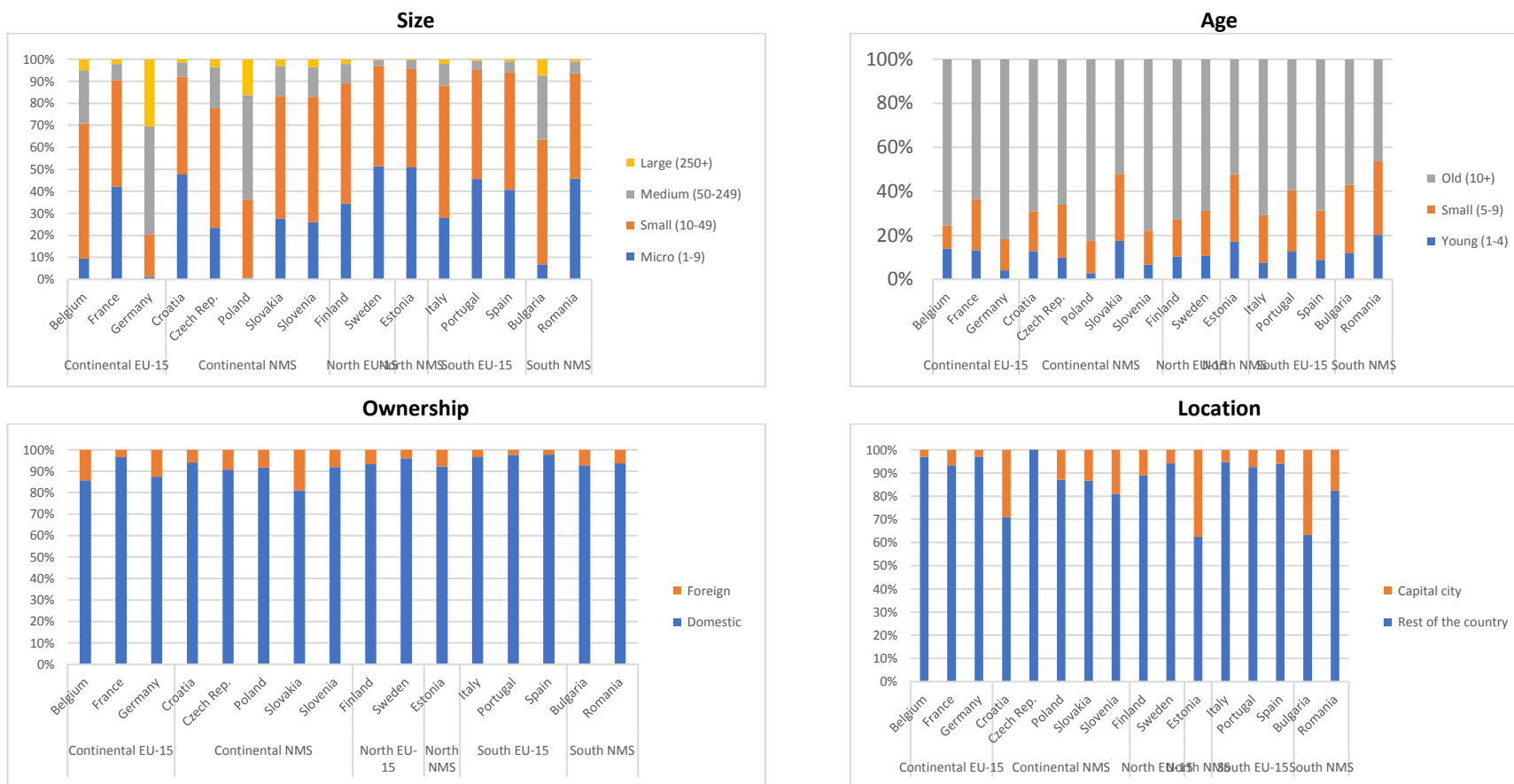
Source: Authors' elaboration with a balanced panel from Orbis
Note: "Size" categories are divided in the following way: micro firms have 1–9 workers, small firms have 10–49, medium firms have 50–249, and large firms have more than 250 workers. "Age" categories are divided in the following way: young firms are 1–4 years old, medium aged firms are 5–9 years old, and old firms are older than 10 years, where the age is determined in 2008. "Ownership" categories are divided into domestic and foreign firms. "Location" categories are divided into firms in the capital city and those in the other locations.

Evidence from the enterprise survey: Policy variables vs firm attributes

14.   **To further investigate the importance of different policy and firm attributes to firm-level TFP*R* we estimate their marginal effects on the median productivity firm**. In order to quantify the effect of policy variables on productivity, we follow the methodology by De Loecker (2013) and focus our analysis on variables related to the business environment (for example, formal and informal competition, red tape, custom procedures, tax frequency, and crime) and other choice variables related to productivity-enhancing investments (training, foreign technology, export, and foreign ownership).[1] First, we start from a general model, with the 70 policy variables included at once, and then we reduce it to a simpler model with only the relevant (significant) variables by removing variables according to the Chi square statistic of each variable.[2] Once we have an initial parsimonious model, we then start adding policy variables to our initially selected model to check if we had omitted a relevant policy variable in the process (specification test). The final estimated model is efficiently estimated once we have deleted insignificant or irrelevant variables. The key results are as follows (**Figure 11**):

- Among the top 10 factors affecting TFP*R*, 5 relate to 'firm attributes'—credit, training, exports, foreign technology and ownership—and 5 to policy/institutional factors—customs, frequency of tax inspections, competition, days to get a permit, and time spent by management with red tape).

- Results indicate that access to credit has the largest impact, as it tends to raise median firms' TFP*R* by 14 percent (as compared with firms without access to credit). The effects of providing labor training and having access to foreign technology are within the 6–8 percent range.

- Data also suggest that red tape and regulation factors are having an important negative impact on TFP*R*, as indicated by "managers' time spent with red tape", "days to get a permit", and frequency of tax inspections. The largest impact, however, comes from the time required to clear direct exports in customs, with one additional day implying almost a 10 percent loss on TFP*R*.

Figure 11. Marginal effects of BE variables on TFPR: Romania
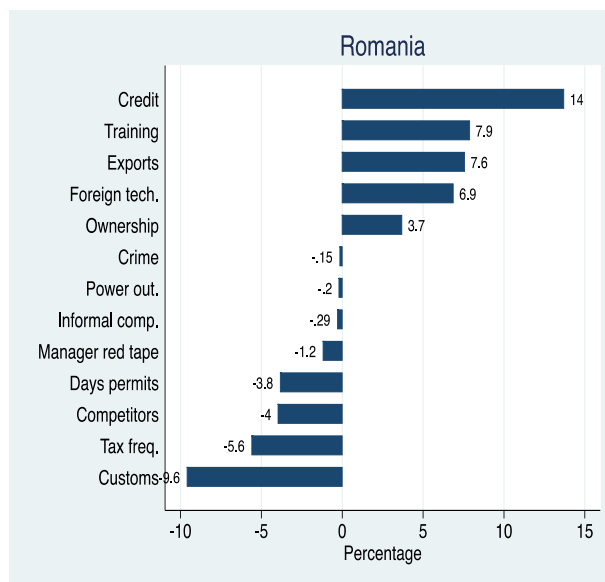
Source: Correa, Cusolito and Pena (2017)

How are the results aligned for the EU with the global empirical evidence?

15.   **The findings that foreign-owned and city-located firms are the most productive are fully in line with the existing literature.** Foreign-owned firms are usually more productive than domestic firms for several reasons: (i) they are endowed with more financial, capital, and human resources to engage in TFP-enhancing activities; (ii) they often sell their products in several locations, which gives them the advantage of diluting the fixed cost of increasing TFP across several markets (Brambilla, 2009); (iii) they increase innovation incentives through reducing career risks (Aghion et al., 2013); and (iv) they have access to and absorb new knowledge from abroad, which helps them adopt best managerial practices, new technologies, and innovate all activities related to TFP increases.

16.   **Location is also another important factor that can contribute to TFP growth at the firm level through the appropriation of the economic benefits of agglomeration**. "Sharing theories" highlight the importance of having firms spatially concentrated, which allows them to have access to and share specialized inputs and factors of production that can help them engage in TFP-enhancing activities and reduce production costs (Porter, 1990; Porter, 1998a and 1998b). "Matching theories" rely on the argument that agglomeration is associated with thicker labor markets that increase opportunities for specialized workers, reduce the waiting costs of finding the best partners, and raise the likelihood of assortative matching and allocative efficiencies with positive effects in terms of TFP growth at the aggregate level. "Knowledge-spillover theories" rely on the characteristics of knowledge to improve TFP as a public good (for example, non-rivalry and non-excludable) to emphasize the benefits of agglomeration for facilitating the flow of new ideas, an important input for process innovation and efficiency gains.

17.   **Evidence on size and age has been overall more controversial,** with recent findings highlighting the higher efficiency gains that small and young firms obtain, when analyzing differences in physical total factor productivity (TFPQ) against large and mature firms, but less clear are the results when the performance measure is revenue total factor productivity (TFP*R*), as in this study. This happens because the revenue-based productivity advantage of start-ups and young firms is much less pronounced, and is sometimes nonexistent because of the negative correlation between efficiency gains and product prices, as more mature firms are able to charge higher markups (Foster et al., 2008; Eslava and Haltiwanger, 2014). The finding that small firms have higher TFP levels suggest that as firms become larger, they may face more regulations, and the heavier regulatory burden decreases TFP. For example, labor regulations in France become binding constraints on firms with more than 50 employees. These labor regulations have distorted the size distortion of French firms, resulting in an equilibrium where too many workers work for small firms and productive firms are kept below their optimal size (Garicono et al., 2016).

Identifying Policy Areas for Intervention

The cost of doing business

18.   **Despite few recent seatbacks, Romania has made some progress in improving business regulations over the period 2010–2018**. Some areas still require additional reforms, namely: (i) obtaining electricity; (ii) dealing with construction permits; (iii) starting a business; and (iv) protecting minority investors (**Figure 12**).

Figure 12. Doing Business Global Ranking

Source: *Doing Business*. World Bank

Product market regulation

19.   **State control and barriers to entrepreneurship are the largest contributors to Romania's product market restrictions** (**Figure 13**)**.** Barriers to trade and investment hamper competition to a significantly smaller extent. Such ranking of obstacles to competition is shared by many other European countries. Yet Romania is salient on these issues, as the country appears to be the most restrictive among its peers.

Figure 13. Economy-wide PMR
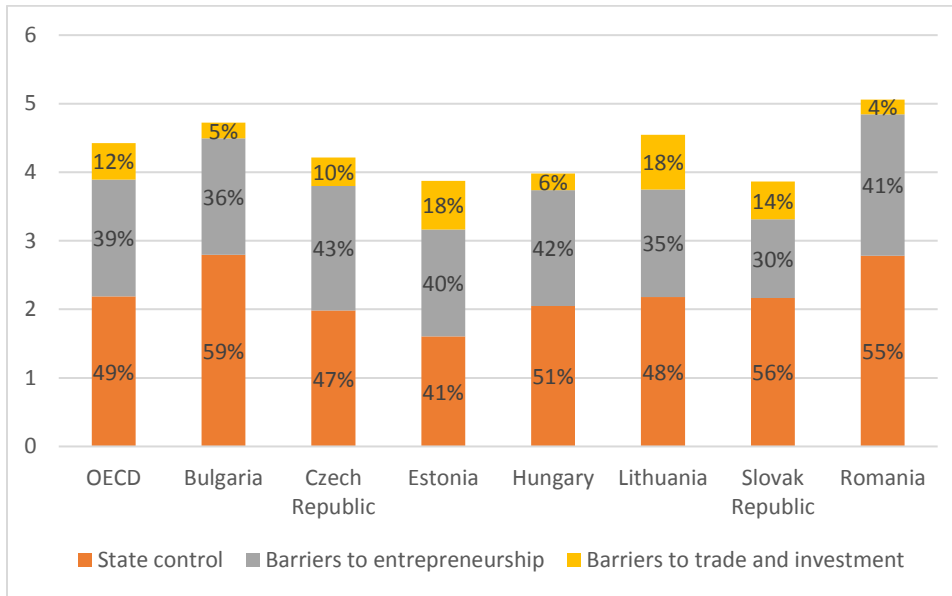
Source: WBG/OECD PMR data 2013-2014
Note: Index ranges between 0 and 6, from least to most restrictive.

20.   **Further insights can be gained from a more granular sectorial analysis.** Focusing on the service sector is particularly appropriate given its large—at more than 60 percent of GDP—and ever-increasing economic footprint. In general, competition in services is in a relatively nascent phase, as regulations of services are still rigid in the EU compared with other advanced regions. Regulations of professional services are particularly restrictive in Romania. Conversely, in network sectors and retail businesses, the country fares similarly to the EU28 average (**Figure 14**).

Figure 14. Regulations of services in the EU
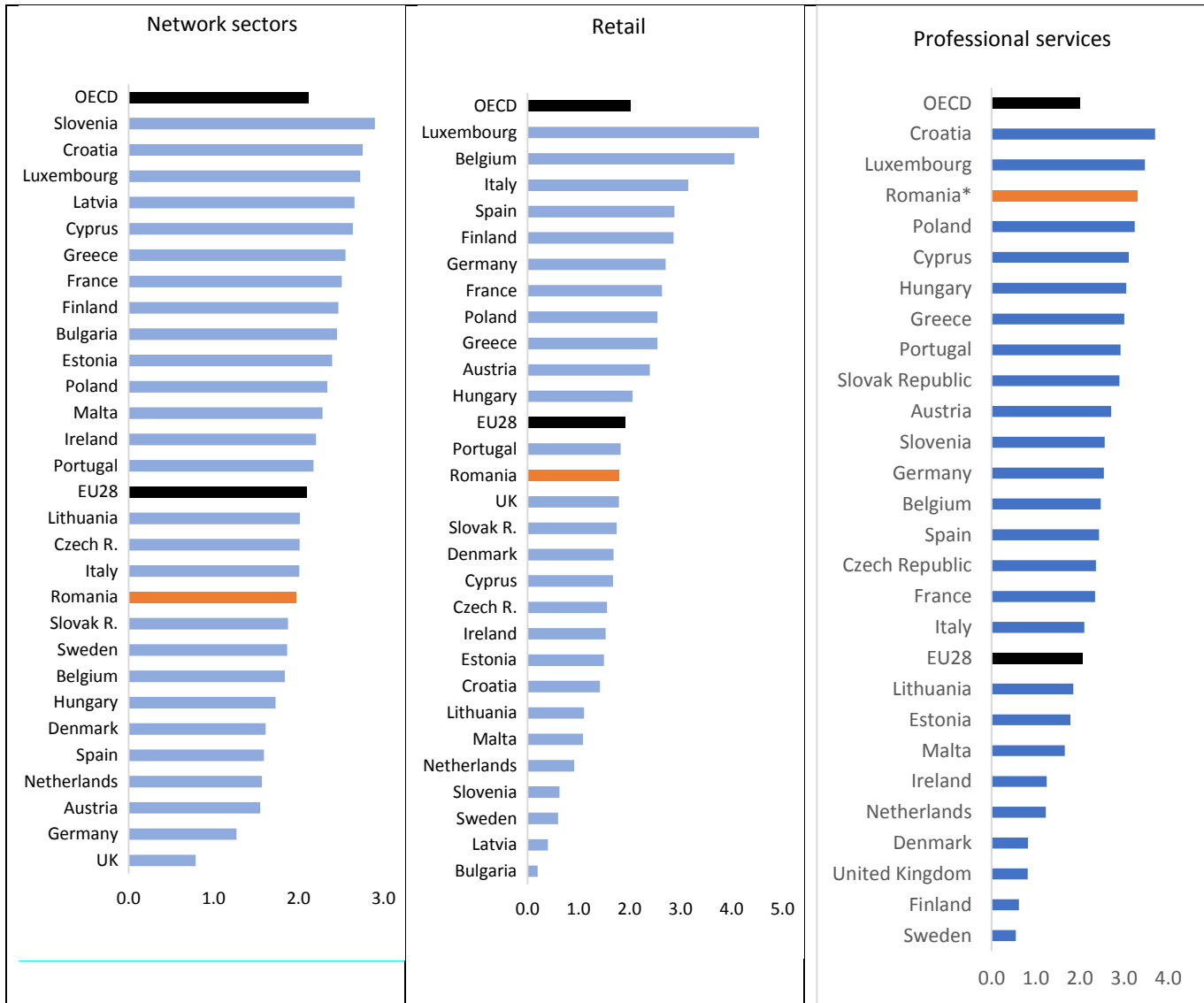
Source: OECD
Note: Romania* includes only data on accounting and legal; information on architect and engineer is missing.

State aid: An agenda that needs to be revisited

21.   **Careful consideration of state aid policy is warranted, as state aid can potentially affect TFP in opposite directions.** On the one hand, state aid can relax firms' financial constraints and help them cover the fixed costs of investing in TFP-enhancing activities, such as innovation and technology adoption. On the other hand, state aid may introduce economic distortions that affect key framework conditions like competition, and induce a misallocation of resources toward unproductive firms (Garcia and Neven, 2005).

22.   **Originally, in the EU, state aid could be used as a policy tool only if it passes the "balancing test," where the positive effects on the firms outweigh the negative effects from distorting competition.**[3] But in 2008, after the global financial crisis, the EU relaxed this test and it is now unclear whether the effects of state aid helped improve or dampen aggregate efficiency.

23.   **State aid allocation appears not to be channeled toward sectors with stronger economic potential.** The latest figures available for the period 2009–2015 provide a breakdown of the allocation toward different investments (**Table 1**). Consistently across the years, the poor-performing railroad sector absorbs a sizeable portion of the overall state aid.[4] Conversely, the state-aid allocation for research and development, or risk capital for small and medium enterprises—areas that have the potential to spark growth—has been limited. Over the years, the allocation toward agriculture and rural development has declined, while that in favor of regional development has increased.

Table 1. State-aid spending, 2009–2015

	2009	2010	2011	2012	2013	2014	2015
Environmental protection incl. energy saving	0%	0%	20%	41%	52%	33%	38%
Railways sector	36%	65%	45%	26%	24%	36%	29%
Regional development	4%	11%	12%	8%	13%	19%	22%
Agriculture and rural development	48%	11%	22%	20%	3%	7%	4%
Rescue & Restructure	1%	0%	0%	1%	1%	0%	2%
Closure aid	0%	0%	0%	3%	3%	2%	1%
Research and development incl. Innovation	2%	4%	0%	1%	1%	2%	1%
Sectoral development	6%	7%	0%	0%	3%	1%	1%
Transport aid (excluding railways)	1%	0%	0%	1%	1%	1%	1%
Culture	1%	0%	0%	0%	0%	0%	0%
SME incl. risk capital	0%	1%	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%	0%	0%
Compensation of damages caused by natural disaster	0%	0%	0%	0%	0%	0%	0%
Employment	0%	0%	0%	0%	0%	0%	0%
Heritage conservation	0%	0%	0%	0%	0%	0%	0%
Promotion of export and internationalization	0%	0%	0%	0%	0%	0%	0%
Social support to individual consumers	0%	0%	0%	0%	0%	0%	0%
Training	0%	0%	0%	0%	0%	0%	0%
Aid granted to fisheries and aquaculture	0%	0%	0%	0%	0%	0%	0%
Total (spending in million €, current prices)	1232.6	833.8	1171.1	1128.6	1217.8	1813.5	1833.4

Source: European Commission.

24.   **The literature on the effects of state aid is small.** Van Cayseele et al. (2014) show that state aid can increase the productivity growth of firms, and this effect is stronger for firms that are laggards than those that are closer to the productivity frontier. One the other hand, Schweiger (2011) find that state aid in Slovenia has been distortive, as it did not affect the TFP of Slovenian firms and reduced allocative efficiency. Similarly, Criscuolo et al. (2012) found that state aid in the UK did not affect TFP but had a positive effect on employment, investment, and the net entry of firms. Aside from TFP, Stöllinger and Holzner (2017) also found that state aid does not have any impact on the exports of manufacturing value added. The firm level result from Stöllinger and Holzner (2017) is contradicted by Aghion et al. (2011), who found that state aid can improve a country's export performance.

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[1] De Locker (2013) avoids the misspecification of the production function and estimation bias often present in the control function approaches (e.g. Olley and Pakes (1996), Levinshon and Pretrin (2003), and Ackerberg, Caves, and Frazer (2015)). For example, in the case of the impact of exports on productivity, De Locker (2013) shows that an exogenous production function implies that past export experience has no impact on direct technological improvements or sales despite the vast evidence showing the contrary. In that case, the standard two-step approach of estimating TFP in the first step and then analyzing the relationship between TFP and exporting in a second step leads, due to a misspecified productivity process, to biased estimates of the production function and of productivity in a systematic way. An additional advantage of this methodology is that it allows estimating heterogeneous marginal effects across firms with different productivity levels.

[2] We use the Chi square instead of F-test because we use robust standard errors. Also, the Chi square comes from the productivity equation of the De Loecker procedure, so it is the test of joint significance of the four coefficients corresponding to each variable. Parsimonious means a simplified model obtained from a general one using the GETS procedure (see e.g. Hendry D. F. and H.M. Krolzig (2001). Data source: WBES for 2009 and 2013. For broader discussion see Correa, P. Ana P. Cusolito and J. Pena (2017).

[3] The balancing test is conducted by performing an economic assessment of the proposed state aid. A set of principles to conduct this assessment has been proposed by the European Commission, which can found on http://ec.europa.eu/competition/state_aid/reform/economic_assessment_en.pdf

[4] The quality of railroad infrastructure is ranked among the worst in Europe according to data from the World Economic Forum.