What Drives the Dynamics of Business Growth?

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1. INTRODUCTION

Employment and productivity growth are at the heart of current policy discussions, yet our understanding of which policies are more effective at encouraging their growth is still limited. Growing empirical evidence confirms the role of government policies and framework conditions in explaining – at least partially – the existing differences across countries in employment and productivity dynamics. However, much of the existing literature has focused on the “average firm”, while firms are heterogeneous and so are their employment and productivity dynamics.

The main contribution of this paper is to fill this gap and provide new evidence on how the impact of framework conditions varies alongside the firm growth distribution. Rather than assuming that all firms benefit equally from improving framework conditions, our analysis shows that there are both winners and losers, even if the economy as a whole benefits. This reallocation of resources across firms, often referred to as Schumpeterian creative destruction, constitutes one of the main drivers of long term economic growth. The question that this paper seeks to address is what is the role of framework conditions in accelerating or slowing down this resource reallocation process in the economy.

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Recent evidence demonstrates the importance of firm dynamics and resource reallocation for the processes of creative destruction, selection and learning, and their impact on aggregate employment and productivity growth (OECD, 2009b, Bartelsman et al., 2009a and Bravo-Biosca, 2010b). It also finds that there are large differences in firm dynamics across countries. While some of this variation is explained by differences in sectoral composition, differences in the post-entry performance of firms remain even after controlling for sectoral effects. It is therefore likely that they reflect the role of differences in countries’ policies, market structures and institutional frameworks.

In this paper we focus specifically on two institutional factors that could be driving these differences: the labour market and the financial system. Policy-makers, businesses, and researchers regularly emphasize the importance of a flexible labour market and sufficient availability of finance to achieve better economic performance. For instance, European high-growth firms identify access to talent and finance as the main barriers to growth that they face (after macro conditions).  

We examine the impact of employment protection legislation and financial institutions on firm growth dynamics using a recently developed database that captures the full distribution of firm growth rates across 11 countries (the United States, Canada, and eight European countries: Austria, Denmark, Finland, Italy, Netherlands, Norway, Spain and the United Kingdom). The database provides harmonised micro aggregated data on employment growth rates in both manufacturing and non-manufacturing sectors for all firms in the mid-2000s, drawing from confidential business registers in participating countries (Bravo-Biosca, 2010b).

The analysis uses a “difference-in-differences” approach combined with an instrumental variables estimation to correct for possible biases due to measurement error. This methodology provides comparative evidence on the differential impact of policies and institutions at different points of the growth distribution, controlling for country and industry unobservable factors. This approach allows disentangling the effects of labour and financial markets institutions from other correlated omitted factors with these that could potentially be driving the results.

The results show that both employment protection legislation and financial institutions have a heterogeneous impact across the distribution of firm growth, and therefore impact the speed of the resource reallocation process. Specifically, we find that stringent employment protection legislation leads to a less dynamic firm growth distribution, slowing down resource reallocation, particularly in labour intensive as well as highly innovative sectors. Secondly, our results show that more developed financial institutions are associated with a more dynamic firm growth distribution. Specifically, we consider several dimensions of a well-functioning financial system, such as the overall level of financial development, the size of the stock market, the barriers to competition in the banking sector, and the rights of creditors in case of bankruptcy, and find that they are all associated with faster resource reallocation, although with some qualifications.

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1 Based on analysis undertaken by Bruegel using Eurostat data (http://www.bruegel.org/en/blog/detail/view/1514).
This paper extends the existing literature in a number of ways. Most existing research focuses on the impact of framework conditions on average employment and productivity growth on the one hand, and on entry and exit of firms on the other (i.e. the so-called “extensive margin”). Cross-country studies have not looked at how framework conditions have affected growth at different points in the growth distribution, and thus their impact on resource reallocation among existing firms. This paper also complements the nascent literature on high-growth firms and how policies can support them. However, instead of focusing on only one part of the employment growth distribution, the top performers, it also considers the whole distribution, convening a fuller picture of the impacts of framework conditions on employment growth across different groups of firms.

The paper is organised as follows: the next section sets up the hypotheses that we examine in this paper and how they link to the literature. Section 3 discusses the estimation strategy and Section 4 presents the data used. Section 5 reports the results of the analysis. Finally, Section 6 summarises the evidence and concludes.

2. FRAMEWORK CONDITIONS AND FIRM DYNAMICS

The importance of resource reallocation for productivity growth is widely recognised. Several studies have documented the large heterogeneity in productivity levels within narrowly defined sectors, and the contribution that the reallocation of output and labour from less productive firms towards more productive firms makes to overall productivity growth, accounting for example for about half of total productivity growth in US manufacturing (Baily et al., 1992; Haltiwanger, 1997). More recently, Kogan et al. (2012) show that resources in the US are reallocated towards more innovative firms within sectors and towards more innovative sectors across sectors. Similarly, Andrews et al. (2014) using firm-level data for around 20 countries find that patenting firms attract more resources, but at different pace across countries; the different degree to which resources are reallocated to patenting firms is robustly correlated with national policies indicators.

Productivity decompositions may underestimate the impact of resource reallocation for productivity growth, given that the competition it generates also incentivises firms to improve their productivity performance. For instance, Bartelsman, Haltiwanger and Scarpetta (2004) show that a higher pace of firm turnover is associated with faster productivity growth for incumbents, and more recently Bravo-Biosca (2010b) finds that a 5pp increase in the share of static firms (i.e., firms not growing or shrinking) is associated with 1pp lower annual productivity growth rate.

The development of fiscal, legal, and regulatory frameworks that lead to a dynamic growth distribution is therefore central to a country’s future economic performance. A large literature has demonstrated the impact that several factors have on aggregate

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2 More precisely, a larger contribution from the within-firms term in the standard Foster, Haltiwanger and Krizan (FHK) decomposition
industry performance, such as financial development (e.g. Rajan and Zingales, 1998), human capital (e.g. Ciccone and Papaioannou, 2009), rule of law, contract enforcement and institutional quality (e.g. Nunn, 2007, and Levchenko, 2007), or labour market regulation (e.g. Bartelsman, Gautier and de Wind, 2010). Nevertheless, very few studies have explored the impact that these factors have within sectors; furthermore, those studies considered only the average firm rather than the full distribution of business growth, which underlies the resource reallocation process. This literature does however point towards several testable hypotheses, which we discuss next for the two domains that constitute the focus of this paper: labour markets and financial markets institutions.

2.1. Labour market institutions

Stringent labour market regulations may increase the cost of hiring and firing workers and therefore are likely to affect job turnover across firms. This may hinder firm growth through several mechanisms and might also affect firms’ ability to adjust to exogenous technology and demand shocks that require the reallocation of resources within and across firms and sectors.

This is consistent with empirical work based on cross-country harmonised firm-level data, which shows that stringent employment protection legislation (EPL) slows down job reallocation via entry and exit of firms (e.g. Haltiwanger, Scarpetta and Schweiger, 2008; Scarpetta et al. 2002; and OECD 2009c, chapter 2). Strong EPL is also negatively correlated to job creation by entrants (Autor et al. 2007 for evidence on the United States and Kugler and Pica, 2008 for Italy), which may be explained by the potentially lower present value of the future stream of profits for entrants if firing costs are high (Hopenhayn and Rogerson, 1993). Strict EPL also reduces job creation and destruction amongst incumbent firms, at least in European countries (Gomez-Salvador et al. 2004), with the latter effect being particularly significant. The relationship is also found to be much stronger in declining sectors of the economy (Messina and Vallanti, 2007), suggesting that firing restrictions might be particularly costly for firms in sectors that are contracting, as they might slow down the reallocation process, especially during downturns. EPL hampers the creative destruction process reducing the overall speed of adjustment, although only in countries with strong rule of law where labour regulation is actually enforced (Caballero et al., 2013). Labour market regulations that only apply to firms above a certain size threshold also distort the incentives of employers to grow above that particular threshold (Garicano et al. 2012). Other features of the labour market seem to have a similar impact: high wage bargaining coordination and generous unemployment benefits also reduce job creation and job destruction and therefore the extent of job turnover (for supporting evidence see Gomez-Salvador, 2004; Salvanes 1997; Garibaldi et al. 1997).

These distortions might in turn affect the decision of firms to take risks and invest in innovation, impacting productivity growth. Firms may be less willing to pursue uncertain growth opportunities in new markets if they cannot adjust their workforce if
their attempts prove to be unsuccessful. Moreover, at the macro level these distortions might constitute a barrier to an efficient reallocation of resources as they might slow down firms’ exit and hinder the growth potential of incumbent firms. As a result, stringent EPLs are negatively associated with productivity (e.g. Bassanini et al, 2009 and Bartelsman, Perotti and Scarpetta, 2008) and discourage risky and innovative investments, such as in ICT, because of the risk to firms of paying high firing costs in case of failure (Bartelsman and Hinloopen, 2005, and Bartelsman, Gautier and de Wind, 2010). These costs are likely to be particularly important in sectors that experience high technological change and therefore require quick adjustments such as the ICT sector (Samaniego, 2006). The negative link between innovation and EPL is not uncontroversial, since firms that invest significant amounts in training and share tacit knowledge with R&D workers might feel reassured that they will reap the full returns from these investments when EPL is more stringent, and workers may also feel more reassured to engage in innovative yet risky projects (consistently with Acharya, Baghai and Subramanian, 2010, who show that stringent labour laws can provide firms with a commitment device not to punish short-run failures and thereby spur their employees to pursue value-enhancing innovative activities). Looking at overall volatility rather than technological innovation per se, the evidence shows that countries with flexible labour market institutions tend to specialize in sectors with higher volatility, given their lower adjustment costs (Cuñat and Melitz, 2012). Finally, existing econometric evidence suggests that stringent labour market policy also has a negative impact on capital investment especially for financially constrained firms (Cingano et al. 2010).

The main hypothesis that emerges from this discussion is that stringent EPL should be associated with a narrower growth distribution, since it increases the costs of downward adjustment while it encourages a more conservative growth strategy, with slow gradual expansion rather than fast growth (which in turn decreases the pressure on underperforming firms).

The estimation strategy that we use in this paper, discussed in detail in the following section, is based on the assumption that the impact of labour regulation is stronger in some sectors than others. Following on the discussion above, two sector characteristics appear particularly relevant. Firstly, how labour intensive it is. Secondly, how risky and innovative the sector is.

Let’s consider labour intensity first. Sectors in which labour is the key input are more likely to be affected by stringent EPL than capital intensive sectors, for which other factors such as the cost of capital, investment needs and capital adjustment costs play a more important role in determining firms’ growth strategy. Therefore, we can assume that labour regulation will have a stronger impact, whether positive or negative, in more labour intensive sectors than in sectors with relatively low labour intensity.

The second characteristic that we consider is how innovative the sector is. In a mature sector with little innovation and much stability there is less of a need to reorganize production activity. In contrast, firms in highly innovative sectors that are constantly experimenting with new technologies or business models face a more uncertain
environment. High hiring and firing costs increase the firm’s cost of adjusting its labour force to exogenous shocks or to changes in their organisation due to innovation. Therefore, we can assume that labour regulation will have a stronger impact, whether positive or negative, in more innovative sectors than in less innovative ones, for which adjustment needs are lower.

2.2. Financial institutions

Financial development has been found to be an important driver of economic growth in a variety of cross-country studies, but the evidence on how it affects the reallocation of resources within sectors is more limited. Access to finance is an important ingredient for firms that are aiming to grow fast, for which internal resources are unlikely to be sufficient to fund growth. On the other hand, a more developed financial market may also provide some resources to underperforming firms, allowing them a second chance to improve their performance, and so slowing rather than speeding up the reallocation of resources.

Cross-country evidence suggests that higher financial development is associated with higher growth in sectors that are more financially dependent (Rajan and Zingales, 1998), in sectors that have higher growth potential (Fisman and Love, 2007), and in those that have a higher share of small firms (Beck et al. 2008). Developed financial markets are also linked to the entry of small firms and post-entry growth performance in sectors that are more dependent on external finance, while they negatively affect the entry of larger firms in these same sectors (Aghion, Fally and Scarpetta, 2007). Moreover, the impact of financial development on the growth performance of new entrants is much stronger, both economically and statistically, than the average impact on incumbent firms (Aghion et al., 2007).

Financial development is also found to facilitate the reallocation of capital from declining sectors to sectors with better investment, innovation and growth opportunities (Wurgler, 2000; Ciccone and Papaioannou, 2006) and to facilitate the process of creative destruction through a positive relationship between financial development and firm churning (de Serres et al., 2006). The type of financial institutions also matters. For instance, de Serres et al. (2006) find that venture capital market development matters more for growth than for entry and exit rates, while regulatory barriers to banking competition matter relatively more than securities market regulations for entry and exit rates than for growth; consistent with banking competition having more impact on start-ups and younger firms than on incumbents. Kerr and Nanda (2009, 2010) also find that banking deregulation has a strong impact on entry and exit (much stronger than on the entrants’ average size and post entry growth rate). (See Levine, 2005 for an extensive review of the theoretical and empirical literature on financial development).

A related literature has analysed the impact of financing constraints on the growth of firms using within-country evidence. For example, Bottazzi, Secchi and Tamagni (2011) find that financing constraints prevent potentially fast growing firms - especially young
ones - from exploiting growth opportunities ("pinioning the wings" effect) but also weakens the growth prospects of already slow growing firms, especially old ones ("loss reinforcing" effect).

A separate literature has looked at one important dimension of a well-functioning financial system, the rights of creditors in case of bankruptcy. While countries differ in the treatment of corporate and personal bankruptcy regimes, both can have an impact on firm growth. Cross-country empirical evidence on the impact of bankruptcy laws is still scarce and the results from single country studies are mixed. Most of the literature focuses on the impact of bankruptcy law regimes on entrepreneurship and firm entry, but there is only limited evidence available on the impact of bankruptcy on employment growth of existing firms. The theoretical predictions of the impact of bankruptcy laws on entrepreneurship, growth and innovation are twofold. Tight bankruptcy law will hamper entrepreneurship, growth and risky investments as it poses a greater burden on entrepreneurs in case of failure. On the other hand, tighter bankruptcy laws will represent a strong guarantee for investors, making access to credit easier and cheaper and thus facilitating risky investments. The expected impact of tougher bankruptcy rules is therefore ambiguous, because of the two opposing effects arising from the trade-off between the insurance against business failure and the effects on credit supply. De Serres et al. (2006) shows that policies improving the efficiency of bankruptcy procedures are found to foster labour productivity and value-added growth, notably in sectors most dependent on external finance, while Acharya and Subramanian (2009) find that stronger creditors’ rights are associated with lower innovation and slower growth due to the risk of excessive liquidation.

Overall, the main hypothesis that follows from this discussion is that more developed financial institutions should be associated with a more dynamic growth distribution. In other words, the existing evidence suggests that financial development may have a heterogeneous effect not only across different groups of firms (e.g. small versus large, young versus old) but also across the growth distribution.

In order to test this hypothesis, we need first to determine which are the sectors of the economy that are more likely to be impacted by a well-functioning financial sector. Intuitively, the extent to which firms in an industry need external capital varies according to the technology used, their capital intensity needs and their use of financial and legal agreements such as leases and rentals. Therefore, the analysis asks whether sectors that are more dependent on external finance providers also display faster expansion and contraction in countries with more developed financial markets.

As the discussion above makes clear, there are several features of the financial system that impact how well it fulfils its mission. These include the overall availability of finance in the country, the size of the stock market, the barriers to banking competition and the strength of creditors’ rights. Therefore, we seek to test each of these factors separately, as well as jointly.

Specifically, we test the following hypotheses with regards to financial institutions. First, increased availability of finance (or overall financial development) is associated
with a more dynamic growth distribution in sectors more dependent from external finance.

Second, larger stock markets are associated with a more dynamic growth distribution in sectors more dependent on external finance, regardless of whether we control or not for overall financial development. Stock markets increase the availability of equity-financing, directly through secondary offerings or indirectly by enabling an IPO market that provides an exit route for early stage equity investors, such as business angels and venture capitalists. Equity investment is the preferred form of financing for risky investments, such as those undertaken by high-growth companies aiming to expand fast, so it should disproportionally benefit firms at the top of the business growth distribution.

Third, banking competition is associated with a more dynamic growth distribution in sectors more dependent on external finance, regardless of whether we control or not for overall financial development. Controlling for the overall availability of finance, the impact of banking competition likely captures the more efficient allocation of funding and its lower cost.

Fourth, the strength of creditors’ rights is associated with a less dynamic firm growth distribution in sectors more dependent on external finance if we control for the overall availability of finance. Otherwise, following from the discussion above this relationship is ambiguous. Creditor-friendly bankruptcy regimes may discourage risk-taking, which would reduce the rate of growth at the top of the firm distribution; while also decreasing the cost of external finance for firm growth, with the opposite effect. At the bottom of the distribution a similar trade-off emerges. Firms might avoid asking for loans for restructuring if the risk of failure is high and the penalties severe, but funding for firm growth is likely to be more available than in debtor-friendly regimes. Therefore, while a creditor-friendly bankruptcy regime may reduce the overall variance of the growth distribution, the opposite effect is possible as well.

3. ESTIMATION STRATEGY

The estimation strategy follows a “difference-in-difference” approach first used by Rajan and Zingales (1998), but adapted to correct for potential measurement error. Intuitively, we identify the role of labour and financial institutions by exploiting the variation across sectors of their expected impact, controlling for sectoral and country level (unobserved) factors. In other words, firms in different industries might be affected by framework conditions to a different degree because of structural differences in technologies and other sector characteristics. For instance, Rajan and Zingales (1998) estimate the impact of financial development by asking whether industries that are more dependent on external finance grow relatively faster in countries with more developed financial markets, relative to industries less dependent on external finance. We use a similar approach but consider a wider range of outcome variables and drivers.

The main regression model is based on the following equation:

\[ y_{ik} = \alpha + X_{ik} \beta + \theta_k + \delta_i + \epsilon_{ik} \quad \text{with} \quad X_{ik} = q_i n_k \]  

(1)
Where $i$ indexes industries and $k$ countries; $\theta$ and $\delta$ are country and sector fixed effects, respectively. Since the data are based on a cross-section we do not use a time index or year dummies. The dependent variable $y$ is one of the following measures of the shape of the firm growth distribution: (i) the share of shrinking firms, (ii) the share of stable firms, (iii) the share of high-growth firms, (iv) the growth rate at the 25th percentile of the growth distribution, and the growth rate at the 75th percentile of the growth distribution and, last, (vi) the interquartile range in the firm growth distribution. $X$ is a matrix of country-sector specific controls, based on interactions between sector-specific characteristics, $q_i$, that are fixed across countries, and country specific policies, $n_k$, that are invariant across industries, as described in more detail below.

The estimates of the $\beta$ coefficients of the variables included in $X$ should capture the effect of country-sector specific factors on the dependent variable, conditional on the country and sector averages, which are absorbed by the fixed effects. Their sector-specific impact is therefore estimated by a set of interaction terms, contained in $X$. Each interaction term $x_{ki} = n_k q_i$ is composed by a variable $n_k$ varying only at country level, which describes different features of national policies, and a measure $q_i$ – varying only at sector level – which captures technological and structural characteristics of the sector and might affect the degree to which the given sector is affected by that policy.

However, $\beta$ coefficients’ estimates may be biased and inconsistent because of endogeneity due to reverse causality or omitted variables bias. Ideally, the variables $q_i$ should describe and rank industries only according to technological or structural features without being affected by national policies and framework conditions. This is not straightforward: for example the labour intensity of a particular sector in a given country is going to be affected by national policies of that given country, thus biasing the results of the analysis. Therefore, we set a benchmark country for the vector of sector variables $q_i$ and exclude it from the sample. This should eliminate the risk that the estimated relationship might be driven by a causal relationship going from sector features to national policies, rather than by policies affecting sector outcomes (i.e. endogeneity driven by reverse causality). The United States is consistently ranked among the top countries in terms of financial development and flexible labour markets, so the observed technological and structural characteristics of each sector in the United States are probably the closest proxies for the underlying sector characteristics in an “undistorted” economy. Therefore, for simplicity, the United States is used as the benchmark country in all regressions and therefore is excluded from the regressions. In addition, to minimise biases due to reverse causality, the period of reference for the sector characteristics considered are those at the beginning of the period (or earlier when available).

An attractive feature of this methodology is that the interaction terms allow inferring the effect of national policies on sectoral growth, while controlling for other unobservable country factors that have been omitted from the regression equation and that might be potentially correlated with both the policy framework and the sector performance in a given country.
However, the traditional Rajan-Zingales approach has been recently criticised by Ciccone and Papaioannou (2006 and 2010), who argue that the estimator is prone to both an “attenuation bias”, due to classical measurement error, and to an “amplification bias”, due to a systematic error component. The sum of the two biases would generate a “benchmarking bias”, the direction of which cannot be determined a priori, but which might lead to inconsistent estimates.

The magnitude of the “attenuation bias” (i.e. how much error in the measurement of the interaction term pushes the coefficient estimates towards zero) will depend on the extent to which the chosen benchmark country (generally, the United States) differs from the ideal frictionless economy. The further away from the ideal frictionless economy the benchmark country is, the stronger the attenuation bias and the closer to zero the estimated coefficients will be.\(^3\)

Ciccone and Papaioannou (2006 and 2010) therefore propose an instrumental variables (IV) approach that produces consistent estimates which are not affected by the “attenuation bias”, which we adopt in this paper. Specifically, they suggest to instrument United States proxies with a second indicator of sector characteristics which is i) correlated with the global component of United States sector values, but ii) does not reflect the United States specific component, nor that of other countries.\(^4\) As the authors point out, an indicator satisfying both of these requirements would simply be the average cross-country sector value. However, such an indicator may not fully satisfy condition ii), since it would also reflect the effect of the country-specific component. A better candidate is therefore a cross-country indicator “purged” from the individual countries’ effect.

The instrumental variable is therefore estimated via the following regression:

\[
q_{ik} = \delta_i + \theta_k + \sum_i \gamma_i \pi_k + \epsilon_{ik}
\]  

(2)

in which the sector component of the interaction for each country is regressed on country and sector fixed effects and an interaction of sector fixed effects and country policies. The estimated instrumental variable (IV\(_i\)) is equal to the estimated sector fixed effect plus the United States value of the policy variable multiplied by its sector-specific coefficient:

\[
IV_i = \delta_i + \tilde{\gamma}_i \pi_{US}
\]  

(3)

The estimates can easily be interpreted and quantified: the estimates reflect the difference in the differential effect of the policy in two different sectors (normally we

\(^3\) For instance, rewriting eq. (1) for the case in which the industry component in the interaction term is proxied by the United States value, expressing the latter as the sum of the true unobserved industry component \(q\) and an idiosyncratic term \(\varepsilon\):

\[
y_{ik} = \alpha + (q_i + \varepsilon_{iUS}) \pi_k + \theta_k + \delta_k + \epsilon_{ik}.
\]  

From this, it is easy to see that it would yield consistent estimates of \(\beta\) only in the special cases of \(\varepsilon_{iUS} = 0\) or \((\varepsilon_{iP}, \varepsilon_{ik}) = 0\), since only in these two cases the error term would be uncorrelated with the variable of interest.

\(^4\) Note that the first requirement relates to the strength of the instrumental variable, while the second relates to the validity of the exclusion restriction.
consider industries in the top and bottom quartile of the distribution) if moving from a country with low values to countries with a high value for that particular policy.

4. DATA

4.1. Data on firm growth

This paper uses a novel database on the distribution of firms’ growth that was collected from business registers as part of a joint project by FORA and Nesta in collaboration with researchers and national statistical agencies in participating countries and with support from the International Consortium for Entrepreneurship (ICE) and the Entrepreneurship Indicators Programme (EIP) of the OECD. The following description and discussion of the database draws extensively on Bravo-Biosca (2010b), which contains additional information.

Measuring the distribution of business growth consistently across countries is challenging. There are currently two different data sources to accomplish this task, business registers and standard commercial databases.

Several studies have used commercial databases, such as Bureau van Dijk’s ORBIS, which typically collect data from companies’ filings and yellow pages directories (see OECDb 2009). However, the coverage of business activity in commercial databases is limited and differs across countries, over time, and across size classes, being better for larger businesses.5

Business registers provide a much more comprehensive coverage of economic activity in any country, basically covering the universe of firms. However, due to the confidential nature of the information, access to this rich data source is restricted. To circumvent confidentiality, Bravo-Biosca (2010b) built a micro aggregated database on firm growth dynamics with information from business registers. The database is based on a partnership with each country’s national statistical offices or, alternatively, with researchers that have authorised access to the microdata (following the approach used by Bartelsman, Haltiwanger and Scarpetta 2004, Brandt 2004 and OECD 2009a).

Participants were provided with a methodological manual and software code to extract the required data, building – whenever feasible – on the Eurostat-OECD Business Demography Manual (2007), which most business registers follow. The information submitted by each partner was then scrutinised to identify potential inconsistencies and, if necessary, subjected to a process of revisions with each partner in the project.

Collaborations were established with research partners in Austria, Canada, Denmark, Finland, Italy, the Netherlands, New Zealand, Norway, Spain, the United Kingdom and the United States. Each country provided harmonised micro aggregated data on business growth following standard definitions provided at the outset of this project, which in turn

5 Appendix A.1 included in the OECD working paper version of this paper presents a comparison of the distribution of firm growth rates across countries, sizes, sectors and ages for the same time period, and finds that there are large (and heterogeneous) differences, both in the coverage of firms and in the distribution of firm growth, between the ORBIS database and the Nesta-FORA database.
were based on the Eurostat-OECD Manual on Business Demography Statistics developed by the Entrepreneurship Indicators Programme. The resulting database draws on individual records for six million firms, which employed over 120 million people in 2002. It measures how firms expanded and shrank between 2002 and 2005: the period after the dotcom bubble and before the height of the boom that later degenerated into the recent financial crisis.

Average annual employment growth over a three-year period was measured for each surviving private sector firm that had at least one employee and was at least one year old (turnover growth data is also available for some countries). Based on their growth rate, firms were placed in one of 11 pre-defined growth intervals. This data was then used to estimate the percentiles of the growth distribution and produce a growth distribution curve for each country. The resulting database contains the full growth distribution and a variety of other indicators on business growth for up to 51 sectors, ten firm size classes and five age groups in the participating countries. The data used in the regression analysis however consider only firms with 10 or more employees and are restricted to 36 sectors and eight countries (Austria, Denmark, Finland, Italy, the Netherlands, Norway, Spain and the United Kingdom), while the United States is used as the benchmark country.

The main advantage that this database provides, compared to other existing data sources, is the possibility to go beyond the “average” firm and analyse the full distribution of firm growth across several countries and sectors, derived from harmonised official business registers providing quasi-universal coverage of business activities from one plant to another is treated differently if the plants belong to the same subsidiary or to two different subsidiaries of the same firm. Outsourcing to an external provider decreases employment growth (but not turnover growth). Employment outside the home country is not measured in business registers, so FDI or offshoring are not properly captured. A few issues regarding the database are worth being highlighted. First, the growth data for the United Kingdom was derived from a database still under development, so changes may occur in future revisions. Second, the data for Canada only covers firms with between 10 and 250 employees. Third, the data only includes surviving firms (defined as those that have survived with positive employment throughout the three-year period); therefore the data does not allow for the analysis of entry and exit patterns, or for the contribution of entry and exit to aggregate employment growth. Fourth, data was collected for all firms with at least one employee, but the firm growth indicators discussed here focus on firms with ten or more employees, since percentage growth rates for very small firms are often very "noisy" indicators (e.g. a firm growing from two to four employees has a 100% employment growth rate). Fifth, the breakdown for age and size categories is not available at the 2-digit industry level but only for more aggregated sectoral groupings. This means that it is not possible to distinguish in the regression analysis for factors that might affect young versus mature firms or small versus large businesses differently. Finally, all measures of job creation discussed here capture in principle all jobs gained by surviving firms, regardless of whether they are the result of organic growth or instead are gained through acquisitions of existing firms. Similarly, job destruction captures both jobs lost by firms that dismiss employees and spinouts that reduce the headcount of the firm. These measures thus capture the restructuring process that firms undertake, regardless of whether this is achieved through acquisitions, spinouts or organic growth. Another issue relates to the boundaries of firms. The administrative or legal definition of an enterprise (or establishment) used by business registers does not necessarily coincide with the economic definition of the firm (which itself is also often diffuse). For instance, a new subsidiary of a larger firm is generally coded as a new entering firm. Shifting of activities from one plant to another is treated differently if the plants belong to the same subsidiary or to two different subsidiaries of the same firm. Outsourcing to an external provider decreases employment growth (but not turnover growth). Employment outside the home country is not measured in business registers, so FDI or offshoring are not properly captured. However, these concerns should not be over-emphasised, since the boundaries of the firm are relatively clear for the majority of firms. After all, as Bartelsman, Scarpetta and Schivardi (2003) point out, the average number of plants per firm is 1.2 in the United States and 1.1 in Finland, despite the large difference in country size.

Data for Canada and New Zealand are not available at a detailed sectoral level, and therefore are not included in the regression analysis and any other analysis requiring industry breakdowns. The United States is also excluded from the econometric analysis since it is used as the benchmark economy.

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6 Specifically, the 11 growth intervals considered are: [-∞,-20%], [-20%,-15%], [-15%,-10%], [-10%,-5%], [-5%,-1%], [-1%,-1%], [1%-1%], [1%-0%], [0%-1.5%], [1%-15%] and [20%:].
7 To obtain the percentiles of the growth distribution, Bravo-Biosca (2010b) starts from the 11 growth intervals, the endpoints of which provide the skeleton of the cumulative distribution function. It then interpolates between them to derive the full distribution, controlling for the common curvature of the growth cdf using the Laplace distribution (which according to several studies fits the empirical growth distribution quite closely). See Bravo-Biosca (2010b) for additional details on the approach followed to do so.
8 A few issues regarding the database are worth being highlighted. First, the growth data for the United Kingdom was derived from a database still under development, so changes may occur in future revisions. Second, the data for Canada only covers firms with between 10 and 250 employees. Third, the data only includes surviving firms (defined as those that have survived with positive employment throughout the three-year period); therefore the data does not allow for the analysis of entry and exit patterns, or for the contribution of entry and exit to aggregate employment growth. Fourth, data was collected for all firms with at least one employee, but the firm growth indicators discussed here focus on firms with ten or more employees, since percentage growth rates for very small firms are often very "noisy" indicators (e.g. a firm growing from two to four employees has a 100% employment growth rate). Fifth, the breakdown for age and size categories is not available at the 2-digit industry level but only for more aggregated sectoral groupings. This means that it is not possible to distinguish in the regression analysis for factors that might affect young versus mature firms or small versus large businesses differently. Finally, all measures of job creation discussed here capture in principle all jobs gained by surviving firms, regardless of whether they are the result of organic growth or instead are gained through acquisitions of existing firms. Similarly, job destruction captures both jobs lost by firms that dismiss employees and spinouts that reduce the headcount of the firm. These measures thus capture the restructuring process that firms undertake, regardless of whether this is achieved through acquisitions, spinouts or organic growth. Another issue relates to the boundaries of firms. The administrative or legal definition of an enterprise (or establishment) used by business registers does not necessarily coincide with the economic definition of the firm (which itself is also often diffuse). For instance, a new subsidiary of a larger firm is generally coded as a new entering firm. Shifting of activities from one plant to another is treated differently if the plants belong to the same subsidiary or to two different subsidiaries of the same firm. Outsourcing to an external provider decreases employment growth (but not turnover growth). Employment outside the home country is not measured in business registers, so FDI or offshoring are not properly captured. However, these concerns should not be over-emphasised, since the boundaries of the firm are relatively clear for the majority of firms. After all, as Bartelsman, Scarpetta and Schivardi (2003) point out, the average number of plants per firm is 1.2 in the United States and 1.1 in Finland, despite the large difference in country size.
9 Data for Canada and New Zealand are not available at a detailed sectoral level, and therefore are not included in the regression analysis and any other analysis requiring industry breakdowns. The United States is also excluded from the econometric analysis since it is used as the benchmark economy.
activity in all sectors of the economy. This represents an advance with regards to the existing literature, which either studies only the firm growth distribution within a single country, or undertakes cross-country analysis but only looking at the average firm or aggregate sector indicators (and/or with commercial databases with incomplete coverage of business activity).

4.2 Cross-country patterns

An analysis of this database shows that there are large differences in firm growth dynamics across countries, which are examined in detail in Bravo-Biosca (2010b). In the following, we summarize the most salient features which are relevant for the econometric analysis.

Figure 1 compares the distribution across countries classifying firms into four growth intervals: shrinking, stable, growing and high-growth firms. The graph sorts from left to right countries that have the lowest share of high-growth firms. Many continental European countries have few high-growth firms, while they are among the countries where the share of stable firms is the largest. As a result, there are large differences in the patterns of job expansion and contraction across countries, as can be seen in Figure

---

10 Decreasing, stable, growing and high-growth firms are defined according to the following growth rate intervals, respectively: \([-\infty;-5\%], [-5\%;+5\%], [+5\%;+20\%], [+20\%;+\infty]\). All data refer to firms with 10 employees or more. Source: Nesta-FORA firm growth project.
European countries typically have lower rates of both job creation and destruction, while countries like the United States and Canada that have an above-average share of high-growth firms also have significantly larger job destruction. This confirms the importance of looking at the whole distribution of firms to understand the dynamics of employment growth rather than restricting the analysis to HGFs.

Table 1 shows the large heterogeneity that exists within and between countries in the shape of the growth distribution. The share of stable firms can range between 16% and 100% depending on the country-sector pair considered. The growth rate of companies at the 25th percentile ranges from -55% to +1.5%, while the growth rate for firms at the 95th percentile can be as little as 23% to as much as 776%. The interquartile range for the growth rate distribution sums up this variation, ranging from less than 14pp to almost 80pp.
Table 1. Descriptive statistics by country-sector cell

<table>
<thead>
<tr>
<th>Variable</th>
<th>Nr obs.</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min</th>
<th>Max</th>
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<tbody>
<tr>
<td>Share of shrinking firms</td>
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<td>29.1</td>
<td>8.6</td>
<td>0.0</td>
<td>74.7</td>
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<tr>
<td>Share of stable of firms</td>
<td>234</td>
<td>46.6</td>
<td>9.6</td>
<td>16.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Share of growing firms</td>
<td>234</td>
<td>19.7</td>
<td>5.7</td>
<td>0.0</td>
<td>41.3</td>
</tr>
<tr>
<td>Share of high-growth firms</td>
<td>234</td>
<td>4.6</td>
<td>3.2</td>
<td>0.0</td>
<td>21.4</td>
</tr>
<tr>
<td>Growth rate 25\text{th} percentile (p25)</td>
<td>225</td>
<td>-18.6</td>
<td>8.1</td>
<td>-54.9</td>
<td>1.5</td>
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<tr>
<td>Growth rate 50\text{th} percentile (p50)</td>
<td>225</td>
<td>-1.3</td>
<td>5.7</td>
<td>-41.3</td>
<td>32.3</td>
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<tr>
<td>Growth rate 95\text{th} percentile (p95)</td>
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<td>78.6</td>
<td>63.8</td>
<td>23.1</td>
<td>775.9</td>
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<tr>
<td>Growth rate Inter Quartile Range (IQR)</td>
<td>225</td>
<td>34.7</td>
<td>10.1</td>
<td>13.6</td>
<td>79.3</td>
</tr>
</tbody>
</table>

Note: Growth percentiles are obtained by non-linear interpolation of the 11 growth brackets following a Laplace distribution. See Bravo-Biosca (2010b) for details.

Figure 3 reports the share of high-growth firms (HGFs), their share in total employment, and their contribution to job creation. In all countries, high-growth firms account for a very small share of the total number of firms and initial employment, but...
make a disproportionate contribution to job creation. For instance, in the United Kingdom, United States, and Italy, HGFs account for more than 40% of total job creation by surviving firms with 10+ employees, while they represent on average only 5% of the total number of surviving firms with 10+ employees. Specifically, they account for between 3.2% (Norway) and 6.4% (United Kingdom) of all surviving firms with ten or more employees, yet they account for 40% and 64% of all jobs created by surviving firms with ten or more employees in Norway and United Kingdom, respectively. This justifies the prominence of high-growth firms in the debate about job creation and employment growth, although it leaves between 36% and 74.5% of employment growth to be attributed to other firms. Therefore it is important to look beyond HGFs and explore the full growth distribution.
Figure 4 highlights this point further, by plotting the full growth distribution for the US and Europe (or to be precise, the average for the European countries included in the sample). It shows that looking only at one extreme of the firm growth distribution, as policy makers often do when considering high-growth firms, might provide a misleading picture of the extent of the differences in business growth across countries. There are substantial differences between European countries and the US, with Europe having a larger share of stable firms and lower shares of both growing and shrinking firms. Or, in other words, the US displays a more dynamic firm growth distribution than the average European country included in the sample (See Bravo-Biosca 2010b for country by country differences).
4.3. Framework conditions and sector characteristics data

In addition to the firm growth data, we use several other data sources in this analysis, either to measure labour market regulation and financial development, or to measure the sector characteristics that reflect a sector exposure to labour and financial market institutions.

We use two indices of labour market regulation to measure the flexibility of the labour market. First, a composite index of employment protection legislation (EPL) constructed as a weighted sum of 21 indicators in two main areas: i) protection of regular workers against individual dismissal; and ii) regulation of temporary forms of employment. Second, an index focused on regulation regarding collective dismissals (EPL Collective), which measures additional costs and procedures involved in dismissing more than one worker compared with the costs of individual dismissal. Table 2 shows the significant heterogeneity across countries, with the US having the most flexible labour market overall (with EPL of 0.6) and Spain the most rigid one (with EPL of 3.1).

Four measures are used to capture the degree of financial development in a country, reported in Table 2. First, a summary index of financial development, consisting of the sum of the stock and bond market capitalisation and of private credit by banks, normalised over GDP. Second, the size of the stock market, measured as stock market capitalisation relative to GDP. Third, an index that captures the level of regulation and barriers to competition in the banking sector. Fourth, an index of the strength of creditor rights in case of corporate bankruptcy.11

Table 2. Labour and financial market institutions by country (2002)

<table>
<thead>
<tr>
<th>Country code</th>
<th>AT</th>
<th>DK</th>
<th>FI</th>
<th>IT</th>
<th>NL</th>
<th>NO</th>
<th>ES</th>
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<tr>
<td>EPL</td>
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<td>2.6</td>
<td>3.1</td>
<td>1.1</td>
<td>0.6</td>
</tr>
<tr>
<td>EPL Collective</td>
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<td>3.9</td>
<td>2.6</td>
<td>4.9</td>
<td>3.0</td>
<td>2.9</td>
<td>3.1</td>
<td>2.9</td>
<td>2.9</td>
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<td></td>
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<tr>
<td>Fin. dev. index</td>
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<td>2.00</td>
<td>1.58</td>
<td>2.88</td>
<td>1.31</td>
<td>1.86</td>
<td>2.79</td>
<td>2.81</td>
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<td>Stock market capitalisation</td>
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<td>0.48</td>
<td>1.22</td>
<td>0.42</td>
<td>0.99</td>
<td>0.36</td>
<td>0.68</td>
<td>1.29</td>
<td>1.21</td>
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<td>Banking regulation</td>
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<td>2.74</td>
<td>1.66</td>
<td>2.45</td>
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<td>3</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td></td>
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</table>

11 The sources for these variables are as follows. Employment protection legislation data is obtained from the OECD www.oecd.org/employment/protection, with data from year 2002 used here. Financial development and stock market capitalisation were developed originally by Beck et al. (2000) and are updated regularly by the World Bank (the analysis here uses 2002 figures). Banking regulation is taken from de Serres et al., 2006 and is calculated by the authors as an unweighted average of four different indicators: the first three – Foreign entry index, Domestic entry index, and Bank activity index – are extracted from the World Bank’s “Bank, Regulation and Supervision” Database (see de Serres et al., 2006, p.36 for the exact definitions) which compiles the results from a detailed survey of banking regulation conducted in 2000 and again in 2002-03 in a large number of countries; the fourth indicator is an index of restrictions on foreign entry in banking based on earlier OECD work on FDI restrictions (Golub, 2003). Creditor rights is constructed for every year from 1978 to 2000 following Djankov et al. (2007) and La Porta et al. (1998), ranging from 0 to 4 with a higher value if i) there are restriction such as creditor consent or minimum dividends for a debtor to file for reorganisation, ii) secured creditors are able to seize their collateral after the reorganisation petition is approved, iii) secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers and iv) if management does not retain administration of its property pending the resolution of the reorganisation (the analysis here uses 2002 figures).
As discussed in the earlier section, in order to implement the “difference-in-difference” estimation, we need to find sector level variables which can reflect as closely as possible the technological characteristics of the sector and at the same time affect the extent to which labour and financial institutions have an impact on firm growth in a particular sector.

We consider two sector characteristics that should affect the impact of labour market regulation on firm growth dynamics. First, the labour intensity of the sector, measured as the ratio of labour cost over value added of the sector. Second, the sector’s “innovativeness”, which given the limitations of available data is proxied by its R&D intensity (measured as the ratio of sector R&D expenditure over value added), with the caveat that this measure might systematically underestimate innovation activity in the services sectors, in industries with smaller average size and in more dynamic industries with many innovative start-ups.\(^\text{12}\)

Finally, to estimate the impact of financial development we use the sector’s dependence on external finance providers, measured by the inverse Leontief’s coefficient on the input from finance and insurance from input-output tables for each sector.\(^\text{13}\)

5. RESULTS

We first consider the impact of employment protection legislation on the resource reallocation process, then move onto looking at the impact of financial institutions, and conclude with a discussion of the robustness of the results. Specifically, we consider 6 measures of the shape of the firm growth distribution: i) the share of shrinking firms, ii) the share of stable firms, iii) the share of high-growth firms, iv) the growth rate at 25\(^{th}\) percentile of the growth distribution, v) the growth rate at the 75\(^{th}\) percentile of the growth distribution and, last, vi) the interquartile range of firm growth distribution.\(^\text{14}\)

5.1. Labour market institutions

Table 3 estimates the impact of employment protection legislation (EPL) on the distribution of firm growth using the instrumental variables estimation approach discussed in section 3.

\(^{12}\) The data on labour intensity and R&D intensity are extracted from the OECD STAN database for the year 2002.\(^\text{12}\)

\(^{13}\) This is used as a proxy for external finance dependence, but in addition it captures the wide array of financial products and services that sectors consume. The measure, extracted from OECD STAN for the year 2002, includes interest paid and fees, but excludes loans. Therefore, it serves as a proxy for dependence on external finance but more broadly it captures the sectors that consume more financial services (and are therefore likely to benefit the most from a developed financial market). It is not possible to use the external finance dependence measure originally developed by Rajan and Zingales (1998) since this was based on the external finance needs of US listed companies obtained from Compustat. The instrumental variables approach used here requires information on external finance needs in all the countries in the sample. However, in most of them the stock market plays a much smaller role than in the United States and it is likely to be less representative of the external finance needs of a particular industry in the country, while the available data on external finance dependence for non-listed companies are much more limited. Excluding the financial sector from the analysis leads to very similar results.\(^\text{13}\)

\(^{14}\) Correlation tables for the dependent variables, the policy indicators, and the industry-specific measures are available upon request.
The table only reports the coefficient for the parameter of interest for each regression (as well as the corresponding standard errors clustered at sector level in parenthesis), but in addition all regressions also include the following unreported control variables: average firm size at the beginning of the period, total employment growth of surviving firms with 10+ employees, and country and sector fixed effects.

<table>
<thead>
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<th>VARIABLES</th>
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<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tr>
<td></td>
<td>(5.735)</td>
<td>(4.599)</td>
<td>(1.318)</td>
<td>(4.558)</td>
<td>(70.20)</td>
<td>(3.844)</td>
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<td>Labour cost/V.A. X EPL collective</td>
<td>-5.216***</td>
<td>9.069***</td>
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<td>8.701***</td>
<td>-54.88***</td>
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<tr>
<td></td>
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<td>56.43</td>
<td>56.43</td>
<td>57.08</td>
<td>57.08</td>
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<td>R-squared</td>
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<td>215</td>
<td>207</td>
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<table>
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<th>VARIABLES</th>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<td></td>
<td>(6.323)</td>
<td>(14.26)</td>
<td>(4.476)</td>
<td>(7.714)</td>
<td>(80.10)</td>
<td>(11.45)</td>
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<tr>
<td>R&amp;D/V.A. X EPL collective</td>
<td>-4.558</td>
<td>15.54*</td>
<td>-2.541</td>
<td>2.579</td>
<td>-87.60*</td>
<td>-18.14</td>
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<tr>
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<td>(5.546)</td>
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<td>(2.503)</td>
<td>(7.149)</td>
<td>(47.43)</td>
<td>(11.16)</td>
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<tr>
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<td>38.75</td>
<td>38.75</td>
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<tr>
<td>F-test excl. IVs</td>
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<td>215</td>
<td>215</td>
<td>207</td>
<td>207</td>
<td>207</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.065</td>
<td>0.032</td>
<td>0.195</td>
<td>0.113</td>
<td>0.417</td>
<td>0.075</td>
</tr>
</tbody>
</table>

Note: The units of observation are country-sector pairs. The dependent variables are (1) the share of shrinking firms, (2) share of stable firms, (3) share of high growth firms, (4) the growth rate at the 25th percentile of the growth distribution, (5) the growth rate at the 95th percentile, and (6) the difference in average employment growth between p75-p25. The table reports the coefficients estimated using the instrumental variables approach described in section 3. Countries included in the regressions are Austria, Denmark, Finland, Italy, Netherlands, Norway, Spain and the United Kingdom (the United States is only used as a benchmark). All regressions include average firm size at the beginning of the period, total employment growth of surviving firms with 10+ employees, and country and sector fixed effects. Robust standard errors clustered at sector level in parenthesis. *** significant at 1%; ** significant at 5%; * significant at 10%. The F-test excl. IVs is a joint F-test of significance of the excluded instruments in the first stage regression.

The top panel considers the interaction between EPL and labour intensity. The coefficients capture the differential impact of stringent labour market regulation in more labour intensive sectors compared to sectors with a lower labour cost/value added ratio, under the assumption that EPL should have a stronger impact on labour intensive sectors. Two complementary EPL indicators are considered, respectively the one relative to individual dismissal of regular and temporary workers, and the one measuring additional regulation for collective dismissal. The results show that stricter regulation of collective dismissal is associated with a relatively lower share of shrinking firms in labour intensive sectors and a larger share of stable firms. Furthermore, the coefficients’ estimates on the percentile of the employment growth distribution also point to a significant narrowing of the growth distribution, with a relatively better performance of firms at the 25th percentile of the employment growth distribution, and a strong negative
link with the growth of the 95th percentile. The coefficients’ negative estimates when the dependent variable is the interquartile range (IQR) – with both the EPL indicators – confirm the association of stricter EPL with a narrower growth distribution.

The second panel in Table 3 reports the differential impact of EPL in relation to R&D intensity, under the assumptions that i) the more R&D intensive sectors should be more affected by EPL due to their more risky and innovative nature, and ii) the fact that wages are generally the largest component of R&D expenditures.

The results show that strict EPL for regular and temporary workers is associated with a relatively narrower growth distribution in R&D intensive sectors, driven by a lower share of shrinking firms and a higher share of stable firms (columns 1-2). The coefficients are not significant at the top of the distribution, although their negative sign is consistent with a narrowing of the growth distribution as well. The collective dismissal indicator points to similar conclusions, as strict regulation is associated with slower growth at the 95th percentile of the growth distribution. In a nutshell, EPLs – in particular those relative to collective contracts – appear to slowdown the contraction of poorly performing firms while hampering the performance of fast growing firms in R&D intensive sectors.

Figure 5 attempts to give an illustration of the economic magnitude of the estimated differences in employment growth distribution resulting from stringent EPL. The example reported in the Figure mirrors the “difference-in-difference” approach of the econometric analysis: it compares the difference of two sector values across two countries. Specifically, it displays the estimated difference in the employment growth performance of firms at different points in the growth distribution in a high labour cost sector, textiles (the sector at the 90th percentile of the labour cost distribution) and a low labour cost sector, such as electricity and water (10th percentile) in Italy (the country with the most stringent EPL for collective dismissals) and Finland (the country with the lowest EPL for collective dismissals), respectively.

Consider for example firms at the 95th percentile. The difference in their growth in textile versus electricity and water is -54pp larger in Italy, the country with the most stringent employment protection legislation for collective dismissals, than in Finland, the country with the lowest EPL for collective dismissals. In other words, if Italy were to replicate Finland’s labour regulation, the gap between its 95th percentile in the textile sector and the electricity and water sector would be 54pp higher than it is under Italian reported EPL (i.e. Italian best performing textile firms would grow relatively faster). Given that the average growth rate of the 95th percentile firm in the sample is 77% (see Table 1), the estimated impact of the policy is economically sizeable.

Figure 6 quantifies instead the estimated “differences in differences” in the employment growth performance of firms in a high R&D intensive sector, Computer services, (the 90th percentile) and a low R&D intensive sector, such as Construction
(10th percentile), in the country with the most and least stringent employment protection legislation for regular and temporary workers (Spain and United States, respectively).

**Figure 5. Differential effect of EPL on growth percentiles in high labour cost industries**

Note: The graph reports the estimated “differences in differences” in the performances of top and bottom (p90 and p10) labour costs industries (Textile and Electricity-gas-water), respectively, in the country with the most and least most and least stringent employment protection legislation for collective dismissals (Italy and Finland), respectively. Dotted bars report 10% confidence intervals. *Source:* Authors’ elaboration.

**Figure 6. Differential effect of EPL on shares of firms in R&D intensive industries**

Note: The graph reports the estimated “differences in differences” in the performances of top and bottom (p90 and p10) R&D intensive industries (Computers and Construction), respectively, in the country with the most and least stringent employment protection legislation for temporary and regular workers (Spain and United States), respectively. Dotted bars report 10% confidence intervals. *Source:* Authors’ elaboration.

The figure shows that the difference in the share of stable firms between Computers and Construction is 9 percentage points (pp) higher in Spain, the country with the most stringent employment protection legislation, than in the United States, the country with
the lowest EPL for collective dismissals; while the gap in the share of shrinking firms between Computers and Construction is equal to 5pp. In other words, if Spain were to replicate United States’ labour regulation, the gap between its share of shrinking firms in the Computer sector and in the Construction sector would be 5pp higher (e.g. Spain’s Computer sector would have a relatively higher share of shrinking firms).

Rather than considering both channels separately, Table 4 looks at the relative impact of both EPL on R&D intensive sectors and on labour intensive sectors jointly. Similar results emerge (even if significance levels are slightly lower, not unexpectedly given the existing multicollinearity among the main variables and the small sample size); the main conclusions are confirmed. Stringent EPL for collective dismissal is associated with a relatively less dynamic business growth distribution in more labour intensive sectors, even when controlling for the similar effect of stringent EPL on R&D intensive sectors (and viceversa). In R&D intensive sectors, once controlling for the interaction of EPL with labour intensity, the only significant effect is on the lower share of shrinking firms (col. 1) and on the higher growth rate of firms at the 25th percentile of the distribution. This suggests that EPL might have a disproportionate positive effect on growth at the bottom of the distribution in R&D intensive sectors.

Table 4. Labour market regulation in R&D and labour intensive sectors

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Shrinking</th>
<th>Stable</th>
<th>HGF</th>
<th>p25</th>
<th>p95</th>
<th>IQR</th>
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</thead>
<tbody>
<tr>
<td>Labour cost/V.A. X EPL</td>
<td>-0.434</td>
<td>5.234</td>
<td>-1.738</td>
<td>0.994</td>
<td>61.34</td>
<td>-7.201**</td>
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<td>X EPL</td>
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<td>(4.426)</td>
<td>(1.320)</td>
<td>(4.506)</td>
<td>(67.71)</td>
<td>(3.643)</td>
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<tr>
<td>R&amp;D/V.A. X EPL</td>
<td>-15.79**</td>
<td>28.02</td>
<td>-5.521</td>
<td>15.89*</td>
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<td>R&amp;D/V.A. EPL</td>
<td>(7.159)</td>
<td>(19.22)</td>
<td>(6.106)</td>
<td>(8.620)</td>
<td>(91.64)</td>
<td>(18.69)</td>
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<td>Labour cost/V.A. X EPL collective</td>
<td>-5.266**</td>
<td>8.342**</td>
<td>-0.979</td>
<td>9.726***</td>
<td>-52.43***</td>
<td>-13.84***</td>
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<tr>
<td>R&amp;D/V.A. X EPL collective</td>
<td>(2.064)</td>
<td>(3.462)</td>
<td>(1.576)</td>
<td>(2.863)</td>
<td>(20.00)</td>
<td>(2.695)</td>
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<td>F-test excl. IVs</td>
<td>15.25</td>
<td>15.25</td>
<td>15.25</td>
<td>13.69</td>
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<td>Observations</td>
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<tr>
<td>R-squared</td>
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<td>0.057</td>
<td>0.178</td>
<td>0.147</td>
<td>0.416</td>
<td>0.089</td>
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Note: The units of observation are country-sector pairs. The dependent variables are (1) the share of shrinking firms, (2) share of stable firms, (3) share of high growth firms, (4) the growth rate at the 25th percentile of the growth distribution, (5) the growth rate at the 95th percentile, and (6) the difference in average employment growth between p75-p25. The table reports the coefficients estimated using the instrumental variables approach described in section 3. Countries included in the regression are Austria, Denmark, Finland, Italy, Netherlands, Norway, Spain and the United Kingdom (the United States is only used as a benchmark). All regressions include average firm size at the beginning of the period, total employment growth of surviving firms with 10+ employees, and country and sector fixed effects. Robust standard errors clustered at sector level in parenthesis. *** significant at 1%; ** significant at 5%; * significant at 10%. The F-test excl. IVs is a joint F-test of significance of the excluded instruments in the first stage regression.
All in all, the analysis of EPL suggests that the regulation for collective dismissal is particularly important for firms in labour intensive industries, which may encounter the need to undertake large restructuring and reorganization of the labour force. For R&D intensive industries, instead, the regulation of individual dismissals seem to be more relevant, and more so for firms in the bottom part of the distribution; this looks plausible given that innovative and research-oriented firms rely more on specialized skilled workers.

5.2. Financial institutions

We next consider the impact that well-functioning financial institutions have on the dynamism of the firm growth distributions and henceforth the speed of the resource reallocation process. As discussed earlier in the paper, there are different ways to characterise the functioning of the financial system in a particular country. Table 5 reports the regression results looking at each of them independently. Specifically, the table reports the coefficient for the interaction between the sector’s dependence on providers of external finance and one of the four measures of financial development used in this paper.

The top panel in Table 5 looks at an overall index of financial development, defined as the sum of the stock and bond market capitalisation and of private credit by banks (normalised over GDP), and confirms that financial development is important in shaping the firm growth distribution in a country. Specifically, more developed financial markets are associated with a more dynamic growth distribution in industries with higher external finance dependence. This is driven by significantly faster growth at the top of the distribution (95th percentile, column 5) and faster shrinkage at the bottom as well (25th percentile, column 4). The two reinforcing effects at the top and bottom of the distribution lead to a significant widening in the distribution, with a significantly smaller range (column 6). Considering shares instead of percentiles leads to similar conclusions, with one caveat. Financial development is associated with fewer stable firms (column 2) and more shrinking firms (column 1) in sectors with higher external finance dependency, but somewhat surprisingly also with fewer high-growth firms (column 3), although this result is only marginally significant.\footnote{Unreported results (available in the OECD Working Paper version of this paper) examine this finding in more detail and find that while the share of HGFs is lower in external finance dependent sectors when financial development relative to GDP is higher, the average growth rate of HGFs is higher and so is the share of growing firms, both of which are consistent with the higher growth rate at the 95th percentile that we report here.}

The second panel in Table 5 explores the impact of having developed stock markets, measured as stock market capitalization relative to GDP. The results are similar in terms of magnitude and significance as those reported in the top panel, although we no longer find a negative impact on the share of high-growth firms (column 3), and the positive impact on the share of shrinking firms falls short from significance.

The third panel looks at regulatory barriers to banking competition, and finds that they are associated with a less dynamic firm growth distribution in sectors that are more
dependent on external finance providers. Higher levels of banking regulation increase the number of stable firms (column 2) and decrease the number of shrinking firms (column 1). We find that underperforming firms contract more slowly (25th percentile, column 4) while the expansion of top performing firms is also slower (95th percentile, column 5), resulting in a much narrower firm growth distribution, as shown by the significantly lower interquartile range (column 6).

The bottom panel in Table 5 considers the strength of creditors’ rights in corporate bankruptcy processes. In this case, the theoretical predictions are unclear, since both firms’ decision to engage in risky investments and financial intermediaries’ decision to financially support such an investment are affected by the strength of creditors’ rights, but in opposite directions. Increasing the severity of corporate bankruptcy law (or, in other words, its creditor-friendliness) is associated with faster contraction at the bottom
of the growth distribution in sectors more dependent on external finance, whether measured in terms of the number of shrinking firms (column 1) or of the growth rate at the 25th percentile (column 4). The impact at the top end of the growth distribution of strong creditor rights is less clear-cut, since it is associated with fewer high-growth firms, but also appears to be weakly correlated with faster growth at the 95th percentile.

Figure 7 illustrates the difference in the growth performance between sectors with high and low financial dependency (e.g. renting of machinery and pulp & paper, respectively) in the most financially developed country (Denmark), as compared to the growth differential of the same two industries in the least financially developed economy (Italy). While the differential effect is significant for the shares of shrinking and stable firms, the magnitude is not large, being equal to around 0.5% in both cases. Similarly, while the gap for the 95th percentile is statistically significant, the differential effect is quantifiable at around 3 percentage points, not high in comparison to the typical growth rates at the top of the distribution.

Figure 7 - Differential effect of financial development on the distribution of firm growth

Note: The graph reports the estimated “differences in differences” in the performances of top and bottom (p90 and p10) financial dependent industries (renting of machinery and pulp & paper, respectively), respectively, in the most financially developed country (Denmark), as compared to the growth differential of the same two industries in the least financially developed economy (Italy), respectively. Dotted bars report 10% confidence intervals. Source: Authors’ elaboration.

The regressions in Table 5 look at each of the characteristics of the financial system separately. This has the advantage that reduces multicollinearity issues, given the correlation that exists among the different channels considered, but has the disadvantage that it is not possible to identify which institutional features of the financial system have a stronger impact on firm growth dynamics, and what the underlying channels of the impact are.

Because of this, Table 6 reports the results for the regression that includes the three measures simultaneously (the stock market variables is excluded as it is contained in the financial development index one). Given the small sample size of the study and the
multicollinearity risk, these regressions need to be interpreted with care. Intuitively, each coefficient needs to be read as the impact of a change in that particular dimension of the financial system, keeping all the other dimensions the same. Not unexpectedly, some of the coefficients now loses their significance – especially those on the financial development index variable – however it is important to note that an insignificant coefficient cannot be interpreted as the inexistence of an effect, but instead as our inability to confirm or reject whether an effect actually exists for one particular feature once we control for the other features of a country’s financial institutions. Nevertheless, the signs of the estimates are generally consistent with the main finding, namely the positive association between a less regulated financial system and stronger creditor rights with a more dynamic firm growth distribution.

Table 6. Financial institutions (joint regressions)

<table>
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<tr>
<th>VARIABLES</th>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<tr>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>p25</td>
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<td>p95</td>
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<td>-2.730</td>
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<td>-137.2</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
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<td>230</td>
<td>230</td>
<td>221</td>
<td>221</td>
<td>221</td>
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<tr>
<td>R-squared</td>
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<td>0.160</td>
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<td>25.40</td>
<td>25.40</td>
<td>25.40</td>
<td>20.26</td>
<td>20.26</td>
<td>20.26</td>
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Note: The units of observation are country-sector pairs. The dependent variables are (1) the share of shrinking firms, (2) share of stable firms, (3) share of high growth firms, (4) the growth rate at the 25th percentile of the growth distribution, (5) the growth rate at the 95th percentile, and (6) the difference in average employment growth between p75-p25. The table reports the coefficients estimated using the instrumental variables approach described in section 3. Countries included in the regression are Austria, Denmark, Finland, Italy, Netherlands, Norway, Spain and the United Kingdom (the United States is only used as a benchmark). All regressions include average firm size at the beginning of the period, total employment growth of surviving firms with 10+ employees, and country and sector fixed effects. Robust standard errors clustered at sector level in parenthesis. *** significant at 1%; ** significant at 5%; * significant at 10%. The F-test excl. IVs is a joint F-test of significance of the excluded instruments in the first stage regression.

5.3. Robustness

There are several criticisms that could be made to the analysis discussed in the preceding sections. The potential role of omitted variable bias and reverse causality is the main concern. All regressions incorporate sector and country fixed effects, which by construction capture any omitted variable as long as it is constant within a country or an sector. However, the fixed effects fail to control for any variable that varies at a country-sector level as well as for any potential reverse causality that can emerge if institutions
evolve in response to some specific characteristics of a subset of industries in the country.

For instance, financial markets may become more developed in countries that have a natural advantage in industries that are highly dependent on external finance, since their demand would drive the development of the financial sector. However, the institutional factors considered in this paper tend to be deeply ingrained in a country’s institutional framework, and only evolve slowly or in response to major shocks. Moreover, the focus of the analysis is on the shape of the firm growth distribution within a sector, which should be less affected by reverse causality than the estimates referring to average sector performance (moreover, note that all the regressions control for the average size and the average growth rate for the sector).

An approach to address some of these concerns is to augment the regressions with additional variables. The analysis so far has considered the impact of each factor individually, so Table 7 reports the results of a robustness test that entails running a regression analysis including all factors considered jointly. This allows controlling for some potential sources of omitted variable bias not picked up by the country and sector fixed effects. However, these results should be interpreted with caution, since the limited size of the sample may amplify multicollinearity problems (especially when instrumental variables are involved).

The results are broadly consistent with those discussed in the previous sections, with the interaction terms maintain their significance in most cases. Creditor-friendly bankruptcy regimes, stringent labour regulation and less-developed financial markets are associated with lower churn (as measured by the interquartile range) and/or lower growth at the top of the distribution (p95) in industries more likely to be affected by these factors. The results that look at the share of firms in different growth categories point to the same conclusion. Employment protection legislation and regulation of the banking sector would appear to be the most relevant policy variables among those taken into consideration by the analysis, although the methodological caveats mentioned above should deter from interpreting these results as a “policy ranking” exercise.

Rather, these final set of results provide a useful reminder of the need to consider the full policy mix. No single policy lever holds the key to a more dynamic growth distribution. They all play an important role in shaping the employment growth dynamics in a country and in explaining cross-country differences over, and beyond, simple sectoral composition effects. A more comprehensive working paper version of this analysis encompasses additional policy areas, further corroborating the importance of taking into account the whole policy mix (Bravo-Biosca et al., 2013).

In order to validate the instrumental variables approach used here, we test the null hypothesis of no canonical correlation between endogenous variables and instruments in all the different specifications that we run, and in most cases reject that the equations are underidentified. The few cases in which we are not able to reject the null hypothesis of weak instruments are not particularly worrisome, as we also estimate the same
specifications using OLS obtaining very similar results, albeit typically with slightly lower levels of significance.16

Finally, given the small sample size of this study, and the similarities among the countries included, it is important to emphasize that insignificant results should not be interpreted as lack of an effect, but rather the reflection of our inability to conclude whether an effect exists or not.

Table 7. Robustness

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tbody>
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<td>Ext. fin. dep. X Fin. dev. index</td>
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<td>7.145</td>
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<td>-2.982</td>
<td>7.025***</td>
<td>-147.0***</td>
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<td>R-squared</td>
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<td>0.0376</td>
<td>0.0376</td>
<td>0.0683</td>
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</table>

Note: The units of observation are country-sector pairs. The dependent variables are (1) the share of shrinking firms, (2) share of stable firms, (3) share of high growth firms, (4) the growth rate at the 25th percentile of the growth distribution, (5) the growth rate at the 95th percentile, and (6) the difference in average employment growth between q75-q25. The table reports the coefficients estimated using the instrumental variables approach described in section 3. Countries included in the regression are Austria, Denmark, Finland, Italy, Netherlands, Norway, Spain and the United Kingdom (the United States is only used as a benchmark). All regressions include average firm size at the beginning of the period, total employment growth of surviving firms with 10+ employees, and country and sector fixed effects. Robust standard errors clustered at sector level in parenthesis. *** significant at 1%; ** significant at 5%; * significant at 10%.

6. CONCLUSIONS

This paper sheds some further light on the impact that labour and financial market institutions have on the process of resource reallocation. The Schumpeterian creative destruction, as it is often referred to, is a key driver of productivity growth due to the large heterogeneity in productivity levels across firms that can be observed even within narrowly defined sectors.

Several studies have examined the relationship between labour and financial institutions on the one hand, and aggregate (or sectoral) economic performance on the

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16 Both of these are included in the longer OECD Working Paper version of this paper, or available upon request.
other. In this paper we go one step forward by looking at the impact that these institutional factors have not only on the average firm, but across the distribution of firms within sectors, showing that improvements in a country’s institutional framework create both winners and losers, even when the economy as whole benefits.

Specifically, we exploit recently available cross-country harmonised micro aggregated data that provide a much richer picture of the employment growth dynamics of a country, since they capture the full distribution of growth rates in a sector rather than only the average firm. The use of these data, developed in collaboration with National Statistical Agencies from official business registers providing quasi-universal coverage of business activity, uncovers stark differences in the dynamism of the economies considered (Bravo-Biosca 2010b).

The “difference-in-differences” methodology used estimates the differential impact of countries’ institutions on the distribution of firm growth across different sectors controlling for country and sector unobservable factors. This is combined with an instrumental variable method to solve the endogeneity problems that arise from non-classical measurement error in this difference-in-difference estimation.

We find that stringent employment protection legislation leads to a less dynamic firm growth distribution, with more stable firms and slower growth and contraction at both extremes of the distribution, and thus slower resource reallocation.

In contrast, a well-functioning financial system has the opposite effect, namely widening the firm growth distribution. This increase in the interquartile range is driven by faster growth among the best performing firms, faster contraction of underperforming ones and a smaller share of stable firms in the middle.

Overall, the results of the analysis confirm that framework conditions have a heterogeneous impact along the distribution of firm growth, affecting the overall shape of the distribution, and therefore have an impact on employment dynamics and the reallocation of resources across firms.

Our analysis also has some general implications for ongoing policy debates in Europe. The great recession has laid bare the severe limitations of the European growth model, which go beyond the supposed weaknesses of the monetary union and the structural asymmetries across its member countries, and rather point to the lack of dynamism and poor allocative efficiency. For instance, Spain had experienced fast growth but limited selection prior to the crisis, with the well-known post-crisis consequences.

A recent OECD study (Andrews et. Al, 2015) has shown that in Italy firms at the productivity frontier are as productive as firms, but they are much smaller in size than in other countries (e.g. the United States). Andrews et al. (2014) show that in some European countries (Italy, Spain, France, Germany) the flow of capital and labour to patenting firms is significantly slower than in the United States. The lack of dynamics of European economies has also been held responsible for the delay in the digitisation processes and the full exploitation of the related productivity and societal gains.

In terms of direct policy prescriptions, our results suggest that labour market reforms should facilitate labour mobility, for instance, by moving towards the much cited but not
yet very widely adopted “flexi-security” model that protects individuals instead of jobs, and by making employee benefits portable when switching jobs. On the financial side, the European financial sector appears to be more fragmented and dominated by banks as compared to the United States.

The results also bring about some implications for the current debate on banking reforms and the capital markets union (CMU), both for the short and the long term. Reinforcing banks’ balance sheets and fully opening the market to other types of financial providers will enable better access to finance to those firms with a high growth potential but with no tangible collateral, accelerating the reallocation of resources and productivity growth.

Potential avenues that CMU might explore to enhance direct forms of market-based finance include lowering the cost of debt issuance; developing a pan-European private placement market; enabling wider provision of venture capital, which may be particularly important for innovative companies (see for example Anderson et al., 2015).

More broadly, European policy makers should carry on making the implementation of the single market a policy priority. This would make it easier for the most productive companies to scale up across Europe, giving them the opportunity to operate under the same set of simplified rules and procedures across the EU, and to compete at a par with firms from other larger markets (e.g. US; China; etc.). It would also be crucial for improving their productivity given that a single market for services would translate into lower prices and better quality for services which are a key input in the production proces.

Finally, our results can also be related to the causes of the “secular stagnation”, i.e., the marked slowing down of productivity growth in advanced economies over the last decades (see for example Teuling and Baldwin eds., 2014). The policy debate explicitly or implicitly highlights the trade-off between dynamism and stability, with societal preferences generally putting more weight on the latter. However, given the importance of resource reallocation for long term productivity growth and ultimately living standards, the actual trade-off is between a process of continuous reallocation with manageable disruption and a process of slow – but continuous – economic decline.
7. REFERENCES


Supplementary material for

What drives the dynamics of business growth?
by Albert Bravo-Biosca, Chiara Criscuolo and Carlo Menon

**Correlation tables**

Table S1 - Dependent variables

<table>
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Number of observations: 228

Table S2 - Industry variables

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Table S3 - Policy indicators

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Number of observations: 221