# Firm Dynamics and Employment Protection: Evidence from Sectoral Data*

Anna Bottasso
University of Genova

Maurizio Conti
University of Genova

Giovanni Sulis
University of Cagliari
CRENoS and IZA

April 26, 2016

**Abstract**

We analyse the impact of employment protection legislation (EPL) on firms' entry and exit rates for a sample of industries in thirteen countries from the most recent version of the OECD Structural and Business Statistics Database. Using a difference-in-difference identification strategy, we find that more stringent EPL is associated to lower entry and exit, particularly in industries characterized by higher job reallocation intensity. We also find that both collective and individual dismissal regulations reduce firms' entry and exit and that the negative effect of EPL is stronger in the case of small firms. An extensive robustness analysis confirms our findings.

**Keywords:** Entry and exit, turnover, employment protection legislation, reallocation.
**J.E.L. Classification:** J65, L11, L26.

*We thank Lorenzo Cappellari, Claudio Lucifora and seminar participants at Università Cattolica in Milan, Joint Research Center of the European Commission in Ispra, and XXX AIEL Conference in Cagliari for comments and suggestions. We also thank Fabiano Schivardi for giving us access to his data. The usual disclaimer applies. Contacts: Anna Bottasso, bottasso@economia.unige.it; Maurizio Conti, mconti@economia.unige.it; Giovanni Sulis (corresponding author), Department of Economics and Business, University of Cagliari, Viale S. Ignazio da Laconi 78, 09123 Cagliari, Italy, gsulis@unica.it.

# 1 Introduction

Recently, a large and growing empirical and theoretical literature has ascribed to the misallocation of resources, potentially associated to the institutional and regulatory environment where firms operate, an important share of the cross-country differences in incomes and productivity (Restuccia and Rogerson (2008), Hsieh and Klenow (2009), Bartelsman et al (2013), Hopenhayn and Rogerson (1993) and Poschke (2009), among the others). In particular, this literature has highlighted the importance of static allocative efficiency (i.e. the extent to which more productive firms tend to have larger market shares) as a driver of cross-country productivity level differentials (Bartelsman et al (2013), Andrews and Cingano (2014)). Other authors (e.g. Foster et al (2001)) have found that, in many countries, a sizeable share of productivity growth derives from reallocation of resources, within narrowly defined sectors, from low productivity to high productivity establishments (dynamic allocative efficiency). The above literature suggests that the efficiency of the allocative process might be dampened by distortions induced by labour and product market regulations, taxation, subsidies, trade restrictions or non-competitive banking systems. In this context, some recent papers by Haltiwanger et al (2014) and Bassanini and Garnero (2013) have explicitly focused on the effect of employment protection legislation on reallocation and job flows, suggesting that firing regulations have a determinant role in reducing the efficiency of the (re)allocation process.

As a matter of fact, reallocation of resources can work though expansion and contraction of existing firms, or via the entry-exit channel: indeed, some studies have found that exiting firms are in general low productivity ones, while, if a sufficient window of time is allowed for, entering firms on average tend to become high productivity producers (or rapidly shrink and exit). Indeed, and leaving aside any measurement error issue (Foster et al, 2001), the net entry (i.e. entry less exit) component of reallocation seems to account for a non-negligible share of aggregate productivity growth. Some authors have found that, in the case of the US and over a five or ten-year horizon, at least one quarter of aggregate productivity growth is associated to the net entry component (Foster et al (2008) and Foster et al (2001)), i.e. to

the exit of low productivity firms and the entry and expansion of high productivity ones.[1] Moreover, there are non-negligible differences across countries: Bartelsman et al (2009) show that net entry accounts for between one-fifth and one-half of aggregate productivity growth in a sample of OECD countries. This in turn suggests that such cross-country differences might be associated to country-level heterogeneity in government policies and institutions.[2]

In particular, some authors have studied the impact that labour and product market regulations, barriers to entry, taxation or financial development have on average entry and exit rates. For example, Klapper et al (2006) and Ciccone and Papaioannou (2007) examine the impact of entry costs and regulation, Da Rin et al (2011) study the effects of taxation of corporate income, while Samaniego (2010) focuses on the role played by technical change and entry costs.

As far as employment protection legislation (EPL) is concerned, a number of theoretical studies have considered its implications on firms' incentives to enter and exit. In a seminal paper Hopenhayn and Rogerson (1993) suggest that high labour adjustment costs reduce the present discounted value of profits and induce a lower pace of job and firm turnover. Similarly, Bertola (1994), by modelling firing costs as an adjustment friction, argues that they reduce the value of the firm and therefore firms' incentives to enter, ceteris paribus. Likewise, Koeniger and Prat (2007) show that firing costs reduce firm entry in their model because, by reducing the shadow value of labour, they increase the productivity threshold above which it is convenient to enter. Overall, the consensus generally acknowledges that more rigid labour markets tend to deter entry and such prediction is mostly confirmed by the empirical literature.

Some studies focus on single countries, like Autor et al (2007) who find, using US data, that, after the introduction of the good faith exception (a form of common law exception

[1] In some sectors, its contribution can be even higher. Foster et al (2006) found that virtually all productivity growth in the US retail sector was due to entry of high productivity firms and to the exit of low productivity ones. In general, the contribution of net entry to productivity growth is larger in more technologically advanced sectors (Martin and Scarpetta (2012)).

[2] Although cross country differences in average entry and exit rates are not large (Bartelsman et al (2009)), this could be due to different regulations and/or institutions in place in different countries that have opposite impacts on entry and exit rates (see also Cabral (2014).

to the employment-at-will doctrine consisting in the prohibition to employers to fire workers for a bad cause) the number of entering firms fell significantly. Slightly different results are obtained by Kugler and Pica (2008) who suggest that a 1990 reform in Italy - which increased EPL for small (below 15 employees) firms only - reduced entry of small firms relatively to larger ones. Using cross-country data Aghion et al (2007) find that EPL is associated to smaller entry rates particularly in industries that are naturally characterized by stronger labour reallocation.[3] Similar results are obtained by Klapper et al (2006) on a sample of European countries, who show that labor regulations have a dampening effect on entry, especially in sectors characterized by naturally high entry rates and induce an increase in the average size of potential entrants. Finally, Bartelsman et al (2009) suggest that a rigid labour market might deter entry, especially in the case of small firms because the costs entailed by EPL have in general fixed components that are more binding in the case of small size enterprises.

By way of contrast, the theoretical literature on EPL and exit does not offer clear-cut conclusions. For instance, Poschke (2009), building on Samaniego (2006), models firing costs as both an adjustment cost and as a tax on exit: his theoretical model shows that, if firing costs are charged only to continuing firms, firing costs reduce the value of continuing operations and therefore increase exit, thereby positively contributing to selection and productivity growth.[4] By way of contrast, if firing costs are levied also on continuing and exiting firms, they reduce the value of continuing but also the value of exit: however, the latter drops more because firing costs are to be borne immediately, thereby reducing exit, with respect to a benchmark economy with no firing costs.

However, there might be other reasons to believe that EPL tends to reduce exit: for instance, in countries with rigid labour markets firms will tend to experiment less because of the adjustment costs entailed by high EPL, especially in sectors where experimentation is more important (e.g. those sectors that naturally require more labour reallocation, or those

[3] See also Scarpetta (2002).

[4] A similar result is also found in the model of Koeniger and Prat (2007) where firing costs increase the productivity threshold below which it is convenient to exit, because they reduce the shadow value of labour and therefore the option of waiting.

that use ICT more intensively). If this is indeed the case, firms in high EPL countries will use more stable and already experimented technologies and therefore we might expect fewer failures so that the exit rate might be lower, particularly in sectors requiring high flexibility. Furthermore, by reducing exit and keeping more low productivity firms alive, EPL might also deter entry, because resources (capital and labour) are not liberated by firms that would have otherwise exited in more flexible labour market environments.[5]

The empirical literature on exit rates is really scant and does not offer clear cut predictions. To the best of our knowledge, the only studies available in the literature are the already mentioned single country studies by Autor et al (2007), who use US industry panel data at the state level, and by Kugler and Pica (2008), who use Italian firm level panel data. Both studies however do not find any statistically significant effect of EPL on exit rates.

We use the latest version of the OECD Structural and Business Statistics Database (ISIC Rev 3) and the standard employment protection legislation indicators computed by the OECD, in order to study whether firms' entry and exit decisions are affected by EPL in a cross section of 27 sectors of 13 OECD (EU) countries observed over the 2004-2007 period. In particular, we use the Rajan and Zingales' (1998) difference-in-difference approach as an identification framework in order to analyse whether firms' entry and exit rates are negatively impacted by firing restrictions, particularly in sectors that naturally require more flexibility in labour force adjustment, the latter proxied by industry level worker reallocation rates in the US.

The main result of this study is that EPL is associated to both lower entry and exit rates. Moreover, we find that the additional burden imposed to firms in the case of collective dismissals has a further negative effect on top of that associated to stricter individual dismissal regulations. In turn, difficulty of dismissals seems to be the most important regulatory determinant. Interestingly, we find that the negative effects of EPL are larger in the case of small firms (those between 1 and 9 employees) while, in the case of larger ones (those with 10 or more employees), our results do not allow us to draw firm conclusions.

[5]See Aghion et al (2008).

This paper is related to different strands of literature. First, it is in line with studies analysing the impact of EPL on job reallocation, like Haltiwanger et al (2014) who find, using industry data for a set of emerging, industrial and transition economies observed over the 1990s, that stricter EPL reduces job reallocation (job creation plus job destruction), particularly in those industries and firm size classes that require more frequent labour adjustment. Interestingly, they find that this effect is particularly strong in the case of job reallocation originated by entry and exit of firms (the extensive margin) with respect to that due to reallocation among continuing firms. A similar study is that of Bassanini and Garnero (2013) on a set of OECD countries, who find that countries with stricter EPL tend to display lower within industry job-to-job transitions. Second, this work is associated to the empirical literature analysing the link between EPL and productivity growth, which generally finds a negative correlation between labour market rigidity and total factor productivity, particularly in sectors with higher reallocation intensity or in more innovative ones.[6] Finally, this study is linked to the empirical literature that has sought to study the impact of government regulations on entry rates as well as to the industrial organization literature on entry and exit (Dunne et al (1988), Caves (1998) and Santarelli and Vivarelli (2007)).[7]

Our analysis contributes to the previous literature on different dimensions. First, it uses the latest version of the OECD Structural and Business Statistics Database, which measures entry and exit on a consistent basis across countries, and for a more recent period than virtually all recent empirical works on firm turnover. Second, unlike previous comparable studies, such as that of Aghion et al (2007), we disentangle the role of different regulatory provisions (e.g. individual versus collective dismissals). More importantly, to the best of our knowledge, this is the first paper that empirically analyses the link between employment protection legislation and firms' exit using a consistent cross country-cross industry source of data.

[6]See, among the others, Bassanini et al (2009), Cingano et al (2010), Autor et al (2007) and Conti and Sulis (2015). However, see also Belot et al (2007) who found a positive effect of EPL on per capita GDP and Acharya et al (2010). See also Scarpetta and Martin (2012) for a literature review.

[7]See Klapper et al (2006) and Ciccone and Papaioannou (2007) for the role of entry costs and regulation; Da Rin et al (2011) on the effects of taxation of corporate income and Samaniego (2010) on the role played by technical change and entry costs, among the others.

The remainder of the study is organized as follows. In Section 2 we present the datasets, while in Section 3 we describe our estimation and identification framework. Section 4 contains the empirical results while Section 5 concludes.

# 2 Data

## 2.1 Country-industry level

We use the last version of the SDBS Business Demography Indicators (ISIC Rev. 3) database from the OECD for our dependent variables. From this dataset, we extract information on entry and exit rates based on the number of active employer enterprises (see more below) for a set of 13 European countries (Austria, Belgium, Czech Republic, Denmark, Finland, Hungary, Italy, Netherlands, Norway, Portugal, Slovakia, Spain and Sweden) for the period 2004-2007. The dataset provides information on births (entry) and deaths (exit) based on different sectors of economic activities at the ISIC Rev. 3 version of STAN including manufacturing, electricity and gas, wholesale and retail trade, hotels and restaurants, transport, financial intermediation and real estate activities (more details in Tables 1 and 2).[8] The total number of industries at the 2 digit ISIC Rev 3 level is 36; however, we exclude part of countries/sectors available in the database as information was not reliable or missing for the observation period: we end up with 13 countries and 27 sectors. In order to minimize missing data problems, we calculate the average of our dependent variables over the period 2004-2007. The complete dataset should include 351 observations (13 countries $\times$ 27 sectors $\times$ 1 year); however, our baseline regressions are run on 332 (293) observations for entry (exit) rates, with data for exit rates for Sweden that are completely missing. For some countries, the number of sectors is below 27, but it never falls below 24. With the relevant exception of the sector "Real estate activity", for which we have information available only for 8 countries, other sectors are equally represented across countries, ranging from 10 to 13 country

[8]More information on the SDBS Business Demography dataset is available at the following webpage http://www.oecd.org/std/business-stats/eurostat-oecdmanualonbusinessdemographystatistics.htm. In particular, see Section 5 (7) of the manual for definitions of birth (death) events.

observations (see Tables 1 and 2).

The main advantage of the SDBS dataset is that it allows us to compare cross-country data on entry and exit rates. As Bartelsman et al (2005) discuss, this is the most relevant problem when studying firm dynamics using aggregated sectoral data derived from business statistics and business registry. As pointed out in Eurostat (2007), to ease comparability across countries, the statistical unit to be used for firm demography data is the enterprise. In this paper, we use indicators based on the population of "employer enterprises", i.e., enterprises that have paid employment or at least one employee.[9] For this population of employer enterprises, absolute numbers of births and deaths are provided, and entry and exit rates are easily calculated and directly made available by the OECD.

Our regressions include a set of controls that are derived from different sources. In particular, after matching their (slightly) different sectoral classification, from Bassanini and Garnero (2013) we take the country-industry share of self-employed (Self-employed), share of medium educated (Med. educated), the share of low educated (Low. educated) and the share of temporary contracts (Temporary).[10] We take the average values of these control variables over the period 2004-2007. Similarly, we also include in some of our robustness regressions a set of controls that vary at the country and sector level for the same period. In particular, we include a measure of vertical integration, calculated as the ratio between production and value added (Vert. Integration), the past five years industry value added growth (Past Ind. Growth), as a proxy for growth opportunities, and R&D expenditure over value added (R&D Intensity). Finally, we include the number of hours worked per employee (Hours Employee). Such variables are obtained from the STAN Database for Structural Analysis (ISIC Rev 3 Classification), while R&D expenditures are derived from the ANBERD database.

In Tables 1 and 2 we report descriptive statistics for the main variables at the sectoral

[9]Moreover, there is recognition that the population of employer enterprises is distinctly different from the population of non-employer businesses. Note that this is not the only possible unit of observations. For example, in a recent paper on the effect of taxation on firm dynamics, Kneller and Macgowan (2012) use the entire population of active enterprises derived from a previous version of the SBDS database, thus including self-employed.

[10]These are originally obtained from the Labour Force Surveys micro data and are made directly available on their webpage.

Table 1: Descriptive statistics. Industry level

| | Total sample | | | | | Size 1-9 | | | | Size 10 Plus | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Industry | Obs | Entry | Obs | Exit | Reallocation | Obs | Entry | Obs | Exit | Obs | Entry | Obs | Exit |
| 15_16 | 13 | 5.7 | 12 | 6.45 | 39.22 | 12 | 7.94 | 12 | 8.63 | 12 | 1.49 | 12 | 2.21 |
| 17_18 | 12 | 7.23 | 11 | 10.08 | 41.87 | 12 | 9.13 | 11 | 12.86 | 12 | 1.9 | 11 | 3.51 |
| 21_22 | 13 | 7.06 | 12 | 7.41 | 34.37 | 11 | 9.51 | 11 | 9.75 | 11 | 1.57 | 11 | 2.56 |
| 27_28 | 13 | 7.18 | 12 | 6.19 | 32.43 | 13 | 9.55 | 12 | 7.98 | 13 | 1.7 | 12 | 1.92 |
| 30_33 | 13 | 6.41 | 12 | 6.67 | 31.61 | 12 | 8.76 | 11 | 8.85 | 12 | 1.35 | 11 | 1.97 |
| 34_35 | 12 | 6.63 | 11 | 5.6 | 27.64 | 12 | 10.55 | 11 | 8.66 | 11 | 1.53 | 10 | 1.85 |
| 36_37 | 13 | 6.8 | 12 | 7.36 | 45.21 | 12 | 8.48 | 12 | 9.25 | 11 | 1.51 | 11 | 2.38 |
| 40 | 10 | 9.04 | 5 | 4.22 | 15.51 | 8 | 14.34 | 4 | 6.45 | 8 | 1.73 | 3 | 2.94 |
| 41 | 10 | 5.53 | 5 | 3.11 | 15.51 | 8 | 9.02 | 5 | 5.73 | 9 | 1.42 | 4 | 3.5 |
| 45 | 13 | 11.44 | 12 | 9.24 | 57.3 | 13 | 13.15 | 12 | 10.42 | 13 | 2.61 | 12 | 3.1 |
| 50 | 12 | 7.36 | 11 | 6.44 | 57.89 | 12 | 8.46 | 11 | 7.31 | 12 | 1.44 | 11 | 1.71 |
| 51 | 12 | 9.1 | 11 | 7.93 | 38.04 | 12 | 10.66 | 11 | 9.22 | 12 | 1.43 | 11 | 1.76 |
| 52 | 13 | 9.55 | 12 | 9.11 | 62.64 | 13 | 10.4 | 12 | 9.94 | 13 | 2.06 | 12 | 2.22 |
| 55 | 13 | 11.66 | 12 | 10.66 | 85.87 | 13 | 12.81 | 12 | 11.69 | 13 | 3.15 | 12 | 2.8 |
| 60 | 13 | 9.43 | 12 | 8.5 | 41.17 | 13 | 10.99 | 12 | 9.78 | 13 | 1.71 | 12 | 2.33 |
| 61 | 13 | 10.3 | 11 | 9.75 | 41.17 | 12 | 12.67 | 10 | 12.33 | 13 | 2.44 | 10 | 2.54 |
| 62 | 13 | 9.56 | 11 | 8.18 | 41.17 | 11 | 14.09 | 10 | 13.09 | 11 | 1.9 | 11 | 2.04 |
| 63 | 13 | 9.6 | 12 | 7.22 | 41.17 | 13 | 11.71 | 12 | 8.73 | 12 | 2.42 | 12 | 2.33 |
| 64 | 12 | 16.5 | 11 | 12.83 | 30.09 | 12 | 20.41 | 10 | 15.94 | 12 | 3.14 | 10 | 3.46 |
| 65 | 13 | 10.64 | 12 | 6.47 | 39.35 | 12 | 14.59 | 11 | 9.5 | 12 | 2.07 | 11 | 2.27 |
| 66 | 13 | 5.97 | 12 | 4.67 | 39.35 | 11 | 11.85 | 10 | 9.88 | 12 | 2.14 | 11 | 1.2 |
| 67 | 13 | 12.76 | 12 | 9.91 | 39.35 | 13 | 13.85 | 11 | 11.3 | 13 | 2.73 | 11 | 3.21 |
| 70 | 8 | 13.79 | 7 | 9.36 | 45.91 | 7 | 15.99 | 6 | 10.83 | 7 | 3.66 | 6 | 4.8 |
| 71 | 13 | 12.11 | 12 | 9.91 | 43.14 | 12 | 14.2 | 11 | 11.69 | 13 | 2.41 | 12 | 2.64 |
| 72 | 13 | 13.37 | 12 | 9.57 | 43.14 | 12 | 15.24 | 12 | 10.65 | 13 | 2.24 | 12 | 2.16 |
| 73 | 13 | 15.27 | 12 | 11.08 | 43.14 | 12 | 20.61 | 11 | 14.56 | 12 | 1.93 | 10 | 1.93 |
| 74 | 10 | 15.39 | 7 | 10.32 | 43.14 | 2 | 14.2 | 2 | 9.88 | 2 | 3.96 | 1 | 2.36 |

**Notes:** Descriptive statistics have been calculated on the sample used in baseline regressions (Tables 3, 7, 8, cols. 1). Industries codes follow the ISIC Rev 3 Classification (see http://www.oecd.org/sti/ind/40729523.pdf) Definitions: Entry is the average entry rate of employer enterprises, Exit is the average exit rate of employer enterprises. More information on the dataset is available at this link: http://www.oecd.org/std/business-stats/eurostat-oecdmanualonbusinessdemographystatistics.htm, see Section 5 (7) of the manual for definitions of birth (death) events. Reallocation is directly taken from Bassanini and Garnero (2013), and it is the average level of US sectoral worker reallocation over the period 2004-2007. See Section 2 for more details.

and country level respectively (more details on definitions and sources are discussed in next subsections). In Table 1, we observe a large degree of heterogeneity in terms of entry and exit rates across sectors. The average entry (exit) rate equals 9.83 (8.08) with a standard deviation of 3.19 (2.29), with a large variation in both entry and exit rates: by way of example, entry rates vary from 5.7 (Food, beverages and tobacco) to 15.39 (Other business activities). Note that non-manufacturing industries (codes 40 to 74) exhibit higher entry and exit rates with respect to manufacturing sectors (codes 15 to 37). Similarly, the US reallocation rate has a significant range of variation, i.e. between 15 and 85%.

In the remaining columns of Table 1, we report the descriptive statistics for small (1 to

Table 2: Descriptive statistics. Country level

| Total sample | | | | | |
|---|---|---|---|---|---|
| Country | Obs. | Entry rate | Obs. | Exit rate | EPL |
| AUT | 27 | 8.11 | 27 | 7.64 | 2.62 |
| BEL | 24 | 3.98 | 22 | 2.69 | 2.76 |
| CZE | 26 | 8.92 | 24 | 8.1 | 2.92 |
| DNK | 26 | 10.21 | 26 | 10.89 | 2.45 |
| ESP | 27 | 10.2 | 27 | 7.54 | 2.76 |
| FIN | 27 | 9.95 | 24 | 8.57 | 2.08 |
| HUN | 22 | 13.12 | 20 | 11.4 | 2.40 |
| ITA | 27 | 10.49 | 27 | 7.78 | 3.15 |
| NLD | 27 | 11.55 | 25 | 8.51 | 2.92 |
| NOR | 24 | 6.75 | 24 | 4.43 | 2.38 |
| PRT | 24 | 13.1 | 24 | 13.94 | 3.98 |
| SVK | 24 | 10.77 | 23 | 7.13 | 2.66 |
| SWE | 27 | 9.99 | 0 | | 2.58 |
| Size 1-9 | | | | | |
| Country | Obs. | Entry rate | Obs. | Exit rate | EPL |
| AUT | 27 | 10.13 | 27 | 9.59 | 2.62 |
| BEL | 18 | 4.38 | 14 | 2.58 | 2.76 |
| CZE | 25 | 12.24 | 25 | 11.08 | 2.92 |
| DNK | 26 | 13.37 | 26 | 13.55 | 2.45 |
| ESP | 21 | 11.65 | 20 | 9.18 | 2.76 |
| FIN | 27 | 12.46 | 25 | 9.8 | 2.08 |
| HUN | 21 | 15.16 | 19 | 13.16 | 2.40 |
| ITA | 26 | 13.38 | 25 | 9.65 | 3.15 |
| NLD | 26 | 14.91 | 24 | 11.78 | 2.92 |
| NOR | 24 | 9.21 | 24 | 5.95 | 2.38 |
| PRT | 23 | 15.52 | 23 | 16.4 | 3.98 |
| SVK | 23 | 12.58 | 23 | 8.27 | 2.66 |
| SWE | 18 | 12.28 | 0 | | 2.58 |
| Size 10 plus | | | | | |
| Country | Obs. | Entry rate | Obs. | Exit rate | EPL |
| AUT | 27 | 1.82 | 27 | 1.44 | 2.62 |
| BEL | 18 | 0.66 | 15 | 0.61 | 2.76 |
| CZE | 25 | 2.42 | 23 | 1.83 | 2.92 |
| DNK | 26 | 2.2 | 26 | 4.55 | 2.45 |
| ESP | 22 | 2.31 | 19 | 2.5 | 2.76 |
| FIN | 27 | 1.82 | 24 | 3.63 | 2.08 |
| HUN | 21 | 2.46 | 19 | 3.17 | 2.40 |
| ITA | 26 | 1.84 | 25 | 1.56 | 3.15 |
| NLD | 26 | 2.64 | 24 | 2.45 | 2.92 |
| NOR | 24 | 1.51 | 24 | 0.89 | 2.38 |
| PRT | 23 | 2.11 | 23 | 2.43 | 3.98 |
| SVK | 23 | 4.03 | 23 | 3.6 | 2.66 |
| SWE | 19 | 0.67 | 0 | | 2.58 |

**Notes:** Descriptive statistics have been calculated on the sample used in baseline regressions (Tables 3, 7, 8, cols. 1). Average values for entry and exit rates over 2004-2007 are reported; EPL is the OECD indicator calculated as the weighted sum of sub-indicators concerning the regulations for individual and collective dismissals. See Section 2 for more details.

9 employees) and large (10 plus employees).[11] As expected, entry (exit) rates are higher for small than for large firms, with an average of 12.34 (10.18) against 2.13 (2.51). As a matter of fact, entry and exit are a small firm phenomenon: the average share of entry accounted for by large firms entrants across sectors is 4.5% (with a standard deviation of 3.2), ranging from 15% for utilities to 1% for activities related to financial intermediation. In turn, the average share of exit accounted for by large firms is about 5.6% (St. dev. 3.8).

Descriptive statistics reported in Table 2 illustrate a similar picture across countries. Entry rates vary between 4% (Belgium) to 13% (Hungary), similarly, exit rates for Belgium are very low (less than 3%) while they are very high for Portugal (about 13%). When disentangling country level entry and exit rates by firm size, we still detect important differences across countries. In this case, the share of entry accounted for by larger firms varies from about 1% in Portugal and Sweden to about 5% in Czech Republic and the Netherlands, while the average share of large firm exit is equal to 4.3% across countries.

## 2.2 Industry level

Our measure of labour reallocation is directly taken from Bassanini and Garnero (2013), and it is the average level of sectoral worker reallocation over the period 2004-2007. This measure has been calculated by the authors as the sum of hiring and separations over employment using the Displaced workers/Job tenure supplement of the US Current Population Surveys. Similar measures of job or worker reallocations have been used by Haltiwanger et al (2014) and Bassanini et al (2009).

Other industry level control variables are obtained from different sources and, otherwise stated, refer to the US. In particular, we consider, the turnover rate in the US calculated as the sum of entry and exit rates from the SDBS dataset (Turnover), a measure of financial development from Bravo-Briosca et al (2013) (Fin. Dep.), and a measure of capital intensity from the same source (Cap. Int.). Moreover, in regressions not reported, but available upon

[11] Originally, the dataset provides information on the following firm size categories: 1 to 4 employees, 5 to 9, 10 plus and 20 plus. However, the latter category is only available for the US, and we cannot disentangle the category 10 plus in more detailed ways. We decided to jointly consider the first two categories of firm size.

request, we further control for: the share of employment in total economy in 2004 for each country-industry pair from the STAN database, a measure of R&D intensity in the US over value added from the same source, an index of industry specific technological change taken from Samaniego (2010), an index of industry level of volatility, as a proxy of risk, taken from Michelacci and Schivardi (2013), and the average growth rate 93_03 of full-time equivalents in the US from the STAN database. These variables have been interacted with country level variables described in the next subsection.

## 2.3 Country level

Our preferred measure for employment protection legislation is version 2 of the indicator directly available from the OECD, calculated as the weighted sum of sub-indicators concerning the regulations for individual dismissals (weight of 5/7) and additional provisions for collective dismissals (2/7).[12] The overall index incorporates 12 detailed data items, and in our robustness checks (see Table 6) we combine them to obtain different sub-indicators for EPL. Moreover, as a further check, we also consider the EPL index from the Economic Freedom of the World database. In IV regressions we use country legal origin (taken from Bassanini et al, 2009) as instruments for EPL.

In our robustness regressions we use the following controls at the country level: OECD indices of burden on start-ups and barriers to competition (Barriers) as in Andrews and Cingano (2014); a measure of financial development taken from the World Bank (Fin. Dev.); a measure of costs for resolving insolvency from the World Bank (Insolvency). Moreover we consider a set of controls for other labour market institutions from Bassanini and Garnero (2013): union density (UD), a measure of corporatism (Corp.), the tax wedge (Tax), and the gross replacement rate for unemployment benefits (Repl. Ratio.). In one regression specification, we check whether the effect of EPL varies with the distance from the technological frontier: the TFP level of each country (TFP Dist.), measured as a percentage of the US, comes from the last release of the Penn World Tables.

[12]For more details see http://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm.

# 3 Estimation and identification strategy

Our empirical framework is based on the difference-in-difference approach proposed by Rajan and Zingales (1998) and subsequently employed in many other empirical applications.[13] This approach implies the estimation of the following equation:

$$Y_{s,c} = \alpha(Reallocation_s \times EPL_c + \beta(W_s Z_c) + \lambda X_{s,c} + u_c + u_s + \nu_{s,c}. \quad (1)$$

Where $Y_{s,c}$ is the entry or exit rate in sector $s$ of country $c$, $Reallocation_s$ is the worker reallocation rate of sector $s$ in the US, $EPL_c$ is the level of employment protection legislation in country $c$, $W_s$ is a set of US industry characteristics, $Z_c$ is a set of country level variables; $X_{s,c}$ is a set of variables that vary at both country and sector level, $u_c$ is a country fixed effect, $u_s$ is a sector fixed effect and $\nu_{s,c}$ is a standard error term.

A negative sign for the coefficient $\alpha$ of the interaction term $Reallocation_s \times EPL_c$ indicates that countries characterized by stronger EPL tend to have lower entry and exit rates, especially in industries characterized by high reallocation intensity.

The identification assumption behind equation (1) is that EPL is likely to be more binding in employment reallocation intensive sectors, where the flexibility requirements in the use of labour inputs are likely to play a more important role. The idea underlying the Rajan and Zingales's (1998) approach is that there are industries (in this case those that naturally require higher flexibility in the use of the workforce) that are more likely to be particularly exposed to a particular policy (employment protection legislation in this case): such industries can be considered as a sort of "treatment" group, while those that are less exposed may act as "control" group.

The use of US industry data to build a proxy for sectoral reallocation intensity is motivated by the fact that the US labour market is one of the most flexible, and therefore it can approximate the "natural" industry need for employment reallocation that would have emerged also in other countries if they were not characterized by higher levels of EPL. It

[13] For studies on the impact of EPL and other labour market institutions, see Bassanini et al (2009), Haltiwanger et al (2014), Bassanini and Garnero (2013) and Cardullo et al (2015).

is important to note that for the US industry data to be a valid proxy for the "natural" exposure of an industry to a particular policy in a given country, it is not necessary that in each country the industry characteristics of interest takes on the same values as in the US. Indeed, it is sufficient that the ordering of the industries is about the same across countries. However, even this milder requirement could be violated because each industry is the aggregate of various sub-industries and if there are important differences across countries in the mix of sub-industries, then using US industry data might entail measurement error and attenuation bias. On the other hand, Ciccone and Papaioannou (2010) have argued that in some circumstances also amplification bias might result, especially when the industry characteristics of interest in the benchmark country might be considered as a better proxy for the industry characteristics in more similar countries (e.g., in our paper in the case of countries with more lax employment protection legislation).

Since in principle both attenuation and amplification bias might occur in a given dataset, Ciccone and Papaioannou (2010) have suggested to adopt a "benchmarking bias" approach implemented through an IV method which instruments the interaction term $Reallocation_s \times EPL_c$ with a two-step procedure. First, they propose to obtain the predicted industry slopes of EPL by estimating with OLS on all countries (but the US) the following equation:

$$Y_{s,c} = \rho_s EPL_c + e_c + e_s + e_{s,c}. \tag{2}$$

Second, for the country with the most flexible labour market (the US), the true industry reallocation intensity is built (netting out country effects) as the predicted industry reallocation intensity as follows:

$$\widehat{Reallocation}_s = \hat{e_s} + \hat{\rho}_s EPL_{US}. \tag{3}$$

Finally, the interaction $\widehat{Reallocation}_s \times EPL_c$ is used as an instrument for $Reallocation_s \times EPL_c$.[14] It is however important to note that the Rajan and Zingales (1998) approach

[14]See Bassanini and Garnero (2013) and Conti and Sulis (2015) for an application of this two-step estimator.

only allows us to identify differential effects between higher and lower reallocation intensive industries. Still, this differential provides us some indication on the direction of the average effect of employment protection legislation, subject to the identification assumption that in low employment reallocation intensive sectors the effect of EPL is of the same sign and smaller than in high employment reallocation intensive industries or, alternatively, zero (Bassanini and Garnero, 2013).

In equation (1) country fixed effects should control for any omitted variable at the country level that has the same effect on the entry or exit rate in all industries, such as the level of taxation, quality of institutions, macroeconomic conditions over the period, social norms, etc. In turn, industry dummies may capture differences in technologies, sector specific patterns of entry or exit and the different stage of an industry's life cycles. Moreover, they may account for sector specific barriers to entry and exit, such as economies of scale, sunk costs, technological intensity, the degree of product differentiation and advertising intensity.

Our regression specification takes also into account other possible determinants of entry and exit by including the relevant country and sector interactions $Z_c$ and $W_s$, such as the country barriers to competition or the cost of insolvency and the industry turnover rates, or the industry dependence on external finance and the country level of financial development. Controlling for the relevant country-industry interactions should allow us to take into account the possibility that some industry characteristics are correlated with the US reallocation intensity or that country characteristics are correlated with EPL: in this case, the omission of the relevant country-industry interactions would tend to bias the OLS estimate of our coefficient of interest.

Furthermore, in order to consider the possibility that the employment protection legislation impact might be related to some industry characteristics, in some specifications we augment our regressions with interactions between EPL and sector level variables, such as R&D and physical capital intensity in the US. Moreover, there might be country-level variables, potentially correlated with EPL, that tend to affect entry and exit rates particularly in industries that have higher labour flexibility requirements. Hence, in some regressions we

also include additional interactions between $Reallocation_s$ and country level variables, such as various labour market institutions, barriers to competition, quality of institutions, levels of economic development, among others.

Our empirical model includes also a set of controls that vary at country and sector level ($X_{s,c}$) that have been found to affect reallocation rates (Bassanini and Garnero, 2013), such as the share of self-employed, the share of medium and low educated employees and the share of temporary contracts. Furthermore, in some specifications we further extend this set of controls by including possible determinants of firm dynamics discussed in the industrial organization literature such as a measure of vertical integration, growth opportunity and R&D intensity. Finally, since there could be concerns that countries that specialize in low turnover rate as well as low reallocation intensity industries might also be less likely to have stricter employment protection legislation, we estimate some IV regressions where we instrument EPL with variables related to the legal origin of each country (see the empirical results section).

# 4 Empirical results

## 4.1 Baseline results

In Table 3 we report empirical estimates of the baseline specification of equation (1) for both entry and exit rates. All regressions include the interaction between the US worker reallocation rate at industry level and country level EPL, country and sector fixed effects, as well as a set of controls that vary at both country and sector level, namely the share of temporary workers, the percentage of self-employed and workers educational attainment (the share of medium and low skilled, with high skilled being the omitted category).[15]

In columns 1 and 6 we estimate the baseline difference-in-difference specification in equation (1) with OLS, while in columns 2 and 7 we weight each observation (i.e., each country-

[15]We use standard errors robust to heteroscedasticity. We also checked that results are robust to using standard errors robust to clustering along both the country and industry dimensions: results are available from the authors upon request. If we drop the country-industry level controls, the magnitude of the OLS results is barely affected, while standard errors are just slightly higher.

Table 3: Baseline regressions

| Dependent Variables: | Entry Rate | | | | | Exit Rate | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | OLS | WLS | GLM | IV | Bench. Bias | OLS | WLS | GLM | IV | Bench. Bias |
| Reallocation × EPL | -0.0403** | -0.0502** | -0.0048** | -0.0747* | -0.231** | -0.060*** | -0.052*** | -0.0072*** | -0.088*** | -0.122*** |
| | (0.0199) | (0.0216) | (0.00202) | (0.0427) | (0.0936) | (0.0196) | (0.0174) | (0.00167) | (0.0292) | (0.0351) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Country dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Industry dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 332 | 328 | 332 | 332 | 328 | 293 | 293 | 293 | 293 | 293 |
| R-squared | 0.602 | 0.702 | | 0.601 | 0.633 | 0.732 | 0.823 | | 0.73 | 0.807 |

**Notes:** Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable in columns 1-5 (6-10) is the average Entry (Exit) rate of employer enterprises over the period 2004-2007. Reallocation is sectoral US worker reallocation and it is taken from Bassanini and Garnero (2013). EPL is the OECD indicator for Employment Protection Legislation; it is calculated as the weighted sum of sub-indicators concerning the regulations for individual dismissals and additional provisions for collective dismissals. Other controls are the country-industry share of self-employed (Self-employed), the share of medium educated (Med. Educated), the share of low educated (Low Educated) and the share of temporary contracts (Temporary) from Bassanini and Garnero (2013) and are calculated as average values over the period 2004-2007. Country and industry dummies included. In columns. 1 and 6 estimation method is OLS. In cols. 2 and 7, weights are share of employment in 2004. In cols. 3 and 8 estimation is GLM. In cols. 4 and 9 instruments are legal origins, and are taken from Bassanini et al (2009). In cols. 5 and 10, estimation method is the two-step IV estimator proposed by Ciccone and Papaioannou (2011).

industry cell) by the average share of country level employment over the period 2004-2007. Indeed, sectoral data might suffer from measurement error, which is likely to be correlated with the dimension of the sector and by using Weighted Least Squares (WLS) we assess the robustness of OLS results.[16] As results displayed in Table 3 show, the interaction between US reallocation and EPL is negative and statistically significant at the 5% and 1% confidence levels in the case of the entry and exit regressions, respectively. In the entry regression, the coefficient of -0.04 in the OLS regression implies that the difference in entry rates in an industry with high flexibility requirements (i.e. at the 90th percentile of US worker reallocation intensity, with a value of 57.9) and an industry with low flexibility requirements (i.e. at the 10th percentile of the US worker reallocation rate, with a value of 30) is reduced by about 0.9 percentage points in a country at the 90th percentile of EPL (Italy, with a value of 3.15) compared to a country at the 10th percentile (Norway, with a value of 2.38).[17] In the case of the WLS regression, the differential in entry rates is slightly larger, namely 1.1 percentage points.

In order to understand the magnitude of these effects, we can observe that the sample cross-country mean difference in entry rates between the industries at the 90th and 10th percentile of worker flexibility requirements is about 9 percentage points. Therefore, a differential of about 1 percentage point is equivalent to about 11% of the cross country mean difference, which might not look a particularly strong effect, although some of the next results point towards larger effects.

In the case of the exit rate, the differential between the industry with high and low flexibility requirements is reduced by about 1.2 percentage points in a country with high with respect to a country with low values of EPL, which is a somewhat stronger effect, if we consider that the cross-country mean difference in exit rates between the industries at the

[16]We have also estimated the baseline regression with a robust regression technique that drops outliers and weights each observations according to absolute residuals and then re-estimates the regression in an iterative process. Estimation results are very similar to those reported in Table 3 and are available from the authors upon request.

[17]In order to ease the interpretation of this result, we can express the differential in entry rates as follows: $D = \alpha * (Reallocation\_90 - Reallocation\_10) * (EPL\_90 - EPL\_10)$, where $\alpha$ is the coefficient of the interaction between Reallocation and EPL.

90th and 10th percentile of US reallocation intensity is about 6 percentage points.

In the next columns, we probe the robustness of these results along different dimensions. First, we take into account the possibility that EPL is endogenous. Indeed, it might happen that EPL and entry (exit) rates are jointly determined if a country that specializes in low turnover and reallocation intensity industries is less likely to adopt strict employment protection legislation rules. In order to address the possible endogeneity of EPL, we follow Bassanini et al (2009) and instrument it with country legal origin dummies: in particular, it is expected that countries with a French legal origin are more likely to have adopted stricter employment protection rules with respect to countries with a German or Scandinavian legal origin. We report IV results in columns 4 and 9 in Table 3. First stage results, available from the authors upon request, show that in both regressions excluded instruments are statistically significant and with the expected sign. Moreover, the Hansen J test statistics rejects at least at the 5% level of confidence the null hypothesis that the excluded instruments are correlated with the error term, while the Kleibergen-Paap rk Wald F statistics does not seem to indicate major signs of a weak instrument problem. As far as the magnitude of the effect of EPL is concerned, we note that the coefficient of the interaction terms increases (in absolute value) to -0.075 in the entry regression and to -0.089 in the exit regression, respectively. These coefficients suggest that the differential in entry (exit) rates of the industry with high and low flexibility requirements is reduced by about 1.6 (1.9) percentage points in a country with high with respect to a country with low values of employment protection legislation, which is a somewhat larger effect than that found in the case of the OLS regression.

In columns 5 and 10 we tackle another endogeneity issue associated to possible measurement error of Reallocation. We apply the two-step IV approach proposed by Ciccone and Papaioannou (2010), discussed in Section 3, and regression results seem to suggest the existence of some form of attenuation bias, particularly in the case of the entry regression. Hence, we might consider the OLS estimates as a sort of conservative lower bound for the differential effect of EPL on entry and exit rates. Indeed, the coefficients reported in columns 5 and 10 suggest that the entry rate differential between the industries with high and low

flexibility requirements would be reduced by about 4.9 percentage points in a country with high with respect to a country with low levels of EPL. This would be indeed a very large effect, given that the cross-country mean difference in entry rates between the industries with high and low flexibility requirements is about 9 percentage points. Although in the case of the exit regression the difference with the OLS results is less striking, the differential in exit rates would grow to about 2.6 percentage points against 1.3 in the OLS regression.

So far, we have assumed a linear relationship between entry (exit) rates and the independent variables; however, the linearity assumption can be problematic when the dependent variable is fractional, i.e. when it takes on values between zero and one.[18] In this case, following Papke and Wooldridge (1996), we assume that the conditional mean of the entry (exit) rate is a logit function of the independent variables and we estimate a Generalized Linear Model (GLM) by quasi-maximum likelihood, where the quasi-likelihood function is the binary choice log-likelihood.[19] Regression results reported in columns 3 and 8 suggest that dealing with the fractional response nature of the dependent variable does not seem to matter: indeed the interaction of reallocation with EPL is negative and statistically significant. Moreover, once we compute the marginal effects of the interaction term, we find values of -0.041 (-0.052) in the case of the entry (exit) rate regressions, very similar to the OLS coefficients reported in columns 1 and 6.

Overall, these results suggest that countries with stricter employment protection regulations tend to have lower firms' entry and exit rates, particularly in industries that naturally require more workers' flexibility. While the results for the entry rate are broadly in line with the previous empirical literature, the negative impact of EPL on exit rates is, to the best of our knowledge, a novel one. More importantly, our results for the exit rates fit well with the model of Poschke (2009) which predicts a negative effect of EPL on exit, provided that firing costs are levied also on exiting firms. In Poschke's (2009) model, by reducing exit,

[18]The linearity assumption can be problematic in our case because of the large differences between entry and exit across industries and countries. See Bassanini and Garnero (2013) for a similar observation in the case of workers reallocation rates.

[19]See Bassanini and Garnero (2013) and Bassanini and Brunello (2011) for recent empirical applications and Wooldridge (2010) for a theoretical discussion.

EPL hampers selection and reduces productivity growth, thereby contributing to undermine the creative destruction process.

The findings discussed so far also shed some interesting insights into the transmission channel between employment protection legislation and productivity growth. Indeed, various recent empirical studies have found that employment protection legislation is associated to lower total factor productivity growth at the industry level (Bassanini et al (2009) and Conti and Sulis (2015), among the others). In turn, the literature on misallocation cited in the Introduction suggests that a sizeable share of sectoral productivity growth is associated to the net entry component (e.g., Foster et al (2008)). Therefore, our finding on higher firing costs associated to lower firms' turnover rates is consistent with the hypothesis that employment protection legislation might indeed tend to affect sectoral productivity growth (also) through the net entry channel. Hence, besides impairing the degree of static allocative efficiency by limiting the expansion and growth of more productive firms (as recently shown by Andrews and Cingano (2014)), employment protection legislation, by affecting the value of the firm and thereby altering the entry and exit thresholds, reduces firms' entry and exit rates and weakens dynamic allocative efficiency, thereby decreasing the level and, possibly, growth rates of total factor productivity.

## 4.2 Robustness checks

In this Section, we discuss a series of robustness checks whose results are shown in Tables 4 and 5. First, in columns 1 of both tables we report estimates of an augmented model where we include a set of variables, that vary both at country and sector level, that need to be taken into account when analysing entry and exit dynamics. We find that industry growth opportunities (Past Ind. Growth) is positively associated to firm turnover, while R&D Intensity is negatively correlated to both entry and exit rates. Indeed a higher level of R&D may act as a barrier to entry to protect incumbents from potential entrants, thereby reducing also exit rates. Reassuringly, our coefficient of interest confirms the previous finding

of a negative impact of EPL on firm dynamics particularly in high reallocation industries.[20] However, it is important to note that the inclusion of this set of controls entails a severe loss of observations; moreover, most of them are endogenously determined and might generate biases in parameter estimates. For these reasons, we decide to exclude this set of controls from the empirical models presented in the remaining columns of the Tables.

In columns 2 of Tables 4 and 5 we consider the role of specific regulatory barriers to entry and exit. In particular, following Andrews and Cingano (2014) we consider in the entry regression the interaction between an indicator of barriers in the product market (defined as the average of the OECD indices of barriers to competition and burden on start-ups) and the US industry level of firms' turnover rates. Indeed, one could argue that barriers in the product market are more likely to display stronger effects in sectors that are naturally characterized by high levels of turnover and the US is in general the country with the most liberalized product market. Similarly, in the case of the exit rate regression, we consider the interaction of turnover rates in the US with a country level index of the cost of insolvency, as a measure of barriers to exit. Empirical results show that none of them is statistically significant; in turn, the interaction of Reallocation with EPL is negative and statistically significant.

In columns 3 of the two Tables we include the interaction between the US industry level of financial dependency with the country level of financial development, proxied by the ratio of private credit by domestic money banks and GDP (Aghion et al (2007)). Again, our main results are confirmed, while we do not find any statistically significant effect of financial development.

In the next columns, we explore the possibility that EPL is simply picking up the effect of other country level variables, potentially correlated with EPL, that could affect entry and exit rates particularly in sectors that naturally require more flexibility. In columns 4 we jointly consider the interaction of reallocation intensity with various labour market variables

[20] As we noted in Section 3, industry specific determinants of entry and exit that do not significantly vary across countries are already controlled by sector dummies. Furthermore, our results are confirmed when we add the share of employment accounted for by each industry in its own country as of 2004 in order to take into account the possibility that the size of the sector plays a role in shaping entry and exit rates.

Table 4: Robustness analysis for Entry Rate

| Dependent Variable: Entry Rate | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Reallocation × EPL | -0.0468** | -0.0406** | -0.0401* | -0.0678* | -0.0421** | -0.0510* | -0.0483** | -0.0406** | 0.272** | -0.169*** |
| | (0.0235) | (0.0202) | (0.0221) | (0.0368) | (0.0207) | (0.0287) | (0.0221) | (0.0196) | (0.127) | (0.0544) |
| Past Ind. Growth | 0.0580*** | | | | | | | | | |
| | (0.0211) | | | | | | | | | |
| R&D Intensity | -0.0644 | | | | | | | | | |
| | (0.0407) | | | | | | | | | |
| Vert. Integration | 0.0384 | | | | | | | | | |
| | (0.0321) | | | | | | | | | |
| Turnover × Barriers | | 0.014 | | | | | | | | |
| | | (0.104) | | | | | | | | |
| Fin. Dep. × Fin. Dev. | | | -0.00057 | | | | | | | |
| | | | (0.0218) | | | | | | | |
| Reallocation × Tax | | | | -0.00521** | | | | | | |
| | | | | (0.00246) | | | | | | |
| Reallocation × Corp. | | | | -0.0055 | | | | | | |
| | | | | (0.0279) | | | | | | |
| Reallocation × UD | | | | -0.00028 | | | | | | |
| | | | | (0.00099) | | | | | | |
| Reallocation × Repl. Ratio | | | | 0.000933 | | | | | | |
| | | | | (0.00147) | | | | | | |
| Reallocation × Barriers | | | | | 0.0109 | | | | | |
| | | | | | (0.0312) | | | | | |
| Turnover × EPL | | | | | | 0.0692 | | | | |
| | | | | | | (0.128) | | | | |
| Cap. Int. × EPL | | | | | | | 0.241 | | | |
| | | | | | | | (0.344) | | | |
| Fin. Dep. × EPL | | | | | | | | -4.928*** | | |
| | | | | | | | | (1.75) | | |
| Reallocation × EPL × TFP Dist. | | | | | | | | | -0.426** | |
| | | | | | | | | | (0.167) | |
| Reallocation × TFP Distance | | | | | | | | | 0.962** | |
| | | | | | | | | | (0.417) | |
| Reallocation × EPL × Hours Emp. | | | | | | | | | | 3.95e-05** |
| | | | | | | | | | | (1.53E-05) |
| Hours Employee | | | | | | | | | | -0.00532** |
| | | | | | | | | | | (0.00264) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Country dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Industry dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 275 | 332 | 332 | 305 | 332 | 332 | 319 | 332 | 332 | 226 |
| R-squared | 0.68 | 0.602 | 0.602 | 0.628 | 0.602 | 0.603 | 0.647 | 0.628 | 0.61 | 0.679 |

**Notes:** Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Reallocation is sectoral US worker reallocation; EPL is calculated as the weighted sum of sub-indicators concerning the regulations for individual dismissals and additional provisions for collective dismissals. Controls are the country-industry share of self-employed (Self-employed), share of medium educated (Med. educated), share of low educated (Low. educated) and the share of temporary contracts (Temporary). In column 1, controls vary at country and sector level: a measure of vertical integration (Vert. Integration), the past five years industry value added growth (Past Ind. Growth) and R&D expenditure over value added (R&D Intensity). Other controls: the turnover rate in the US calculated as the sum of entry and exit rates (Turnover), a measure of financial development (Fin. Dep.), and a measure of capital intensity (Cap. Int.). These variables have been interacted with country level variables: indices of burden on start-ups e barriers to competition (Barriers); a measure of financial development (Fin. Dev.); a set of controls for other labour market institutions: union density (UD), a measure of corporatism (Corp), the tax wedge (Tax), and the gross replacement rate for unemployment benefits (Repl. Ratio). The TFP level of each country (TFP Distance) is measured as a percentage of the US. In column 10 we include the country/sector number of hours per employee (Hours Employees) and the triple interaction term.

Table 5: Robustness analysis for Exit Rate

| Dependent Variable: Exit Rate | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Reallocation × EPL | -0.0594*** | -0.0622*** | -0.0548*** | -0.0395 | -0.0703*** | -0.0729*** | -0.0672*** | -0.0621*** | -0.0305 | -0.0829** |
| | (0.0224) | (0.0196) | (0.0201) | (0.0284) | (0.019) | (0.026) | (0.0198) | (0.0192) | (0.089) | (0.035) |
| Past Ind. Growth | 0.0329* | | | | | | | | | |
| | (0.0192) | | | | | | | | | |
| R&D Intensity | -0.0726** | | | | | | | | | |
| | (0.0323) | | | | | | | | | |
| Vert. Integration | 0.0233 | | | | | | | | | |
| | (0.0228) | | | | | | | | | |
| Turnover × Insolvency | | 0.00204 | | | | | | | | |
| | | (0.00441) | | | | | | | | |
| Fin. Dep. × Fin. Dev | | | -0.0152 | | | | | | | |
| | | | (0.0122) | | | | | | | |
| Reallocation × Tax | | | | 0.000996 | | | | | | |
| | | | | (0.00186) | | | | | | |
| Reallocation × Corp. | | | | -0.0483** | | | | | | |
| | | | | (0.0212) | | | | | | |
| Reallocation × UD | | | | 0.00140** | | | | | | |
| | | | | (0.00068) | | | | | | |
| Reallocation × Repl. Ratio | | | | -0.00024 | | | | | | |
| | | | | (0.00147) | | | | | | |
| Reallocation × Insolvency | | | | | 0.00228* | | | | | |
| | | | | | (0.00131) | | | | | |
| Turnover × EPL | | | | | | 0.0846 | | | | |
| | | | | | | (0.125) | | | | |
| Cap. Int. × EPL | | | | | | | 0.0292 | | | |
| | | | | | | | (0.24) | | | |
| Fin. Dep. × EPL | | | | | | | | -2.483** | | |
| | | | | | | | | (1.117) | | |
| Reallocation × EPL × TFP Dist. | | | | | | | | | -0.077 | |
| | | | | | | | | | (0.112) | |
| Reallocation × TFP Distance | | | | | | | | | 0.0194 | |
| | | | | | | | | | (0.273) | |
| Reallocation × EPL × Hours Emp. | | | | | | | | | | 1.12E-05 |
| | | | | | | | | | | (1.61E-05) |
| Hours Employee | | | | | | | | | | 0.00094 |
| | | | | | | | | | | (0.00298) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Country dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Industry dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 242 | 293 | 293 | 268 | 293 | 293 | 281 | 293 | 293 | 195 |
| R-squared | 0.769 | 0.732 | 0.735 | 0.75 | 0.734 | 0.732 | 0.779 | 0.742 | 0.741 | 0.719 |

**Notes:** Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Reallocation is sectoral US worker reallocation; EPL is calculated as the weighted sum of sub-indicators concerning the regulations for individual dismissals and additional provisions for collective dismissals. Controls are the country-industry share of self-employed (Self-employed), share of medium educated (Med. educated), share of low educated (Low. educated) and the share of temporary contracts (Temporary). In column 1, controls vary at country and sector level: a measure of vertical integration (Vert. Integration), the past five years industry value added growth (Past Ind. Growth) and R&D expenditure over value added (R&D Intensity). Other controls: the turnover rate in the US calculated as the sum of entry and exit rates (Turnover), a measure of financial development (Fin. Dep.), and a measure of capital intensity (Cap. Int.). These variables have been interacted with country level variables: a measure of financial development (Fin. Dev.); a measure of costs for resolving insolvency (Insolvency); a set of controls for other labour market institutions: union density (UD), a measure of corporatism (Corp), the tax wedge (Tax), and the gross replacement rate for unemployment benefits (Repl. Ratio). The TFP level of each country (TFP Distance) is measured as a percentage of the US. In column 10 we include the country/sector number of hours per employee (Hours Employee) and the triple interaction term.

that have been previously considered as possible confounding factors for EPL, namely union power (measured by union density), the degree of corporatism in the economy, the tax wedge and the gross replacement rate of unemployment benefits. In the case of the entry regressions, we find that the effect of EPL is larger than in the baseline model and that, among the other variables, only the tax wedge seems to matter by reducing entry rates particularly in industries characterized by high flexibility requirements. In turn, in the exit regression we find that union density is associated to higher exit rates in sectors requiring more flexibility, while countries with higher levels of corporatism tend to have lower exit rates. Moreover, we find a slightly smaller effect of EPL, which is also somewhat poorly estimated, with a p value of 0.16.

In columns 5 we include an interaction term between reallocation intensity and the OECD indicator of barriers in the product market and the costs of insolvency in the entry and exit regressions, respectively. Reassuringly, the interaction between EPL and industry reallocation in the US is always negative and statistically significant; moreover, we find, somewhat counter-intuitively, that countries with larger costs of insolvency tend to have higher exit rates in high employment reallocation industries.[21]

We further examine whether EPL continues to display a negative and statistically significant effect when we interact it with other industry characteristics that can be thought to influence entry and exit rates, such as firm turnover intensity (column 6), physical capital intensity (column 7) and financial dependency (column 8). Reassuringly, we find that the negative effect of the interaction of employment reallocation and EPL is robust, with an order of magnitude very similar to the baseline model.[22]

We consider the possibility of a differential effect of employment protection legislation depending on each country distance from the technology frontier in column 9. Indeed, previous

[21]In unreported regressions, but available from the authors upon requests, we have controlled for interactions between reallocation and country per capita GDP, the ICGR index of the quality of institutions and the degree of openness to trade. Our main results are confirmed.

[22]In regressions not reported but available from the authors upon request, we have controlled for the interaction between employment protection and US industry volatility (taken from Michelacci and Schivardi (2013), the growth opportunities in the US industries, an US index of industry technological change used in Samaniego (2010), and the R&D intensity in the US. Again, our main results are unaffected.

works have found that the negative effect of EPL on labour productivity and TFP growth is higher in the case of countries near the technology frontier.[23] Regression results suggest that, in the case of the entry regression, the effect of EPL is stronger in the case of countries with high levels of TFP. For instance, at the 25th percentile of the relative TFP distribution, the coefficient of the reallocation-EPL interaction is -0.028 and statistically insignificant, while at the 75th percentile the coefficient takes on a value of -0.14 and highly significant. This result could be explained by arguing that EPL discourages drastic innovation (Saint Paul (2002)) and that the latter is more likely to come from new entrants. Indeed, if drastic innovation is more important for countries closer to the technology frontier, then one might expect that entry is discouraged by higher levels of EPL mostly in countries near the technology frontier. In turn, in countries far from the frontier firms might realize that imitation of foreign best practice technologies is likely to make productivity growth easier and therefore might be less discouraged by high levels of EPL.

Finally, firms may react to external shocks not only by adjusting on the extensive margin, but also exploiting the intensive margin, so that the possible negative effect of EPL on adjustment costs might be attenuated (Llosa et al (2014)). In order to control for this possibility, in columns 10 we report estimates of a regression specification where we include both the country-sector level of hours worked per employee and its interaction with Reallocation and EPL. Interestingly, we find that in countries/industries characterized by a larger intensive margin the negative impact of EPL on firm turnover is somewhat reduced.[24]

## 4.3 Disentangling employment protection legislation

As noted in the data section, the OECD employment protection index that we have been using so far is the weighted average of different legislative provisions related to severance pay, notification procedures, procedural inconveniences, difficulty of dismissals as well as

[23] See, for instance, Conti and Sulis (2015) for empirical evidence and Aghion and Howitt (2006) for a theoretical discussion.

[24] Similarly, another possible margin of adjustment is wage flexibility. Hence, in regressions not reported, but available upon request, in our baseline specification we control for the ratio of labour costs on gross output. Our results are virtually unaltered.

the additional regulations concerning collective versus individual dismissals. Bassanini and Garnero (2013) have found that only some of these provisions matter in shaping the effects of EPL on worker flows; therefore it might be worth trying to disentangle the effects of the main components behind the OECD EPL indicator on firms' entry and exit rates.

We start in columns 1 and 5 of Table 6 by breaking down the OECD EPL index into its individual (EPL Individual) and collective (EPL Collective) regulation components. Empirical results show that both components have a negative and statistically significant effect: this suggests that regulations of collective dismissals do impose an additional burden on firms and that therefore should receive by policymakers at least as much interest as regulations on individual dismissals.

In columns 2 and 6 we break down the individual dismissal index into three components, namely procedural inconveniences (Proc. Inconv.), notice and severance payments (Severance Pay) and difficulty of dismissals (Diff. Dismissal). Empirical results show that neither procedural inconveniences nor notice and severance payments seem to influence entry and exit rates, while the difficulty of dismissal has a negative and statistically significant effect on exit rates and a weakly significant negative effect (the p value is 0.11) on entry rates. Moreover, the indicator for collective dismissals is still negative and statistically significant. If we further disentangle the effect of difficulty of dismissal into its main components (columns 3 and 7), namely definition of unfair dismissal (Unfair Dismissal), possibility of reinstatement (Reinstatement), compensation for unfair dismissal (Compensation) and length of trial period (Trial Length), we find that it is only the length of the trial period that matters in reducing entry rates, while in the case of exit rates it is the definition of unjust or unfair dismissal that is relevant. It is important to note that the specific item for the Trial Length, defined as the time spell when regular contracts are not fully covered by employment protection provisions and unfair dismissal claims can usually not be made, assigns a lower level of employment protection to those countries where the length of the trial period is longer. Our results therefore suggest that in countries with shorter trial periods, firms may be discouraged to enter because the trial period may not be adequately long to screen workers

Table 6: Robustness analysis on EPL indicators

| Dependent Variables: | Entry Rate | | | | Exit Rate | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Reallocation × EPL Collective | -0.0195* | -0.0364** | -0.0358** | | -0.0262** | -0.0334*** | -0.0431*** | |
| | (0.0114) | (0.0168) | (0.0174) | | (0.0104) | (0.0121) | (0.013) | |
| Reallocation × EPL Individual | -0.0265* | | | | -0.0416*** | | | |
| | (0.0145) | | | | (0.015) | | | |
| Reallocation × Proc. Inconv. | | -0.0292 | -0.0335 | | | -0.0178 | -0.00666 | |
| | | (0.0209) | (0.0224) | | | (0.0134) | (0.0143) | |
| Reallocation × Severance Pay | | 0.0105 | 0.00743 | | | -0.0046 | -0.00904 | |
| | | (0.00963) | (0.0103) | | | (0.00827) | (0.00928) | |
| Reallocation × Diff. Dismissal | | -0.0209 | | | | -0.0235** | | |
| | | (0.0131) | | | | (0.00952) | | |
| Reallocation × Unfair Dismissal | | | -0.00253 | | | | -0.0248*** | |
| | | | (0.00908) | | | | (0.00636) | |
| Reallocation × Trial Length | | | -0.0277* | | | | -0.0088 | |
| | | | (0.0147) | | | | (0.00891) | |
| Reallocation × Compensation | | | -0.0152 | | | | 0.0104 | |
| | | | (0.0127) | | | | (0.00914) | |
| Reallocation × Reinstatement | | | 0.00071 | | | | -0.00028 | |
| | | | (0.00522) | | | | (0.00363) | |
| Reallocation × $EPL_{EFW}$ | | | | -0.0212** | | | | -0.0209*** |
| | | | | (0.00858) | | | | (0.0057) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes |
| Country dummies | yes | yes | yes | yes | yes | yes | yes | yes |
| Industry dummies | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 332 | 332 | 332 | 332 | 293 | 293 | 293 | 293 |
| R-squared | 0.603 | 0.606 | 0.609 | 0.606 | 0.732 | 0.734 | 0.739 | 0.734 |

**Notes:** Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable in columns 1-4 (5-8) is the average entry (exit) rate of employer enterprises over the period 2004-2007. Controls and other main variables are defined in Table 3. Reallocation is sectoral US worker reallocation. For more details on different items of employment protection legislation indicator see http://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm. See also section 4.3 in the paper. In cols. 4 and 8, EPL index is from Economic Freedom of the World database.

and verify the quality of the worker-firm match. In turn, the length of the trial period is likely to play a far less important role for the exit decision. In this case, our results suggest that it is the definition of unfair dismissal that matters. In tightly regulated labour markets, workers capability or redundancy are not an adequate and sufficient ground for dismissal; so that, as argued by Scarpetta et al (2002), the adoption of new technologies might be hampered. Indeed, the restriction a firm faces in order to reduce certain types of workers (particularly severe in those countries where the worker capability might not even be ground for dismissal) might attenuate the incentive to adopt the new technologies that require more experimentation. As a result, firms in countries with stricter definition of unfair dismissals might experiment less and stick to more mature and already experimented technologies, thereby reducing the number of failures and the exit rate.

While we should be cautious in our ability to accurately distinguish the effect of these separate provisions on entry and exit rates, our results suggest it might be important for policymakers to focus on the difficulty of dismissal as perhaps the main element of EPL that imposes a significant burden on firms.

Finally, in columns 4 and 8 we assess the robustness of previous results by using a different EPL indicator, namely the hiring and firing regulation index of the Economic Freedom of the World database. Reassuringly, we find that a more regulated labour market is associated to lower entry and exit rates particularly in industries with higher labour flexibility requirements.

## 4.4 Firm size

Overall results suggest that EPL might indeed deter firms' entry and exit; however, it is possible that the effect we have found masks some heterogeneity along the firm-size dimension. Indeed, it might be the case that firms react to the burden imposed by EPL either reducing entry (and exit) or entering in the market with a larger scale in order to spread the fixed costs component of EPL on a larger capital base. By way of contrast, in a few countries some regulations are imposed only on large firms, therefore EPL might reduce firm turnover

particularly in the case of large firms. While it would be interesting to be able to split the sample into many different size classes, data availability and sample size considerations allow us a meaningful split into two size classes only, namely 1-9 employees and 10 plus employees. Nevertheless, our data, as well as those of Klapper et al (2006), suggest that in most countries and industries the bulk of entering firms falls into the 1-9 category. Indeed, in the descriptive section of the paper we showed that entry and exit are mostly a small firms phenomenon, with an average share of small firms' entry and exit of about 95%.

In Table 7, we report the baseline regressions for both entry and exit rates. Regression results for the 1-9 category (top panel) suggest that EPL has a negative and statistically significant effect on both entry and exit rates: interestingly, the magnitude of the effect is, especially in the case of entry rates, substantially larger than in the whole sample, suggesting that EPL tends to reduce firm turnover particularly in the case of small firms.[25] This fits quite well with previous literature, which has highlighted how firms in the US tend to enter on a smaller scale than in the case of most continental European countries.

Regression results in bottom panel of Table 7 show that, in the case of larger firms, the coefficient of EPL displays a negative sign only when we take into account estimates obtained with the benchmarking bias approach. Moreover, it is also possible that the 10 plus category includes too much heterogeneity in firms' dimensions to allow us to draw any definite conclusion. Indeed further sample splits based on different sizes would help to understand such findings, but unfortunately we miss the relevant information.

# 5 Conclusions

In this paper, we have studied the role of employment protection legislation in shaping firms' incentives to enter and exit. Our main empirical finding is that both entry and exit rates are reduced by stricter EPL, particularly in industries that are characterized by higher employment reallocation intensity. These results are robust to various sensitivity checks such

[25]However, the cross-country differentials in entry and exit in the sectors with low and high employment reallocation rates are also higher, so that, in relative terms, the effect of EPL is quite similar to that identified in the case of the overall sample.

Table 7: Baseline regressions. Firm size

| Dependent Variables: | Entry Rate | | | | | Exit Rate | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) OLS | (2) WLS | (3) GLM | (4) IV | (5) Bench. Bias | (6) OLS | (7) WLS | (8) GLM | (9) IV | (10) Bench. Bias |
| Firms 1-9 employees | | | | | | | | | | |
| Reallocation × EPL | -0.0718** | -0.0505** | -0.00624** | -0.185*** | -0.342*** | -0.0849*** | -0.0621*** | -0.0078*** | -0.0954*** | -0.136*** |
| | (0.0318) | (0.0237) | (0.00272) | (0.0682) | (0.126) | (0.0204) | (0.0187) | (0.00157) | (0.0293) | (0.0384) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Country dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Industry dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 305 | 301 | 305 | 305 | 301 | 275 | 275 | 275 | 275 | 275 |
| R- squared | 0.587 | 0.728 | | 0.575 | 0.527 | 0.708 | 0.827 | | 0.707 | 0.810 |
| Firms 10 plus employees | | | | | | | | | | |
| Reallocation × EPL | 0.0012 | 0.00179 | -0.00018 | 0.0265 | -0.135 | -0.00459 | -0.0114 | -0.00194 | 0.00784 | -0.101** |
| | (0.00892) | (0.00718) | (0.00356) | (0.018) | (0.116) | (0.0111) | (0.00931) | (0.0037) | (0.0186) | (0.048) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Country dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Industry dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 307 | 303 | 307 | 307 | 303 | 276 | 276 | 276 | 276 | 272 |
| R- squared | 0.455 | 0.682 | | 0.448 | 0.301 | 0.560 | 0.72 | | 0.559 | 0.588 |

**Notes:** Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable in columns 1-5 (6-10) is the average Entry (Exit) rate of employer enterprises over the period 2004-2007. Reallocation is sectoral US worker reallocation and it is taken from Bassanini and Garnero (2013). EPL is the OECD indicator for Employment Protection Legislation; it is calculated as the weighted sum of sub-indicators concerning the regulations for individual dismissals and additional provisions for collective dismissals. Other controls are the country-industry share of self-employed (Self-employed), the share of medium educated (Med. Educated), the share of low educated (Low Educated) and the share of temporary contracts (Temporary). The above are taken from Bassanini and Garnero (2013) and are calculated as average values over the period 2004-2007. Country and industry dummies included. In columns. 1 and 6 estimation method is OLS. In cols. 2 and 7, weights are share of employment in 2004. In cols. 3 and 8 estimation is GLM. In cols. 4 and 9 instruments are legal origins, and are taken from Bassanini et al (2009). In cols. 5 and 10, estimation method is the two-step IV estimator proposed by Ciccone and Papaioannou (2011).

as those addressing reverse causality or measurement error issues associated to using US data as a proxy of an industry's employment reallocation rates. We also find that both individual and collective dismissal regulations have negative effects on entry and exit rates and that difficulty of dismissal seems to be the component of EPL most likely to affect firms' turnover. This in turn raises an important point that deserves further scrutiny in empirical studies that use aggregate indices of EPL, namely that different provisions might have different effects on firms' behaviour. Moreover, we also find that these results are mainly associated to firms in the 1-9 employees category, that represents the bulk of firms that enter or exit in most countries and industries. By way of contrast, in the case of larger firms, the evidence is less clear-cut, perhaps for the heterogeneity characterizing that group in our sample.

Overall, the results presented in this paper contribute to the literature that has sought to explain cross-country productivity differentials in the light of the misallocation of resources hypothesis. In particular, our findings suggest that the entry and exit channel is likely to be an important mechanism underlying the negative impact of employment protection legislation on productivity that is often found in the empirical literature. In this respect, further research could investigate the role of different bargaining mechanisms for (mis)allocation of resources and possible interactions between employment protection legislation and other labour/product market regulations in shaping firms' dynamics.

# References


[1] Acharya, V., Baghai, R. and Subramanian, K. (2010). Labour laws and innovation. *NBER working paper*, 16484.

[2] Aghion, P. and Howitt, P. (2006). Joseph Schumpeter Lecture. Appropriate growth policy: a unifying framework. *Journal of the European Economic Association*, 4, (2-3), 269-314.

[3] Aghion, P., Fally T. and Scarpetta, S. (2007). Credit constraints as a barrier to entry and post-entry growth of firms. *Economic Policy*, 22, 52, 731-779.

[4] Aghion, P., Bartelsman, E., Perotti, E. and Scarpetta, S. (2008). Barriers to exit, experimentation and comparative advantage. *RICAFE2 working paper*, 056.

[5] Andrews, D. and Cingano F. (2014). Public policy and resource allocation: evidence from firms in OECD countries. *Economic Policy*, 253-296.

[6] Autor, D., Kerr, W. and Kugler, A. (2007). Does employment protection reduce productivity? Evidence from US States. *Economic Journal* 117, F189-F217.

[7] Bartelsman, E., Scarpetta S. and Schivardi F. (2005). Comparative analysis of firm demographics and survival: evidence from micro-level sources in OECD countries. *Industrial and Corporate Change*, 14, 3, 365-391.

[8] Bartelsman, E., Haltiwanger J. and Scarpetta S. (2013). Cross-country differences in productivity: the role of allocation and selection. *American Economic Review*, 103(1), 305-34.

[9] Bartelsman, E., Haltiwanger J. and Scarpetta S. (2009). *Measuring and analysing cross-country differences in firm dynamics*. In Dunne, T., Jensen J. and Roberts M. (eds), *Producer Dynamics: new evidence from micro data*. University of Chicago Press.

[10] Bassanini, A. and Brunello G. (2011). Barriers to entry, deregulation and workplace training: a theoretical model with evidence from Europe. *European Economic Review*, 55, 8, 1152-1176.

[11] Bassanini, A. and Garnero, A. (2013). Dismissal protection and worker flows in OECD countries: evidence from cross-country/cross-industry data. *Labour Economics* 21, 25-41.

[12] Bassanini, A., Nunziata, L. and Venn, D. (2009). Job protection legislation and productivity growth in OECD countries. *Economic Policy* 24, 349-402.

[13] Belot, M., Boone, J. and van Ours, J. (2007). Welfare-improving employment protection. *Economica* 74, 381-396.

[14] Bertola, G., (1994). Flexibility, investment, and growth. *Journal of Monetary Economics* 34 (2), 215-238.

[15] Bravo-Biosca, A., C. Criscuolo and C. Menon (2013). What Drives the Dynamics of Business Growth?, *OECD Science, Technology and Industry Policy Papers*, No. 1, available at http://dx.doi.org/10.1787/5k486qtttq46-en

[16] Cabral, L. (2014). Good turnover and bad turnover: barriers to business and productivity. *Economic Letters*, 125, 179-181.

[17] Cardullo, G., Conti, M. and Sulis, G. (2015). Sunk Capital, Unions and the Hold-Up Problem: Theory and Evidence from Cross-Country Sectoral Data. *European Economic Review*, 76 (May), 253-274.

[18] Caves, R.E. (1998). Industrial organization and new findings on the turnover and mobility of firms. *Journal of Economic Literature*, 36(4), 1947-82.

[19] Ciccone, A. and Papaioannou, E. (2007). Red tape and delayed entry. *Journal of the European Economic Association*, 5(2-3), 444-458.

[20] Ciccone, A. and Papaioannou, E. (2010). Estimating Cross-Industry Cross-Country Models Using Benchmark Industry Characteristics. *University Pompeu Fabra, mimeo.*

[21] Cingano, F., Leonardi, M., Messina, J. and Pica, G. (2010). The effects of employment protection legislation and financial market imperfections on investment: evidence from a firm-level panel of EU countries. *Economic Policy*, 25, 117-163.

[22] Conti, M. and Sulis, G. (2015). Human capital, employment protection and growth in Europe. *Journal of Comparative Economics*, available at http://dx.doi.org/10.1016/j.jce.2015.01.007.

[23] Da Rin, M., Sembenelli A. and Di Giacomo M. (2011). Entrepreneurship, firm entry and the taxation of corporate income: evidence from Europe. *Journal of Public Economics*, 95, 1048-1066.

[24] Dunne, T., Roberts M. and Samuelson L. (1988). Patterns of firm entry and exit in US manufacturing industries. *The Rand Journal of Economics*, 4 (19), pp. 495-515.

[25] Eurostat (2007) *Eurostat-OECD Manual on Business Demography Statistics*, OECD, Paris.

[26] Foster L., Haltiwanger J. and Krizan C.J. (2001). *Aggregate productivity growth. Lessons from microeconomic evidence*. In Hulten C., Dean E. and Harper M. (eds), *New developments in productivity analysis*, University of Chicago Press.

[27] Foster, L., Haltiwanger, J. and Krizan, C.J. (2006), Market selection, reallocation and restructuring in the U.S. retail trade sector in the 1990s. *The Review of Economics and Statistics*, 88(4), pp. 748-758.

[28] Foster, L, Haltiwanger J. and Syverson, C. (2008). Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability? *American Economic Review*, 98: 394-425.

[29] Garicano, L., LeLarge, C. and Van Reenen, J. (2013). Firm size distortions and the productivity distribution: evidence from France. *NBER Working Paper*, 18841.

[30] Haltiwanger, J., Scarpetta, S. and Schweiger, H. (2014). Cross country differences in job reallocation: the role of industry, firm size and regulations. *Labour Economics*, 26, 11-25.

[31] Hopenhayn, H. and Rogerson, R. (1993). Job turnover and policy evaluation: a general equilibrium analysis. *Journal of Political Economy* 101 (5), 915-938

[32] Hsieh, C. and Klenow, P. (2009). Misallocation and Manufacturing TFP in China and India. *The Quarterly Journal of Economics*, CXXIV, 4.

[33] Klapper, L., Laeven, L. and Rajan R. (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, 82, 591-629.

[34] Kneller, R. and Macgowan, D. (2012) Tax Policy and Firm Entry and Exit Dynamics: Evidence from OECD Countries, *Bangor Business School Research Paper* No. 12/006, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2103056##

[35] Koeniger, W. and Prat, J. (2007). Employment protection, product market regulation and firm selection. *Economic Journal*, 117, F302-F332.

[36] Kugler, A. and Pica, G. (2008). Effects of employment protection on worker and job flows: evidence from a 1990's Italian reform. *Labour Economics*, 15, 78-95.

[37] Llosa, G., Ohanian, L., Raffo, A. and Rogerson, R. (2014) Firing Costs and Labor Market Fluctuations: A Cross-Country Analysis, *Meeting Papers Society for Economic Dynamics* 533.

[38] Martin, J.P. and Scarpetta, S. (2012). Setting it right: employment protection, labour reallocation and productivity. *De Economist*, 160, 89-116.

[39] Papke, L.E. and Wooldridge, J.M., (1996). Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics*, 11, 619-632.

[40] Poschke, M., (2009). Employment protection, firm selection, and growth. J*ournal of Monetary Economics*, 56 (8), 1074-1085.

[41] Rajan, R. and Zingales, L., (1998). Financial dependence and growth. *American Economic Review* 88 (3), 559-586.

[42] Restuccia, D. and Rogerson, R. (2008). Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic Dynamics* 11(4),707-720

[43] Samaniego, R. (2006). Do firing costs affect the incidence of firm bankruptcy? *Macroeconomic Dynamics*, 10, 467-501.

[44] Samaniego, R. (2010). Entry, exit and investment specific technical change. *American Economic Review*, 100: 1, 164-192.

[45] Santarelli, E. and Vivarelli, M. (2007). Entrepreneurship and the process of firms' entry, survival and growth. *Industrial and Corporate Change*, 16, 3, 455-488.

[46] Scarpetta, S., Hemmings, P., Tressel, T. and Jaejoon W. (2002). The role of policy and institutions for productivity and firm dynamics. *OECD Working Papers*, 329.