ABSTRACT

Firm dynamics and public policy in OECD countries

This paper reviews evidence from recent OECD research that links cross-country differences in aggregate productivity performance to the widespread heterogeneity in firm size and productivity that exists within sectors. A number of key findings emerge, which carry important implications for public policy. First, contrary to the widespread popular perception, not all small businesses are net job creators, with estimates showing that only young businesses – predominantly small – are the primary drivers of job creation. Second, there are important differences across OECD countries in post-entry growth patterns and the age composition of small businesses. While these differences imply a greater degree of experimentation by entrants in some countries than others, they are also reflective of the ability of economies to channel resources to the most productive firms. Accordingly, we highlight important differences across OECD countries in the efficiency of resource allocation, as measured by the extent to which: i) the most productive firms are also the largest (i.e. static allocative efficiency); ii) resources flow to innovative firms (i.e. dynamic allocative efficiency).

These findings give rise to a number of policy implications, which caution against the use of size contingent policies and highlight the importance of policies that facilitate the reallocation of scarce resources to innovative firms. In this regard, well-functioning product, labour and capital markets; efficient judicial systems and bankruptcy laws that do not overly penalise failure can raise the returns to innovative activity. These benefits are partly realised through stronger competitive pressures and more efficient reallocation, which make it easier for successful firms to implement and commercialise new ideas and, by lowering the costs of failure, encourage firms to experiment with uncertain growth opportunities.
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1. Introduction

1. Cross-country differences in GDP per capita mainly reflect large and persistent differences in labour productivity. At the same time, boosting labour productivity growth is an urgent policy priority, especially in those countries where declining working age populations pose a major headwind to future improvements in living standards. However, productivity growth has slowed in many OECD economies over the past decade, including Australia, which raises important questions about the structural and policy factors that shape productivity performance.

2. Cross-country differences in aggregate-level productivity outcomes are increasingly being linked to the widespread asymmetry and heterogeneity in firm performance within sectors (Bartelsman et al., 2013; Hsieh and Klenow, 2009). The distribution of firm productivity is typically not clustered around the mean (as would be the case with a normal distribution) but is instead characterised by many below-average performers and a smaller number of star performers. Moreover, the degree of heterogeneity is striking: even within narrowly defined industries in the United States, firms at the 90th percentile of the TFP distribution are twice as productive as firms at the 10th percentile (Syverson, 2004). These findings suggest that the focus on average outcomes is misleading and thus heterogeneous firm models are becoming the main analytical workhouse and empirical research is increasingly focusing on the star performers which disproportionately drive productivity and job growth (Haltiwanger, 2013; Criscuolo et al., 2014a).

3. Given the tendency for highly productive firms to coexist with low productivity firms within narrowly-defined sectors, the recent literature has focused on resource misallocation as a potential explanation for why some countries are more productive than others (Bartelsman et al., 2013; Hsieh and Klenow, 2009). Accordingly, this paper reviews evidence from recent OECD research that links cross-country differences in aggregate productivity performance to the widespread heterogeneity in firm size and productivity that exists within sectors. Section 2 explores cross-country differences in employment dynamics and in the extent to which start-ups are able to grow and upscale. A key advance in the productivity and firm dynamics literature in recent years is to focus on how the distributions of firm productivity and firm size are related. Accordingly, Section 3 presents recent estimates on the efficiency of resource allocation, which indicate that some countries are more successful than others at channelling scarce resources to productive and innovative firms. As discussed in Section 4, these outcomes partly reflect cross-country differences in the policy environment. In this regard, well-functioning product, labour and capital markets; efficient judicial systems and bankruptcy laws that do not overly penalise failure are crucial to promote efficient resource allocation and growth. Section 5 offers some concluding thoughts.

2. Cross-country evidence on business dynamics

4. The dynamism of employment varies significantly across countries. Recent cross-country evidence suggests that these differences are evident not only in terms of entry and exit patterns but also in terms of the size of firms at entry and their post-entry growth performance (Bartelsman et al., 2013; Hsieh and Klenow, 2009). The same is true with respect to the firm size distribution, with many small firms co-existing with a smaller number of very large firms (Bartelsman et al., 2013).

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1. The same is true with respect to the firm size distribution, with many small firms co-existing with a smaller number of very large firms (Bartelsman et al., 2013).
For example, the size of entering and exiting firms tends to be smaller in the United States than in Europe and successful young firms tend to expand relatively more quickly in the United States than elsewhere (Bartelsman et al., 2012). This is consistent with a more dynamic distribution of firm growth in the United States, whereby successful firms grow faster and unsuccessful firms shrink faster, than in Europe. Moreover, Europe has a higher share of slow-growing and stagnant firms compared to the United States (Bravo Biosca et al., 2013). The levels and growth rates of firm productivity within industries also tend to be more dispersed in the United States than in Europe (Bartelsman et al., 2004), while more recent evidence points to important differences in productivity dispersion across countries in Europe (Altomonte, 2010).

These differences between the United States and “Europe” appear to reflect a greater degree of experimentation and “learning by doing” among entrants in the United States, given that the largest differences can be found in high technology and emerging sectors, where the imperative for experimentation and intensity in the use of knowledge-based capital (KBC) is likely to be greatest (Bartelsman et al., 2008). Experimentation may be particularly important in a time of extensive technological change, when the success of new business models and applications may only become apparent through testing in the market. The gap in experimentation between the United States and Europe suggests that differences in institutional factors, which shape differences in the cost of reallocating resources, may explain the relative sluggishness of some European countries to capitalise on the ICT revolution (Bartelsman et al., 2010; Conway et al., 2006), and the growth potential embodied in KBC.

Box 1: Dynemp, a new OECD project on firm-level dynamics

The OECD has collected cross-country evidence from countries’ business registers to identify the sources of job creation across countries and over time. The project – called Dynemp – aims to quantify the extent to which firms that differ in terms of age, size and sector of activity contribute to job creation and job destruction and to see how firm entry, growth and exit shape employment dynamics across countries and over time. The resulting statistics also provide insights on the effect of the recent international financial crisis on business dynamics.

A first phase of the project (DYNEMP EXPRESS) has collected non-confidential comparable statistics on employment, gross job creation and destruction by firm age, size and macro-sectors for 18 countries in its first phase: Austria, Belgium, Brazil, Canada, Finland, France, Hungary, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom and the United States. The second phase of the project is ongoing and collects detailed statistics at the 2-digit level; follows cohorts of businesses over 3, 5 and 7 years and reports different moments of the employment growth distribution.

Although efforts have been made to harmonize the data, limitations in cross-country comparability arise because only in few countries mergers and acquisitions could be accounted for; differences in the source data might persist e.g. in the minimum threshold above which a unit is captured, as when a BR builds on tax records and filing is compulsory only above a given level of turnover or of employment (or both). Owing to methodological differences in constructing these indicators, DYNEMP statistics may deviate from official statistics published by national statistical offices. For instance, firms that enter and exit the data in the same year, and those that are never seen to employ more than one employee, are excluded from DYNEMP EXPRESS-based figures.


2.1 Firm age as a key characteristic

New evidence from 18 OECD countries for a longer and more recent period (2001-11) enables for the first time a closer look at the role of age – and not just size – in the growth dynamics of firms (Box 1). This is particularly important because policies have generally focused on targeting small and medium sized enterprises that – conditional on the definition used – typically represent more than 95% of all businesses in an economy (Figure 1) and between 30% and 65% of total employment
for firms with less than 50 employees (Figure 2). Small firms, however, are very heterogeneous in terms of their age profile – a pattern which also varies significantly across countries (Figure 3). The fact that in some economies (e.g. Italy) most firms are small and old might reflect a fundamental lack of dynamism in the economy, while taking the age dimension into account shows that in Brazil the large presence of small firms mainly reflect new entry, which is more typical of an emerging economy.

![Figure 1. Share of firms of different size by country](image1)

**Note:** The period covered is 2001-2011 for Belgium, Canada, Finland, Hungary, the Netherlands, the United Kingdom and the United States; 2001-2010 for Austria, Brazil, Spain, Italy, Luxembourg, Norway and Sweden; 2001-2009 for Japan and New Zealand; 2001-2007 for France; and 2006-2011 for Portugal. Sectors covered are: manufacturing, construction, and non-financial business services. Owing to methodological differences, figures may deviate from officially published national statistics. For Japan data are at the establishment level, for other countries at the firm level. Average across all available years.

Source: Criscuolo et al., 2014a

![Figure 2. Share of employment by different firm size and by country](image2)

**Note:** see notes to Figure 1. Source: Criscuolo et al., 2014a
Figure 3. Age composition of small businesses

Average over time, firms below 50 employees

Note: The graph shows the share of firms by different age groups in the total number of micro and small firms (below 50 employees) in each economy on average over the available years. The period covered is 2001-2011 for Belgium, Canada, Finland, Hungary, the Netherlands, the United Kingdom and the United States; 2001-2010 for Austria, Brazil, Spain, Italy, Luxembourg, Norway and Sweden; 2001-2009 for Japan and New Zealand; 2001-2007 for France; and 2006-2011 for Portugal. Sectors covered are: manufacturing, construction, and non-financial business services. Owing to methodological differences, figures may deviate from officially published national statistics. For Japan data are at the establishment level, for other countries at the firm level. Data for Canada abstract from merger and acquisition activity.

Source: Criscuolo et al., 2014a

7. Therefore, the age dimension is particularly important for the design of policy, especially for small firms. In addition, the data show that young businesses play a crucial role in employment creation. Even during the financial crisis, the majority of jobs destroyed in most countries reflected the downsizing of mature businesses, while net job growth in young firms (less than five years of age) remained positive.

8. The cross-country micro aggregated data also show that, across all countries in the sample, young firms are more dynamic than older firms. Young firms systematically create more jobs than they destroy independently of their size (Figure 4). In particular, young firms represent only around 20% of total employment, but they account for almost 50% of total job creation in the economy, while their share in job destruction is around 25%. These patterns also hold when focusing on the main sectors of the economy separately (Figure 5): for example, such as in services, where small firms tend to be more important than in manufacturing, with small-young firms accounting for almost 45% of job creation, compared with just over 30% in manufacturing.
Figure 4. Employment, job creation and job destruction, by firm age and size, 2001-11

Non-financial business sector, average over 18 countries

Note: see notes to Figure 1.


Figure 5. Employment, job creation and job destruction, manufacturing and services 2001-11

By firm age and size, average over 18 countries

Note: see notes to Figure 1.


9. Differences in the magnitude of this phenomenon across countries point to the importance of national policies and business environments in fostering the birth and growth of new firms. In some countries, e.g. Brazil, New Zealand and Spain, young firms account for more than half of the economy’s total gross job creation, whereas in others, such as Japan and Finland, they account for less than 30% of jobs created (Figure 6).
Figure 6. Employment, gross job creation and gross job destruction in young firms, 2001-11

Note: see notes to Figure 1.


10. The contribution of young firms to aggregate employment growth reflects a process of creative destruction where success and failure go hand in hand. Indeed, young firms dynamics generally present a so-called “up-or-out pattern: a significant share of start-ups does not survive beyond the first two years, but those that do survive contribute more than proportionally to job creation than mature businesses.

11. Differences in the extent to which young firms grow are shown in Figure 7, whereby the potential growth of young firms is inferred by comparing the average size of start-ups and of old businesses (eleven years old or more). This points to some differences in the size of start-ups across countries, although these are not striking, with France, Finland and the Netherlands have the largest infant firms. The picture is much more heterogeneous when examining the size of older businesses. The average size of old firms in the United States – around 80 employees in manufacturing and 40 in services – is by far the largest. This is even more striking since the average size of start-ups in the French manufacturing sector is more than double the average size of US start-ups. This confirms previous results of Bartelsman et al. (2003) who found that seven year old US firms are on average 60% larger than their size at entry, while in European countries the figure ranged between 5% and 35%. With the current data, the Netherlands has amongst the lowest ratios between the average size of old firms and start-ups of all countries, with a particularly low ratio of 1.7 for manufacturing firms. In the United States, this ratio is over 5 for both manufacturing and services firms.

2 These differences might be partly influenced by the intensity of mergers and acquisition activity across countries and whether new businesses that result from M&A deals appear as “entrants” in a country’s business register.
Figure 7. Average size of start-up and old firms across industries and across countries

Note: see notes to Figure 1.

Source: Criscuolo et al. 2014a, based on the OECD Dynemp data collection, March 2014.

These findings suggest that in some countries there are lower entry barriers for new firms; as a consequence, entrants can start off at a smaller size as they have more room for experimentation. Moreover, they can exit more easily if they are not successful. This, in turn, might contribute to stronger growth prospects for very productive and successful businesses, by freeing up scarce resources such as skilled labour. It also suggests that in some countries barriers to growth (access to markets; burdensome regulation on starting businesses; lack of competition; etc.) might hinder the growth potential of young businesses.

2.2 The dynamics of micro start-ups

To better depict the growth dynamics of start-ups, the OECD DYNEMP databases follows cohorts of entrants for 3, 5 and 7, i.e., the transition dynamics of start-ups (firms aged 0 to 2 at the beginning of the period) with less than 10 employees (see Criscuolo et al., 2014c).

Figure 8 shows the importance of this “up or out” dynamics in 16 countries as well as differences across them both in terms of number of firms and jobs involved: Panel A reports the share of the following groups – i) firms employing more than 10 employees after 3 years; ii) firms that still employ less than 10 employees after 3 years; and iii) those that have become inactive within three years of opening – in the total number of micro start-ups (i.e. entrants with less than 10 employees). Panel B of Figure 8 reports the relative contribution to net job creation of each of these groups.

Three main features are worth noting: i) very few micro start-ups – between 2% and 9% – grow above 10 employees, but their contribution to employment change ranges from 19% to 54%; ii) most firms remain within the same size class (i.e. they still employ less than 10 employees after 3 years) and while they still create a reasonable amount of jobs, their contribution is less than proportional to their weight in terms of number of firms, and for some cohorts and countries they actually contribute negatively to net job creation; and iii) the extent to which micro start-ups survive is very different across countries.
Figure 8. Three-year survival and growth performance of micro start-ups

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<tr>
<th>Country</th>
<th>Moving above 10</th>
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Notes: Average over the three 3-year periods. Figures refer to the group of firms which have between 0 and 9 employees in the beginning of the period and which are less than 3 years old. Inactive firms do not report information on employment at the end of the three year period, either because they are temporarily inactive or because they have permanently exited. Sectors covered are: manufacturing, construction, and non-financial business services. Owing to methodological differences, figures may deviate from officially published national statistics. For Japan data are at the establishment level, for other countries at the firm level.

Source: Criscuolo et al., 2014c based on the OECD DynEmp database.

3 Cross-country evidence on resource allocation

16. These aggregations from micro data point to important cross-country differences in business dynamics. These may partly be due to structural differences between the economies, e.g. in the role of different sectors in the economy, but are also likely to reflect policies and framework conditions. An important difference is the extent to which some countries are more successful than others in channelling resources towards innovative and high productivity firms. Indeed, a key advance in the productivity and firm dynamics literature in recent years is to focus on how the distributions of firm productivity and firm size are related.

3.1 Static allocative efficiency

17. According to Olley-Pakes (1996), at any point in time, differences in aggregate labour productivity will reflect: i) the productivity distribution of firms (i.e. the fraction of ‘better’ relative to ‘worse’ firms); and ii) the extent to which, all else equal, it is the more productive firms that command a larger share of industry value added (i.e. allocative efficiency), which will be the outcome of the shift in resources across firms in previous periods. More formally, an index of productivity of industry $j$, defined as the weighted average of firm-level productivity $\left( P_j = \sum_{i \in j} \theta_i P_i \right)$, can be written as:

$$
\sum_{i \in j} \theta_i P = \bar{P}_j + \sum_{i \in j} (\theta_i - \bar{\theta}_j) (P_i - \bar{P}_j)
$$

where $\bar{P}_j = 1/N_j \sum_{i \in j} P_i$ is the unweighted firm productivity mean, $\theta_i$ is a measure of the relative size of each firm (e.g. the employment share) and $\bar{\theta}_j = 1/N_j$ is the average share at the industry level. Hence, aggregate productivity ($P_j$) can be decomposed into a moment of the firm productivity distribution (the unweighted mean) and a joint moment with the firm size distribution reflecting the
extent to which firms with higher efficiency also have a larger relative size: the “Olley-Pakes covariance” term or static allocative efficiency.

18. Using this metric, Andrews and Cingano (2014) find that more productive firms are likely to account for a much larger share of manufacturing employment in the United States and some Nordic countries than in some Continental and Southern European countries (see Figure 9). For example, in the United States, manufacturing sector labour productivity is 50% higher due to the actual allocation of employment across firms, compared to a hypothetical situation where labour is randomly allocated across firms, irrespective of their productivity. By contrast, static allocative efficiency is negative in Poland and Greece, which suggests that a random allocation of labour across firms would actually raise the manufacturing sector labour productivity, relative to the actual allocation of labour. At the same time, the efficiency of resource allocation is much lower in the market services sector than in the manufacturing sector (Figure 9). This might be a symptom of naturally lower competitive pressure, due the fact that services are less trade-exposed than manufacturing. But it also provides a “smoking gun” because we know that pro-competitive product market reforms have generally been less extensive in market services than in the manufacturing in many OECD countries.

19. Moreover, an emerging literature links these sizeable differences in allocative efficiency across countries to policy distortions, which carry important consequences for aggregate performance. For example, estimates suggest that if China and India were able to align their efficiency of resource allocation to that observed in the United States, manufacturing TFP could rise by 30-50% in China and 40-60% in India (Hsieh and Klenow, 2009).

**Figure 9. OECD countries differ in their ability to allocate labour to the most productive firms**

Covariance across firms between firm size and labour productivity; log points; selected OECD countries in 2005


3.2 Dynamic allocative efficiency

20. While there are likely to be many reasons why some countries are more successful than others at channelling resources to the most productive firms, static allocative efficiency can only be
achieved if there is dynamic allocative efficiency that occurs when resources move towards more productive firms at the expense of less productive firms over time (Haltiwanger, 2011).

21. Empirical evidence suggests that, over time, resources tend to be reallocated toward more productive activities. Most existing studies tend to focus on labour. For instance, while the leading cross-country study finds that within-firm improvements in performance account for the majority of aggregate labour productivity growth over a five-year window, the contribution from firm entry and exit is estimated to reach at least 20% in some OECD countries (the estimates are higher for emerging countries), while that from reallocation of labour across existing enterprises is generally small, but positive (Bartelsman et al., 2004; OECD, 2003). Within-countries studies show the importance of reallocation through entry, exit and market share gains by more productive firms via market selection. For example, Disney et al., (2003) show that for the United Kingdom this reallocation accounts for more than 80% of aggregate total factor productivity growth in the manufacturing sector, while decompositions of labour productivity for the Canadian economy as a whole and the United States retail sector yield similar conclusions. There is also considerable heterogeneity across firms in their ability to use capital productively and existing studies show that capital – as measured by acquisitions of property, plant and equipment – also tends to flow from less productive firms to more productive firms (Eisfeldt and Rampini, 2006; Jovanovic and Rousseau, 2002).

22. Recent evidence from the United States suggests that resources flow towards firms that patent – one proxy for innovation – at the expense of non-patenting firms (see Balasubramanian and Sivadasan, 2011; Kogan et al 2012). A recent OECD study (see Andrews et al., 2014) extends this approach to a range of OECD countries, which reveals important differences across countries in the extent to which capital and labour flow to innovative firms. For example, a 10% increase in the firm level patent stock is associated with about a 3% rise in firm capital in Sweden and the United States; a 1½-2% increase in firm capital in the UK, Japan and Germany; and a ½-¾ % rise in firm capital in Italy (Figure 10; Panel A). Similarly, the ease with which patenting firms in the United States can attract labour is roughly twice as large as the average OECD country (Figure 10; Panel B).

23. These patterns are significant to the extent that to effectively implement and commercialise new ideas, firms require a range of complementary tangible resources to test ideas (e.g. to develop prototypes and business models), develop marketing strategies and eventually produce at a commercially viable scale. They also bear some resemblance to cross-country differences in post-entry employment dynamics, which illustrate that young firms in the United States – and to a lesser extent, Sweden – exhibit “up-or-out” dynamics (Haltiwanger et al., 2013; Criscuolo et al., 2014). That is, young firms either: i) grow very rapidly; or ii) they fail and exit the market rather than remaining in business as low-performing small firms, suggesting that market selection is very harsh and reallocation significant in such environments. By contrast, the potential growth of firms in Southern European countries – particularly Italy – is much lower, which tends to manifest itself in a high share of old and small firms, which tend to be less innovative.

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3 These estimates are likely to understate the contribution of reallocation since the direct contribution of net entry is reinforced by an indirect effect whereby incumbents raise their own productivity to maintain market share in the face of strong entry pressures (see Aghion et al., 2007). And, the contribution from reallocation – particularly net entry – tends to increase when the analysis is conducted over longer time horizons (Foster et al., 2001; Bartelsman et al., 2004).

4 Baldwin and Gu (2006) for Canada find that this reallocation accounts for about 70% of aggregate labour productivity growth. Foster et al. (2006) find that entry and exit explain almost all labour productivity growth of the US retail sector.

5 The low sensitivity of resources to patenting in countries such as Denmark, Finland and the Netherlands may reflect the fact that firms in small open economies may expand abroad rather than domestically.
**Figure 10. Cross-country differences in resource flows to patenting firms**

Change in firm inputs associated with a 10% change in patent stock; selected OECD countries (2003-2010)

A: Capital

B. Employment

Notes: The black dot shows the country-specific point estimate while the grey bands denote the 90% confidence interval (note that the confidence intervals vary across countries due to differences in the number of observations). These estimates are obtained from the following baseline fixed effects regression specification:

\[
\ln Y_{i,s,c,t} = \beta_0 \ln(PatS_{i,s,c,t}) + \eta_t + \mu_{s,c,t} + \epsilon_{i,s,c,t}
\]

Where: Y is the economic characteristic (employment or capital) for firm i, in sector s, in country c at time t and PatS is the depreciated patent stock of firm i. The specification also includes firm fixed effects and industry*country*year fixed effects. To obtain the country-specific estimate, PatS is interacted with various dummy variables for each country.

Source: Andrews, Criscuolo and Menon (2014) based on firm level data from the ORBIS-Patstat Database for the non-farm business sector.

4. **The role of public policy**

The working hypothesis in this paper is that these apparent differences in the efficiency of resource allocation are closely related to the design of public policies. Accordingly, this section reviews recent OECD evidence on the link between the efficiency of resource allocation and selected public policies.
4.1 Product market regulations

25. Across OECD countries, less stringent regulations affecting product markets tend to be associated with higher static allocative efficiency in manufacturing sectors (Figure 11A) and this relationship is confirmed by econometric analysis (Andrews and Cingano, 2014). This may reflect the tendency for such regulations to reduce firm entry, prolong the existence of inefficient firms in the market and to raise the cost structure of inputs that are required by innovative firms to underpin their expansion. Product market regulations also influence innovation through the ability of successful firms to attract the complementary tangible resources that are required to implement and commercialise new ideas. Figure 12 shows how the estimated flow of resources to patenting firms – a concept first introduced in Figure 10 – varies with different public policy settings, based on new OECD econometric modelling (see Andrews et al., 2013). For example, the estimates imply that the responsiveness of firm employment to increases in the patent stock would more than double if the stringency of PMR was reduced from the highest observed level (Poland) to the sample mean value (Belgium).

Figure 11. Static allocative efficiency and framework policies

Selected OECD countries in 2005

A. Product market regulations restricting competition

B. Creditor friendliness of bankruptcy law

Notes: Allocative efficiency measures the contribution of the allocation of employment across firms to manufacturing labour productivity in 2005 (see Figure 9). Product market regulation refers to the overall index from of the OECD PMR for 2003 and bankruptcy law is proxied by the cost to close a business, sourced from the World Bank Doing Business Database.


26. Reductions in barriers to trade and investment increase the ability of patenting firms to attract the capital required to implement and commercialise new ideas (Figure 14; Panel B). All else equal, reducing barriers to trade and investment from the most stringent setting (Slovak Republic) to sample average (Japan) is associated with a 70% increase in the extent to which capital flows to patenting firms. Moreover, reforms to trade and investment policy improve the ability of national economies to leverage the benefits of innovation at the firm level through increases in market share of successful firms. Across service sectors in OECD countries, higher restrictions on foreign direct investment are found to be associated with lower allocative efficiency (Andrews and Cingano, 2014).
Figure 12. Framework policies and resource flows to patenting firms, 2003-2010

A: Change in firm employment associated with a 10% change in the patent stock

B: Change in firm capital associated with a 10% change in the patent stock

Note: The chart shows that the sensitivity of firm employment and capital to changes in the patent stock varies according to the policy and institutional environment. To calculate the policy effects, coefficient estimates from Table 8 are combined with the average values of the policy indicators for each country over the sample period. The labels "Minimum" ("Maximum) denotes the country with the lowest (highest) average value for the given policy indicator over the sample period.

4.2 Employment protection legislation

27. Employment protection legislation (EPL) that imposes heavy or unpredictable costs on hiring and firing slows down the reallocation process and by raising the costs of exit in case of business failure, makes it less attractive for firms to experiment with highly uncertain technologies. For example, in sectors with naturally higher reallocation needs – measured by job layoff, firm turnover and ICT intensity; e.g. electrical and optical equipment – less stringent EPL disproportionately raises static allocative efficiency (Andrews and Cingano, 2014) relative to other sectors. Similarly, in more R&D-intensive industries, less stringent EPL raises productivity growth to the extent that it is associated with a more dynamic firm growth distribution – that is, a lower share of static firms and higher share of growing and shrinking firms (Bravo-Biosca et al., 2012).
28. Consistent with these findings, less stringent EPL significantly increases the ability of innovative firms to attract resources that are required to implement and commercialise new ideas (Figure 12). For example, a policy reform that reduced the stringency of EPL from the highest observed level (Portugal) to the average level (Norway) is estimated to more than double the extent to which labour flows to patenting firms. Andrews, Criscuolo and Menon (2014) also find that the burden of stringent EPL falls disproportionately on young firms, which is consistent with existing studies showing that stringent EPL reduces the scope for experimentation with uncertain technologies.

4.3 Bankruptcy legislation and judicial efficiency

29. Bankruptcy legislation that does not excessively penalise failure – as measured by a lower cost to close a business – can promote the flow of capital to more innovative firms (Figure 12, Panel B), by reducing: i) the expectation of entrepreneurs that they will be heavily penalised in case of failure; and ii) the likelihood that scarce resources are trapped in inefficient firms. By contrast, if the cost of winding-down a business is particularly high, risky entrepreneurial ventures might not be brought to the market to avoid incurring high exit costs in case of failure. Indeed, bankruptcy codes that more heavily penalise failure are negatively associated with MFP growth and the share of high growth firms in capital intensive industries (Bravo-Biosca et al., 2012). Finally, across OECD countries, less stringent bankruptcy legislation is to some extent associated with higher allocative efficiency (Figure 11, Panel B), and this effect is particularly strong in sectors with naturally higher firm turnover rates where regulations affecting exit costs are most likely to bind (Andrews and Cingano, 2014).

30. The swift reallocation of resources from failed ventures will also be affected by the time required for the full completion of all legal procedures to wind up a business and the obstacles to the use of out of courts arrangements. In extreme cases, these legal procedures might take years to complete, thus undermining effective reallocation and the accumulation of entrepreneurial capital. In fact, well-designed legal systems can support efficient resource allocation (Haltiwanger, 2011) and raise the returns to innovation (Nunn, 2007). For example, in countries with more efficient judicial systems – proxied by a lower cost of enforcing contracts6 – labour flows more readily to patenting firms (Figure 12, Panel A).

4.4 Financial development and access to risk capital

31. Resource flows to patenting firms tend to be stronger in countries with more developed financial markets (Figure 12A), and this effect is particularly important for young firms (Andrews, Criscuolo and Menon, 2014). Thus, financial systems play an important role in helping credit-constrained firms to implement and commercialise new ideas, raising the returns to innovation. Similarly, resources flow more freely to young patenting firms in countries with more developed markets for seed and early stage venture capital (Figure 12). This suggests that seed and early stage venture capital plays an important role for ensuring the growth of young patenting firms and the development of radical innovations. For example, all else equal, increasing access to early stage venture capital from the lowest level (Greece) to the sample average (Belgium) implies that capital flows to patenting firms would be around one-third higher than otherwise.

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6 The cost of enforcing contracts is sourced from the World Bank and measures the court costs and attorney fees as a per cent of the debt value.
4.5 The unintended consequences of R&D fiscal incentives

32. R&D tax incentives, a non-discriminatory tool that aims at reducing firms’ marginal cost of R&D activities, are present in most OECD member countries and also in Brazil, China, India and the Russian Federation. Support for business R&D through the tax system is typically combined with a broader set of direct support policies (e.g. grants, loan, loan guarantees) that are also intended to address market failures related to investment in innovation. While significant cross-country differences exist in the policy mix, there has recently been a general shift away from direct support and R&D tax incentives have become more generous (see Andrews and Criscuolo, 2013).

33. OECD evidence suggests that R&D tax incentives have the unintended consequence of protecting incumbents at the detriment of potential entrants, thus slowing down the reallocation process (Bravo-Biosca et al., 2012). Figure 13 shows that more generous R&D tax credits are associated with a less dynamic distribution of firm growth in R&D intensive sectors – i.e. a higher share of stagnant firms and a lower share of shrinking firms – thus disproportionately benefiting the slowest growing incumbent firms. Accordingly, R&D tax incentives might embody an important trade-off from the perspective of the KBC-innovation-reallocation nexus.

Figure 13. More generous R&D fiscal incentives are associated with a more static distribution of firm growth in R&D-intensive industries

The differential impact of R&D tax incentives on the share of firms in each employment growth grouping

Notes: The figure shows a numeric example of how more generous R&D tax incentives affect the distribution of firm employment growth, based on the (statistically significant) coefficient estimates in Bravo-Biosca et al., (2012). The darker columns show the estimated shares of shrinking and static firms in an R&D intensive industry (Electrical and optical equipment; NACE rev. 1.1. 30-33) in a country with relatively low R&D tax incentives (e.g. Norway). In turn, the lighter shaded columns show the estimated shares of shrinking and static firms in the electrical and optical equipment sector if Norway were to adopt more generous R&D tax incentives (e.g. corresponding to the level of R&D tax subsidies in Spain).


34. This finding raises the possibility that R&D tax incentives may slow down the reallocation process if not designed properly. Indeed, one policy recommendation to follow from this research is that it is important that R&D tax incentives are refundable or contain carry-over provisions so as to avoid overly favouring less dynamic incumbents at the expense of dynamic young firms (Andrews and
Many young innovative firms are typically in a loss position in the early years of an R&D project and thus will not benefit from the program unless it contains provisions for immediate cash refunds for R&D expenditure or allows such firms to carry associated losses forward to deduct against future tax burdens.

5. Discussion and future research

35. The evidence presented in this paper has pointed to the importance of accessing and using microdata for constructing the evidence base needed for policy making. Often this requires building a data infrastructure for allowing researchers to access the data; additional data cleaning for creating panel data for research and policy analysis purposes from data sources whose used was only envisaged as cross-sectional, such as business registers, and use of different classifications, e.g. of “small” firms, firm “entry”, to be able to calculate a set of statistics that is internationally comparable. The OECD is coordinating with the Australian Bureau of Statistics (ABS) with the aim of creating such a database to look at business dynamics with Dynemp and at the micro drivers of aggregate productivity using Multiprod.

36. Forthcoming research using the Dynemp and Multiprod databases intends to explore policy issues, particularly the policy drivers of post-entry growth. While the policy evidence presented in this paper relies on differences in regulations across countries, recent research is beginning to highlight the adverse consequences for aggregate productivity of regulations that vary in stringency depending on firm size. For example, Garicano et al (2013) show that labour regulations in France, which become more stringent for firms once a firm reaches a size of 50 employees, induces a bunching of firms just below the 50 employee threshold. This carries adverse consequences for allocative efficiency since these firms are relatively more productive than larger firms on the other side of the threshold and the welfare costs are estimated to be in the ballpark of 4-5% of GDP. Using the data collected from the second phase of the DYNEMP project combined with a newly collected database on size contingent labour regulations (Calvino et al., 2016), new research is exploring the impact of size contingent policies on the firm size distribution across selected countries. This would also appear to be relevant for Australia, given that the stringency of labour regulations varies with firm size and the recent debate over whether a two-tier corporate tax rate (that varies according to firm size) should be introduced.
REFERENCES


