Labour Economics 26 (2014) 11–25

Contents lists available at ScienceDirect

Labour Economics

journal homepage: www.elsevier.com/locate/labeco

Cross country differences in job reallocation: The role of industry, firm size and regulations ☆

John Haltiwanger [a,b,c], Stefano Scarpetta [c,d], Helena Schweiger [e,*]

[a] Department of Economics, University of Maryland, College Park, MD 20742, United States
[b] NBER, United States
[c] IZA, Germany
[d] OECD, 2 Rue Andre Pascal, 75016 Paris, France
[e] EBRD, One Exchange Square, London EC2A 2JN, UK

HIGHLIGHTS

- We use harmonized job flow data along country, industry and firm size dimensions.
- We document basic facts about job flows in 16 industrial and emerging economies.
- Firm size is a key factor in determining the variability in job flows.
- Strict hiring and firing regulations tend to reduce the pace of job reallocation.
- Regulations have a stronger effect on firm/industry in greater need to adapt.

ARTICLE INFO

Article history:
Received 18 September 2012
Received in revised form 12 June 2013
Accepted 11 October 2013
Available online 25 October 2013

JEL classification:
J23
J53
K31

Keywords:
Gross job flows
Firm dynamics
Firm size
Product and labor market regulations

ABSTRACT

Somewhat surprisingly, cross-country empirical evidence (at least in the cross section) does not seem to support the predictions of standard models that economies with stricter regulations on hiring and firing should have a lower pace of job reallocation. One problem in exploring these issues empirically has been the difficulty of comparing countries on the basis of harmonized measures of job reallocation. A related problem is that there may be unobserved measurement errors or other factors accounting for differences in job reallocation across countries. This paper overcomes these challenges by using harmonized measures of job creation and destruction in a sample of 16 industrial and emerging economies, exploiting the country, industry and firm size dimensions. The analysis of variance in the paper shows that firm size effects are a dominant factor in accounting for the variation in the pace of job reallocation across country, industry and size cells. However, even after controlling for industry and size effects there remain significant differences in job flows across countries that could reflect differences in labor market regulations. We use the harmonized data to explore this hypothesis with a difference-in-difference approach. We find strong and robust evidence that stringent hiring and firing regulations tend to reduce the pace of job reallocation.

1. Introduction

A growing body of evidence has accumulated suggesting that the reallocation of factors of production – including labor – plays a major role in driving productivity growth (see for example Olley and Pakes, 1996; Griliches and Regev, 1995; Foster et al., 2001, 2002; Bartelsman et al., 2004). New firms enter the market and create new jobs, while other unprofitable firms exit the market contributing to job destruction (see e.g. Sutton, 1997; Pakes and Ericson, 1998; Geroski, 1995). Incumbent firms are in a continuous process of adaptation in response to the development of new products and processes, the growth and decline in markets and changes in competitive forces (Davis and Haltiwanger, 1999). Market structure and size composition of firms play a major role in shaping the magnitude of job flows and their characteristics (Davis et al., 1996). For example, smaller businesses are inherently

☆ We thank the World Bank and the OECD for financial support with original data collection. We are grateful for comments from many, including Robin Burgess, Laurence Kahn, Adriana Kugler, Julian Messina, Carmen Pagés, Luis Serven, John Shea, John Sutton, James Tybout and the participants at the World Bank Conference on the "Microeconomics of Growth" (Washington, D.C., May 18–19, 2006), at the Annual Conference of the European Association of Labour Economists (EALE, Prague, September21–23, 2006), at the World Bank and IZA 2nd Conference on "Employment and Development" (Bonn, June 8–9, 2007) and at the 2008 Annual Meetings of the American Economic Association (New Orleans, 4–6 January, 2008) for their insightful comments. We would also like to thank an anonymous referee and the co-editor, Juan José Dolado. The views expressed in this paper are our own and do not necessarily represent those of the institutions of affiliation.
* Corresponding author.
E-mail addresses: haltiwan@econ.umd.edu (J. Haltiwanger), stefano.scarpetta@oecd.org (S. Scarpetta), schweigh@ebrd.com (H. Schweiger).

0927-5371/$ – see front matter
http://dx.doi.org/10.1016/j.labeco.2013.10.001

more dynamic, in part because they tend to be young ventures and adjust through a learning-by-doing process (Dunne et al., 1988, 1989; Haltiwanger et al., 2013). In addition, some industries have inherently higher job flows than others in all countries, given the smaller size of their typical business and lower inherent entry costs (for example, Foster et al., 2006 report that job flows in the US retail sector are 1.5 times higher than in the manufacturing sector).

Standard models (see, e.g., Mortensen and Pissarides, 1994; Hopenhayn and Rogerson, 1993) predict that, in addition to technology and market-driven factors, the institutional and regulatory environment in which firms operate will have an impact on the pace of job flows. Moreover, consistent with the discussion above, such models imply that restrictions that dampen job reallocation will in turn lower productivity as the dampening of reallocation reduces the extent to which an economy is allocating resources to the most productive producers. However, the empirical evidence on the impact of labor regulations on job flows is inconclusive — countries with different types of labor regulations are observed to have fairly similar gross job flows (see, e.g., Bartelsman et al., 2009; Bertola and Rogerson, 1997; Boeri, 1999). In our analysis below, we confirm the weak relationship between the pace of gross job flows and summary indicators of labor regulations at the country level (see Fig. 2).[1]

The lack of a strong empirical relationship between labor regulations and gross job flows at the aggregate level may be due to various elements. Stringent labor regulations may be associated with other regulatory and institutional factors that also affect job flows. For example, Bertola and Rogerson (1997) argue that the greater compression of wages in Europe than in the US can compensate the differences in labor regulations and so explain the similarity of the job turnover rates. A more fundamental problem is that cross-country analyses of job flows may be flawed by severe omitted variable problems and measurement error, including differences in the distribution of activity across industries and size of firms, as well as different business size cut-off points in the enterprise surveys from which job flows data are obtained. In this paper, we overcome these obstacles by using detailed harmonized indicators of job flows drawn from firm-level databases covering 16 developed, emerging and transition economies of central and eastern Europe. With these data, we explore in detail the industry and size dimensions of job flows, and relate them to institutional differences across countries.

To preview results, we find that countries share a number of features of job flows along the industry and size dimensions. All countries are characterized by large job flows compared with net employment changes. These vary significantly and systematically across industries, pointing to technological and market-driven factors, but they vary especially across firms of different size. To provide a perspective on the importance of firm size, we find that industry effects alone account for about 5% of the variation in job reallocation rates across country, industry and size classes, while firm size effects alone account for about 45% of the same variation. However, even after controlling for industry and size effects, there remain notable cross-country differences in job flows.

In this paper, we develop a formal test of the role that hiring and firing regulations have in explaining these differences, and also test for the robustness of our results to the inclusion of other regulations affecting business operations. Following an identification strategy pioneered by Rajan and Zingales (1998), we use a difference-in-difference approach in which we identify the intrinsic need for job reallocation using data from the most flexible market economy, United States.[2] The advantage, compared with standard cross-country (or even cross-country/cross-industry) empirical studies, is that we exploit within-country differences across industry × size groups based on the interaction between country and industry × size characteristics. Thus, we can also control for country and industry × size effects, thereby minimizing the problems of omitted variable bias and other mis-specifications. We find support for the general hypothesis that hiring and firing costs reduce job turnover, especially in those industries and size classes that require more frequent labor adjustment. Moreover, stringent labor regulations have a stronger effect on the labor reallocation that is originated by the entry and exit of firms than that due to reallocation among incumbents.

Our paper innovates along a number of related dimensions compared with the existing empirical literature. In particular, two recent papers exploit within country variation in job flows to investigate the role of employment protection: Micco and Pages (2007) and Messina and Vallanti (2007). Messina and Vallanti (2007) focus on cyclical and secular variation in job turnover and find that countries with tighter employment protection exhibit less cyclical volatility in job destruction. The authors use the Amadeus dataset (a commercially available collection of company-level accounting data), which is less suitable to explore cross sectional variation in job flows – that is the focus of our contribution – since it does not capture firm entry and exit well. Nor is the Amadeus dataset well suited to exploit differences in job flows across firm size. In addition, while both the Messina and Vallanti (2007) and the current paper find a role for employment protection in dampening job flows on some dimensions, both the mechanisms and the consequences of such dampening may be different on the time series and cross sectional dimensions. For example, the model of Hopenhayn and Rogerson (1993) has clear predictions about the adverse productivity consequences of stifling the pace of reallocation in the steady state but is silent on the consequences of dampening reallocation over the cycle. In that respect, we think it is important to determine whether employment protection has systematic effects on the average pace of reallocation.

One paper that does explore the impact of employment protection on the average pace of reallocation is Micco and Pages (2007). The latter paper exploits industry-level gross job flows for 9 manufacturing sectors for 18 countries from different data sources and uses a difference-in-difference specification close to the specification we consider in our paper. We think there are a number of factors that differentiate our analysis from this paper. First, unlike the data used in Micco and Pages (2007), our indicators are drawn from a harmonized firm-level database that covers all firms with, in most cases, at least one employee for both manufacturing and non-manufacturing sectors.[3] Second, we exploit country, industry and firm size variation in the data, while Micco and Pages (2007) use only country and industry variation. We find that firm size is by far the most important factor accounting for variation in the job flows across country, industry and firm size classes. This suggests that exploiting data by firm size is important to provide greater within-country variation in job flows for our empirical identification strategy. We also think that investigating the role of employer size is important since employment protection likely directly interacts with the relationship between firm size and reallocation. Evidence from enterprise surveys suggests that policy-induced distortions tend to affect firms of different size very differently.[4] Part of the reason is that the smallest firms are either not subject to regulations or are better

[1] There is some evidence that labor market regulations influence worker turnover (Bentolila and Bertola, 1990; Nickell and Layard, 1999) but the impact on worker turnover should also translate into patterns for job turnover which are not observed. An alternative approach has been to look at specific policy experiments within countries. Kugler (2007) summarizes a number of empirical studies that have looked at the effects of reform episodes on job flows in France, Germany, Italy, Spain and the US. These episodes provide "natural experiments" that allow comparing groups of workers targeted by the reform to groups of workers not directly affected by the reform before and after the policy change in what is otherwise the same macroeconomic and regulatory environment. The main conclusion of these studies is that increasing the strictness of employment protection legislation reduces worker flows, while the composition of employment is also swayed against young and female workers.

[2] The results are robust to using the global benchmark measure proposed by Ciccone and Papaioannou (2010) instead of US job reallocation as a measure of the intrinsic need for job reallocation.

[3] In particular, our database covers 14 manufacturing sectors and 5 non-manufacturing sectors — refer to Table A.2 for details.

[4] See e.g. World Bank (2004), Pages et al. (2009).

able to evade the regulation. Lastly, our data allow distinguishing between job flows generated by the entry and exit of firms and those generated by the reallocation of labor by incumbent firms. As shown in the paper, this sheds additional light on labor reallocation and the role of regulations in labor and product markets. Moreover, key theoretical papers in the literature (eg., Hopenhayn and Rogerson, 1993) highlight the importance of considering the impact of employment protection on the entry/exit margin.

The remainder of the paper is organized as follows. Section 2 presents our harmonized firm-level dataset and discusses the different concepts we have used to characterize labor reallocation. Section 3 analyzes the main features of job flows, highlighting the role of firm dynamics, industry and size compositions. Section 4 introduces the difference-in-difference approach used in the econometric analysis and discusses the empirical results for the baseline and policy-augmented specifications of the job flow equations. It also describes a battery of robustness tests. Lastly, Section 5 presents concluding remarks.

2. Data

Our analysis of job flows is based on harmonized indicators drawn from firm-level database that includes 16 industrial, emerging and transition economies (Argentina, Brazil, Chile, Colombia, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Mexico, Portugal, Slovenia, the United Kingdom and the US) and covers the 1990s (the time period covered varies by country — see Table A.1).[5] Beyond the country dimension, the job flow indicators vary across detailed industry and size classes and over time. As explained in Bartelsman et al. (2009), the database was assembled as part of long-term research projects sponsored by the OECD and the World Bank, which used a common analytical framework for the extraction of the indicators. This involved harmonization, to the extent possible, of key concepts (such as entry and exit of firms, job creation and destruction, and the unit of measurement), achieved by using the same protocol for the extraction of indicators from the firm-level databases of the different countries with a close collaboration of country experts who had direct access to relevant data in each country.

The key features of the micro data underlying the analysis are as follows:

Unit of observation: Data used conform to the following definition: "an organizational unit producing goods or services which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources" (EUROSTAT, 1998). Generally, this will be above the establishment level.

Size threshold: While some registers include even single-person businesses (firms without employees), others omit firms smaller than a certain size, usually in terms of the number of employees (businesses without employees), but sometimes in terms of other measures such as sales (as is the case in the data for France). Data used in this study exclude single-person businesses. However, because smaller firms tend to have more volatile firm dynamics, remaining differences in the threshold across different country datasets should be taken into account in the international comparison.

Industry coverage: Data are organized along a common industry classification (ISIC Rev.3) that matches the OECD-Structural database (STAN). In the panel datasets constructed to generate the tabulations, firms were allocated to the single STAN industry that most closely fit their operations over the complete time-span. The complete list of industries used in the analysis can be found in Table A.2.

The firm-level and job flows data come from business registers (Estonia, Finland, Latvia, Slovenia, the United Kingdom and the US), social security databases (Germany, Italy, Mexico) or corporate tax rolls (Argentina, France, Hungary). Annual industry surveys have been used for Brazil, Chile, and Colombia. Data for Portugal are drawn from an employment-based register containing information on both establishments and firms. All these databases allow firms and jobs to be tracked over time because addition or removal of firms from the registers reflects the actual entry and exit of firms.

We define four size classes based on the number of firm employees: 1–19 workers, 20–49 workers, 50–99 workers, and 100 or more workers. The job reallocation rate (*sum*) is defined as the sum of job creation (*pos*) and job destruction (*neg*) rates, while net employment growth (*net*) is defined as the difference between job creation (*pos*) and job destruction (*neg*) rates.[6] We allow job creation and job destruction to vary by the type of firm: entering, exiting or continuing firms. Job creation rate is defined as $pos_{isct} = \frac{\sum_{f \in IS^{+}_{ct}} \Delta E_{f,isct}}{0.5(E_{isct} + E_{isc,t-1})}$ and job destruction rate as $neg_{isct} = \frac{\sum_{f \in IS^{-}_{ct}} \Delta E_{f,isct}}{0.5(E_{isct} + E_{isc,t-1})}$, where f represents firms, i represents industry, s represents size class, c represents country, t represents time (year) and E denotes employment. Capital letters I, S and C refer to a set of industries, size classes or countries, respectively, IS^{+}_{ct} denotes the set of firms of industry I and size S in country C with $\Delta E_{f,isct} > 0$ in a given year t, while IS^{-}_{ct} is the set of firms with $\Delta E_{f,isct} < 0$, $E_{isct} = \sum_{f} E_{f,isct}$.[7] The job flows are calculated on a yearly basis. In all our empirical analysis, we use time averages to reduce the possible impact of business cycle fluctuations in the years for which we have the data and the possibility that such fluctuations were not synchronized across countries and thus not captured by the use of common time fixed effects. We decided against applying the Hodrick–Prescott filter due to the rather short available time series for a number of countries, which may not yield reliable results, and its inability to address the structural changes that occurred in the transition countries of central and eastern Europe in the early 1990s.

3. Basic facts about job turnover in industrial and emerging economies of Latin America and central and eastern Europe

In this section, we highlight the key stylized facts emerging from our analysis of job flows across countries, industries and firm size.[8] These stylized facts are used in the following sections to guide our multivariate analysis.[9]

3.1. Large job turnover in all countries

The first stylized fact emerging from the data is the large magnitude of gross job flows (the sum of job creation and job destruction) in all countries compared with net employment changes, both at the level of total economy and in manufacturing (see Table B.1 in the Appendix A and Haltiwanger et al., 2006). Gross job flows range from about 25% of total employment on average in the OECD countries to about 30% in Latin America and the transition economies. By contrast, *net* employment changes tend to be very modest if not nil in the OECD and Latin America over the sample period, while the transition economies recorded a significant net job growth in the period covered by the data, after the substantial job losses of the early phases of the transition.

[5] The database also includes Indonesia, South Korea and Taiwan (China) as well as Canada, Denmark, the Netherlands, Romania and Venezuela, but annual data on job flows are not available for these countries or are not fully reliable.

[6] We take averages of *pos* and *neg*, and then calculate *sum* and *net*.

[7] See also Davis et al. (1996). Our definitions of job flows follow the latter.

[8] See Geroski (1995) for a summary of the basic facts characterizing firm demographics.

[9] A slightly longer list of the basic facts as well as their more detailed description can be found in Haltiwanger et al. (2006).

Taken at face value, the observed high pace of job reallocation in all countries may suggest a high degree of dynamism in virtually all economies. However, even at the aggregate level there are significant cross-country differences and, in addition, many different country-specific factors tend to influence the pace of job reallocation, within each country, across industries and size classes. Accordingly, the identification of the impact of regulations requires exploiting more than simply cross-country variation.

3.2. Firm turnover plays a major role in total job flows

The second stylized fact is the strong contribution of firm creation and destruction to job flows. Entering and exiting firms account for about 30–40% of total job flows (see Table B.1 in the Appendix A). In the transition countries, entry was even more important in the early years of transition to a market economy, while the exit of obsolete firms became more predominant in the second half of the 1990s, both for the total economy and in manufacturing, when market contestability strengthened.[10]

3.3. Small firms contribute disproportionately to job flows

Small firms account disproportionately for job flows and firm turnover in all countries in our sample. Fig. 1 presents job reallocation rates by firm size classes and countries. In general, job reallocation is highest in firms with less than 20 employees, and the lowest in firms with 100+ employees. In the US, job turnover declines monotonically with firm size, and the decline is particularly marked among large firms (100+). Latin American countries follow similar patterns to those of the US, while the European countries, with the exception of France, have a less marked drop of job reallocation among larger firms. The transition countries, on the other hand, show a steeper slope in smaller size classes, especially in the early years of transition.[11] It is this variation of job flows by size class as well as the variation across industries and countries that we exploit in our empirical analysis.

The analysis of size-specific job reallocation rates should be complemented with a decomposition of the overall job reallocation into that due to firms of different sizes. We find that small firms account for the largest share of firm turnover and also for a significant, albeit less dominant, share of total job flows. In terms of shares of job reallocation by size class, we find a U-shaped relationship that reflects two offsetting effects — first, job flows are higher for small firms as evidenced in Fig. 1 and second, employment is concentrated in larger firms.

3.4. Analysis of variance

The next step is to assess the relative importance of the different dimensions – country, industry and size – in explaining the overall variance in job flows. Table 1 presents the analysis of variance of job flows, for the unbalanced total economy and manufacturing samples.[12] We consider different indicators of job flows — gross job reallocation, job reallocation from entry and exit and job reallocation for continuers. We also assess the contribution to the total variance of industry, size, country and industry × size effects separately and, in addition, differentiate the analysis of variance by region (OECD, transition economies and Latin America).[13]

It is noticeable that technological and market structure characteristics that are reflected in the industry-specific effects explain only 5.1% of the overall variation in gross job reallocation across industry, size and country classes, although they account for a higher share in Latin America (18.4%). They explain much less of the overall variation in the manufacturing sample. By contrast, differences in the size structure of firms explain as much as 45.3% of the total variation in cross-country gross job reallocation overall, and even more in the manufacturing sample only (51.8%). Even country effects explain more of the variation in gross job reallocation than the industry effects (except in Latin America for the total economy sample). Hence, even though there are similarities among countries within a region, there is still significant variation across them. Overall, the combined industry × size effects explain the bulk of the variation in gross job reallocation: 50.8% overall, 46.9% in OECD countries, 64.3% in Latin American countries and 55.8% in transition countries in the second half of the 1990s.

Size heterogeneity plays a particularly strong role in explaining the variation of job creation by new firms and job destruction by exiting firms. Size heterogeneity is particularly important in Latin America, where it accounts for 70.2% of the heterogeneity in job reallocation from entry and exit. In the OECD countries, size heterogeneity plays a smaller role in both job reallocation from entering and exiting firms.[14] It is also interesting that size and industry × size effects account for a substantially larger fraction of entry and exit variation than for continuers. Apparently, a key component that accounts for variation in job reallocation across industry × size and size classes is differences in the pace of entry and exit. Put differently, this result suggests that firm entry and exit is a key margin in driving job flows and, as such, our working hypothesis is that it may be this variation that is especially sensitive to distortions.

3.5. The correlation of industry × size job flows across countries

It is also of importance to assess the correlation of industry job flows across countries. If market-driven and technological factors were the only factor at play, we should observe a strong correlation across countries. However, industry-level job flows in each country are also influenced by the institutional environment in which firms operate. Lack of correlation may accordingly be associated with policies and institutions that distort job flows. Job flows are part-and-parcel of the creative destruction process, and an unfavorable institutional environment will cause this process to be distorted (Caballero and Hammour, 2000). For this descriptive evidence, we use rank correlation as it is more robust to measurement error but the findings are robust to using Pearson correlation statistics.

Industry × size-level correlations with the US are particularly strong for most Latin American countries in the sample, despite the different degrees of economic development, as well as for the United Kingdom (Table 2). In general, correlations are on average slightly higher if we focus only on manufacturing. Some of the lowest correlations are found for some EU countries, in particular France (0.54). It is also interesting to see that transition economies had a much stronger correlation of their job flow patterns by industry and size class with the US in the sample that covers the entire 1990s than in the sample used in this

[10] The large job flows in the transition countries are not surprising. The process of transition started in the early 1990s and it included downsizing or exit of existing firms as well as the entry of many new firms as the economies progressed toward a market economy.

[11] Our data also suggest similar patterns for firm turnover by size class and country (results not presented here).

[12] The total economy sample is unbalanced in the sense that it covers manufacturing only for Brazil, Chile, Colombia and the United Kingdom — see Table A.1 for details.

[13] Mexico became a member of the OECD in 1994 and Hungary became a member in 1996, but for the purposes of this paper, they are classified as a Latin American economy and a transition economy, respectively.

[14] Available from the authors is also an analysis of variance that looks separately at entry and exit. The most interesting aspect of this exercise is that in the transition economies there is a strong difference between the factors accounting for variation in job creation and destruction. The variation of job creation by entrants is strongly influenced by size heterogeneity, while the importance of size effects for variation in job destruction by exiters is relatively small. The reason for the latter is that there are offsetting forces influencing exit in the transition economies. As in most countries, many young businesses fail in the early phases of their life, but in the transition economies (particularly in the early phases of their economic transformation) structural changes also involved the exit of many large, state-owned enterprises.

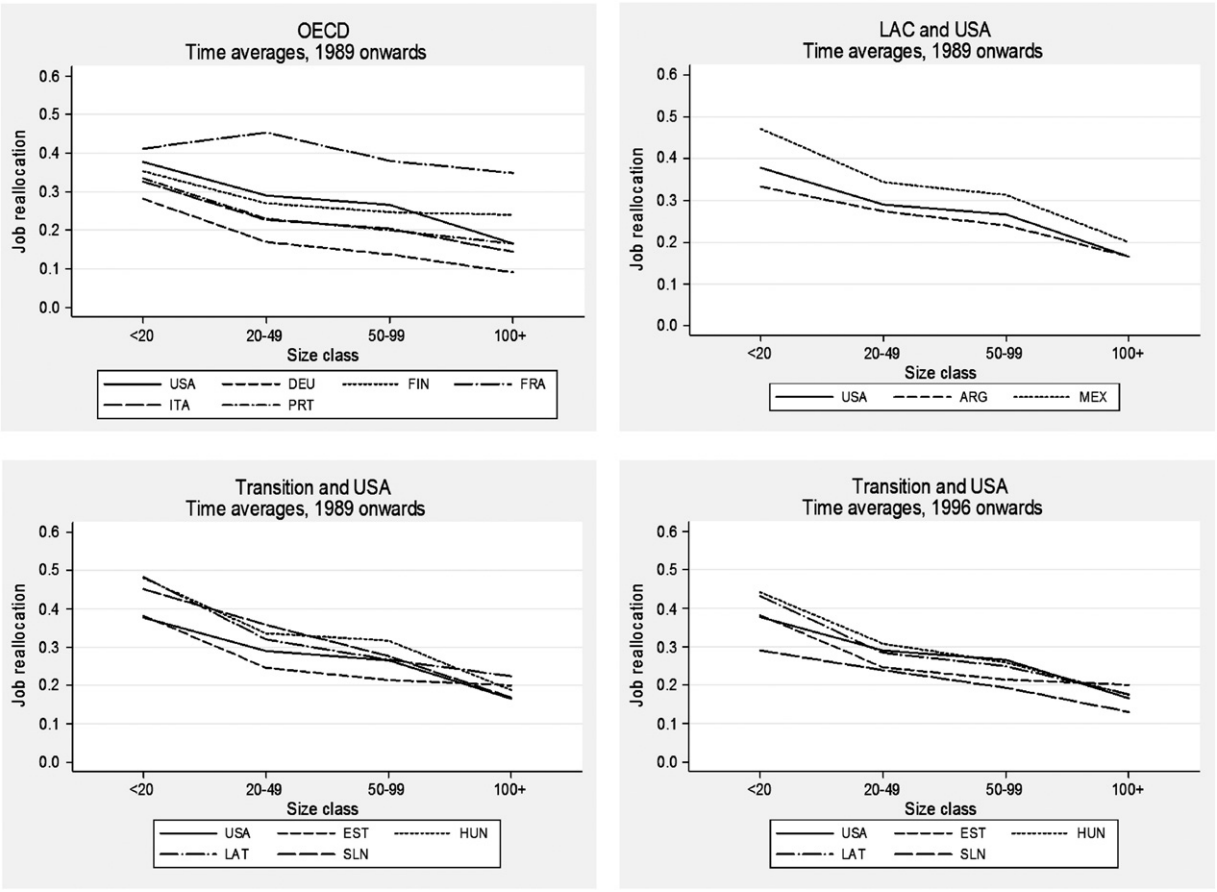

Fig. 1. Job reallocation across firms of different sizes, total economy.
Source: Own calculations based on harmonized firm-level database; see main text for details.

paper that focuses on the 1996–2001 period (see Haltiwanger et al., 2006). This might seem surprising, since the early phases of the transition were characterized by massive job reallocation and the unique need to change the structure of the economy. One working hypothesis that we develop later in the paper is that after the initial phases of transition, these countries have moved toward the job flow patterns

Table 1
Analysis of variance, total economy (unbalanced panel) and manufacturing.
Source: Own calculations based on harmonized firm-level database.

	Total economy			Manufacturing		
	Gross job	Job reallocation	Job reallocation	Gross job	Job reallocation	Job reallocation
	Reallocation	Entry&Exit	Continuers	Reallocation	Entry&Exit	Continuers
Industry effects						
All	0.0510	0.0074	0.0924	0.0057	0.0069	0.0167
OECD	0.0730	−0.0064	0.1661	−0.0014	−0.0067	0.0388
LAC	0.1836	0.0580	0.2585	−0.0113	−0.0166	−0.0102
Transition	−0.0274	−0.0386	−0.0008	−0.0348	−0.0351	−0.0192
Size effects						
All	0.4529	0.5008	0.1924	0.5177	0.5094	0.2444
OECD	0.4100	0.4226	0.1750	0.5209	0.3968	0.3473
LAC	0.4724	0.7023	0.1169	0.5897	0.7764	0.1507
Transition	0.5220	0.4557	0.2966	0.5045	0.4055	0.2901
Country effects						
All	0.1534	0.1342	0.2172	0.1672	0.1548	0.2435
OECD	0.1910	0.2115	0.2015	0.1829	0.2794	0.1569
LAC	0.1474	0.0382	0.3640	0.2030	0.0613	0.5073
Transition	0.0758	0.1020	0.1232	0.0625	0.0950	0.1044
Industry × size effects						
All	0.5082	0.5069	0.2805	0.5331	0.5200	0.2626
OECD	0.4688	0.3762	0.3157	0.5167	0.3522	0.3845
LAC	0.6430	0.7958	0.2737	0.5631	0.7833	0.0307
Transition	0.5584	0.4236	0.3328	0.5495	0.3849	0.3188

Adjusted R-squared is reported. Late 1990s data are used for transition countries.

Table 2
Rank correlations with the US job flows, total economy (unbalanced panel) and manufacturing.
Source: Own calculations based on harmonized firm-level database.

	Total economy			Manufacturing		
	Gross job	Job reallocation	Job reallocation	Gross job	Job reallocation	Job reallocation
	Reallocation	Entry and Exit	Continuers	Reallocation	Entry and Exit	Continuers
OECD	0.7515	0.7223	0.6254	0.7625	0.7189	0.6620
Germany	0.8468	0.9191	0.7214	0.9098	0.9153	0.9234
Finland	0.6946	0.3532	0.7742	0.6714	0.4301	0.7530
France	0.5418	0.7385	0.1762	0.6562	0.7732	0.2892
United Kingdom	0.8994	0.8229	0.6565	0.8994	0.8229	0.6565
Italy	0.6901	0.6896	0.6628	0.6366	0.5772	0.6932
Portugal	0.8363	0.8106	0.7611	0.8015	0.7948	0.6565
LAC	0.8528	0.8542	0.5622	0.8606	0.8705	0.5608
Argentina	0.8844	0.8421	0.7316	0.8847	0.8486	0.6677
Brazil	0.8987	0.9095	0.8135	0.8987	0.9095	0.8135
Chile	0.6787	0.7543	−0.1212	0.6787	0.7543	−0.1212
Colombia	0.9170	0.8975	0.6062	0.9170	0.8975	0.6062
Mexico	0.8853	0.8676	0.7807	0.9237	0.9425	0.8379
Transition	0.7556	0.6905	0.5903	0.7767	0.6832	0.6599
Estonia	0.7364	0.6236	0.6338	0.7460	0.5866	0.7145
Hungary	0.8321	0.8560	0.6897	0.8996	0.8985	0.8064
Latvia	0.7005	0.7215	0.4204	0.6638	0.7000	0.4053
Slovenia	0.7534	0.5609	0.6171	0.7972	0.5477	0.7133

Late 1990s data are used for transition countries.

observed in EU countries, with whom they share several policy and institutional factors.

3.6. The US versus other countries in the "slope" of the industry × size reallocation relationship

The findings from the previous two subsections suggest that industry × size effects account for a large fraction of the variation in job flows across industry, size and country classes, and also strong correlations between the rank order of job flows by industry and size in any given country with that in the US. These findings help motivate our empirical analysis of regulations below since they clearly indicate that there are common factors underlining the patterns of job flows across countries and across industry and size classes. As discussed above, these patterns plausibly reflect technology, demand and cost fundamentals (including the distribution of idiosyncratic shocks and the costs of reallocation) that vary across industry and size classes. Before going to a more formal empirical analysis of the effects of policy-induced distortions on job flows, we run a simple descriptive regression in which we quantify how the "slope" of the industry × size relationship varies between the US and the rest of the world. We take the US as our benchmark because it is the country with arguably relatively low policy-induced distortions. In particular, we estimate the following regression:

$$JFlow_{isc} = \beta_0 + \beta_1 USJFlow_{is} + \sum_{c=1}^{C} \gamma_c D_c + \epsilon_{isc} \quad (1)$$

where D_c are country c ($c = 1,\ldots,C$) dummies, $USJFlow_{is}$ is the US job flow variable in industry i and size class s, and ϵ is the *iid* error term. We estimate weighted regressions, using total employment in each country, size and industry cell as weights in order to take into account the differences in the employment that each cell represents.[15] This specification enables us to quantify the relationship, or slope, between cross-industry × size differences in gross job flows between the US and other countries in our sample. In this descriptive analysis, we start with a baseline specification in which we only include the US job flow benchmark and the country dummies (Eq. (1)). We then allow the coefficient on the US job flow variable to vary by region and by firm size class.[16]

As expected, the estimated coefficient on the US job flow in column (1) in Table 3 is positive and highly significant, confirming the bivariate correlation analysis discussed above. However, the estimated coefficient is significantly less than one, suggesting that, other things being equal, the responsiveness to market and technologically-driven factors that affect job reallocation in the US is less than one in the other countries. Indeed, if we take the US job flow rate as the benchmark for the propensity for the industry × size class to reallocate labor as a result of technology and market fundamentals, this finding suggests that an increase in the propensity that leads to a 10 percentage points increase in job reallocation from one industry × size class to another in the US, only leads to an increase of 6.7 percentage points from the same industry × size class to the other in other countries in the sample. In a suggestive sense, the coefficient being less than one is consistent with the view that the sample of EU, Latin America and transition economies have factors that distort the reallocation process.[17]

If we then allow the coefficient on US job flows to vary by region (EU, transition countries and Latin America) (column (2)), we notice that there is a closer link between cross-industry × size differences in gross job flows between the US and the Latin American countries than between the US and the European Union countries.

However, the coefficients are significantly less than one in all regions. Moreover, the coefficients on US job flow for the EU countries and for the transition countries are not significantly different from each other at 1% significance level (but they are different at 5% significance level). The Wald test for the equality of the coefficients on US job flow for transition countries and for Latin American countries cannot be rejected at any of the usual significance levels.

[15] Results in Tables 3–6 are broadly consistent when we estimate un-weighted regressions.

[16] The measure of job flows is the sum of job creation and job destruction rates (*sum*) and all variables are time averages over the available annual observations (see the next section for more details).

[17] Appropriate caution needs to be used in interpreting the magnitude of the coefficient since measurement errors can drive the coefficient below one. However, it is noticeable that this coefficient is always less than one, and that the pattern of variation in the magnitude of this coefficient across regions and size classes is consistent with our interpretation.

Table 3
Job flows — US versus other countries.
Source: Own calculations based on harmonized firm-level database.

	Total economy			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
USA SUM	0.6699***			0.6121***		
	[0.0396]			[0.0372]		
USA SUM × EU		0.5726***			0.4849***	
		[0.0521]			[0.0353]	
USA SUM × transition		0.7795***			0.7467***	
		[0.0676]			[0.0581]	
USA SUM × LAC		0.8542***			0.7987***	
		[0.0514]			[0.0461]	
USA SUM × <20 workers			0.571***			0.4744***
			[0.0430]			[0.0601]
USA SUM × 20–49 workers			0.4360***			0.3048***
			[0.0573]			[0.0688]
USA SUM × 50–99 workers			0.3890***			0.2201***
			[0.0676]			[0.0769]
USA SUM × 100+ Workers			0.2918***			0.0207
			[0.1019]			[0.1435]
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	940	940	940	709	709	709
Adjusted R-squared	0.78	0.79	0.81	0.81	0.85	0.85

All regressions are weighted by the total employment in each country, industry and size cell and include an intercept. Omitted country is Slovenia. Robust standard errors in brackets. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. USA SUM: industry × size job reallocation in the US. EU denotes the OECD European countries. Transition denotes the countries in central and eastern Europe. LAC denotes the countries in Latin America.

Next, we allow the coefficient on US job flows to vary by firm size (column (3)) and we find – perhaps not surprisingly – that the coefficient is the highest for the smallest size class (1–19 employees) and declines monotonically for the larger size classes. In other words, the patterns of cross industry job flows in the US and other countries are more similar among small firms than among larger firms, possibly because small firms are exempt from certain regulations and/or can more easily avoid other regulations. Hence, small firms show a degree of dynamism that is closer to that of the non-distorted (US) economy. For larger firms, regulations are likely to be more binding, especially in those industries that are inherently more volatile. The equality of all pairs with the coefficient for the smallest size class can be rejected at 1% significance level, indicating that the coefficient for the smallest size class is highly significantly different from those of larger size classes. The equality of the coefficients cannot be rejected for the coefficients for the 20–49 and 50–99 size class pair at any of the usual significance levels, while the equality of the coefficient for the 20–49 and 100+ size class pair and for the 50–99 and100+ size class pair can be rejected at 5% significance level.

4. Empirical analysis

4.1. The framework

In this section, we develop an empirical analysis of the determinants of the observed differences in job flows across countries, industries and size classes. We base our empirical analysis on three important results discussed in the previous section: (i) a significant share of the total variance in job flows observed in the data is explained by industry × size effects, (ii) there is a high correlation of industry × size job flows across countries, and (iii) the other countries in the sample tend to have less variation across industry × size classes in the magnitude of reallocation than the US. The first two results are consistent with the hypothesis that the distribution of idiosyncratic profit shocks affecting desired employment and the costs that influence the adjustment to such shocks vary systematically by industry and size class. For example, demand characteristics in some industries imply that firms in these industries face higher volatility in their product demand than other industries.[18] Likewise, technological characteristics may require more frequent retooling of the production process with the associated need to adjust the workforce. Alternatively, certain technological characteristics may require firms to use highly specialized workers and thus make them less likely to frequently adjust their workforce to respond to idiosyncratic shocks. Demand and technological characteristics also affect the composition of firms within each industry and their response to shocks. For example, some industries are characterized by the presence of small firms, which tend to be more volatile than large businesses in all countries.[19]

As discussed in the previous section, the third result suggests that there are factors that reduce reallocation differences across industry × size classes in other countries relative to the US. Our empirical analysis is designed to identify and quantify such factors. Before proceeding to that empirical analysis, it is instructive to review the insights from the recent literature on adjustment costs and reallocation (see, e.g. Caballero et al., 1997).

Adjustment costs governing responses to idiosyncratic shocks vary not only by industry and size, due to underlying market and technological factors, but also across countries, due to differences in institutions and policy settings. To the extent that institutions vary more by country than industry and size, our working hypothesis is that the impact of institutions that hinder adjustment in any given country will be more binding on industry × size cells with the greatest propensity for reallocation in that country. The amount of job reallocation in a particular sector hence depends on the distribution of productivity shocks and adjustment costs.

[18] This microeconomic evidence is also consistent with an extensive literature that has highlighted the importance of sector-specific shocks to aggregate fluctuations, e.g. Long and Plosser (1987), Horvath (1998).

[19] Different factors contribute to a different volatility of employment across firms of different sizes. On the one hand, fixed adjustment costs that are unrelated to firm size may make the area of inaction larger for small firms compared with larger ones (see e.g. Nilsen et al., 2007). On the other hand, distortions, such as for example credit market imperfections, may force small firms to react more swiftly to shocks (see e.g. Gertler and Gilchrist, 1994).

While these considerations tend to apply to incumbent firms, it is straightforward to extend the argument to include the entry and exit of firms. Indeed, standard models of entry and exit (e.g., Jovanovic, 1982; Hopenhayn and Rogerson, 1993; Melitz, 2003; Asplund and Nocke, 2006) posit that new entrant firms do not know, *ex ante*, their productivity type and must pay an entry fee before learning their type. Firms enter the market until the expected present discounted value of profits from entry is just equal to the entry cost. Firms with low productivity draw exit *ex post*. Higher adjustment costs – including labor adjustment costs – reduce the present discounted value of *ex ante* profits, especially for sectors with a high variance of productivity shocks (for the reasons discussed above). This yields a lower pace of entry as well as an implied lower pace of exit in the steady state. The theoretical model that illustrates this effect most directly is Hopenhayn and Rogerson (1993) who show that policy-induced higher employment adjustment costs lead to a lower pace of job and firm turnover.

4.2. The estimation model

We explore the links between the regulatory environment in which firms operate and job turnover by exploiting the observed industry × size variations through a difference-in-difference approach (see Rajan and Zingales, 1998).[20] The test is constructed as follows: we identify an industry × size propensity for job reallocation from the US data. Under the assumption that regulations in the labor and goods markets in the US are among the least restrictive in our sample, variation in job reallocation across industry × size cells in the US should proxy for the technological and market-driven differences in job reallocation in the absence of policy-induced adjustment costs. Under the additional assumption that these technological and market-driven differences in the demand for job reallocation carry over to other countries, we assess whether industry × size cells that have a greater propensity for job reallocation are disproportionally affected by regulations that raise adjustment costs. This would imply that, ceteris paribus, industry × size cells with more volatile idiosyncratic profit shocks and more frequent adjustment of factors should be more strongly affected by regulations raising adjustment costs than those industry × size cells with less volatile idiosyncratic profit shocks and less frequent adjustment.

Empirical evidence on the impact of labor regulations and job flows at the aggregate level is inconclusive, and indeed, we also do not find significant correlation between hiring and firing regulations and gross job reallocation. Fig. 2 presents the scatter plot relating job reallocation (for manufacturing for which we have the largest country sample) to the index of hiring and firing regulations we describe in the next section. As is apparent from the figure, there is no systematic relationship between job reallocation and the hiring and firing index we use at the country level (the correlation is negative but weak at −0.19, with p-value of 0.47).[21] Instead of exploiting cross-country variation with the host of measurement and omitted variable problems, the advantage of our approach is that we exploit within-country differences between industry × size cells based on the interaction between country and industry × size characteristics. Thus, we can also control for country and industry × size effects, thereby minimizing the problems of omitted variable bias and other mis-specifications.

The core model specifications used in our empirical analysis can be summarized as follows:

$$JFlow_{isc} = \beta_0 + \sum_{is=1}^{I\times S} \gamma_{is} D_{is} + \sum_{c=1}^{C} \gamma_c D_c + \beta_2 (USJFlow_{is} \times R_c) + \epsilon_{isc} \qquad (2)$$

where D_{is} are industry × size *is* ($is = 1,\ldots,I \times S$) dummies, D_c are country c ($c = 1,\ldots,C$) dummies, $USJFlow_{is}$ is the US job flow variable in size class s and industry i, R_c is the variable measuring regulations in country c, and ϵ is the *iid* error term. Controlling for country effects sweeps out any country-specific variation, controlling for industry ×size effects sweeps out the large common factors associated with industry and size, and the key interaction term between the US job flow in the industry × size class and the country regulation allows us to identify how the measured regulatory environment affects the variation across industry × size classes within countries. The US job flow here is used to quantify the propensity for the industry × size class to reallocate and, as discussed, reflects the fundamental driving forces underlying job reallocation across industry × size classes.

While the US is a country with relatively low policy-induced distortions, using it as a benchmark hinges on the assumptions that a particular US industry–size pair is representative of the industry × size's intrinsic need for job reallocation within the set of countries covered in the sample and that it does not reflect idiosyncratic shocks. Our results are robust to using an alternative global benchmark measure not reflecting idiosyncratic factors specific to a given country or regulatory environment as proposed by Ciccone and Papaioannou (2010).[22]

In what follows, the measure of job flows used in the empirical analysis is the sum of job creation and job destruction rates (*sum*).[23] As stressed above, all our variables are time averages over the available annual observations to reduce the possible impact of non-synchronized business cycle fluctuations in the years covered in our analysis. The sample is unbalanced and covers fewer years for some countries than others (see Table A.1). We use the period from 1989 to 2001 for OECD and Latin American countries and sample from 1996 to 2001 for the transition economies. The choice of the restricted subsample for the transition economies is motivated by two interrelated factors. First and as discussed in the previous section, the initial years of the transition process (1991 to 1995) were characterized by unprecedented reallocation of labor – and other factors of production – across industries, firms and locations. The magnitude and direction of the observed flows were only temporary and, indeed, job flows declined towards the standards of the OECD countries over time, and also became more balanced within each industry × size cell.[24] Second, the early years of transition were characterized by major regulatory reforms to conform countries' institutional settings to those of market economies. For these two reasons, focusing on the second half of the 1990s for the transition economies is more appropriate in our comparative analysis of job flows.[25]

In addition to the core specification, we consider some closely related specifications. As a robustness check, we estimate an augmented model that also considers business sector regulations. In addition, we explore specifications that focus on, alternatively, job flows from entry and exit or continuing firms.

[20] The difference-in-difference approach has already been used in the corporate literature (e.g., Classens and Laeven, 2003), in the analysis of firm dynamics (Klapper et al., 2006) and in the analysis of output and employment growth as well as job flows (Micco and Pages, 2007).

[21] Fig. 2 uses a hiring and firing indicator that is not adjusted for enforcement. If we use the indicator that does take enforcement into account, the correlation at the country level becomes more negative but is still largely insignificant (−0.29 with p-value of 0.28). The outcome is similar if we use job reallocation for the total economy: the correlation with the hiring and firing index is −0.24 (with p-value of 0.46), and the correlation with the hiring and firing index adjusted for enforcement is −0.20 (with p-value of 0.53).

[22] See Section 4.5 for more details.

[23] The results are largely unaffected by the use of excess job reallocation, that is, the difference between the sum and the (absolute value of) net employment change. These results are available in the web appendix at http://www.helenasch.net.

[24] Results for the whole sample for transition economies are available in the Web appendix at http://www.helenasch.net.

[25] In any event, in the sensitivity analysis in Section 4.5, we exclude each country in turn to assess the robustness of our empirical results to the country sample composition.

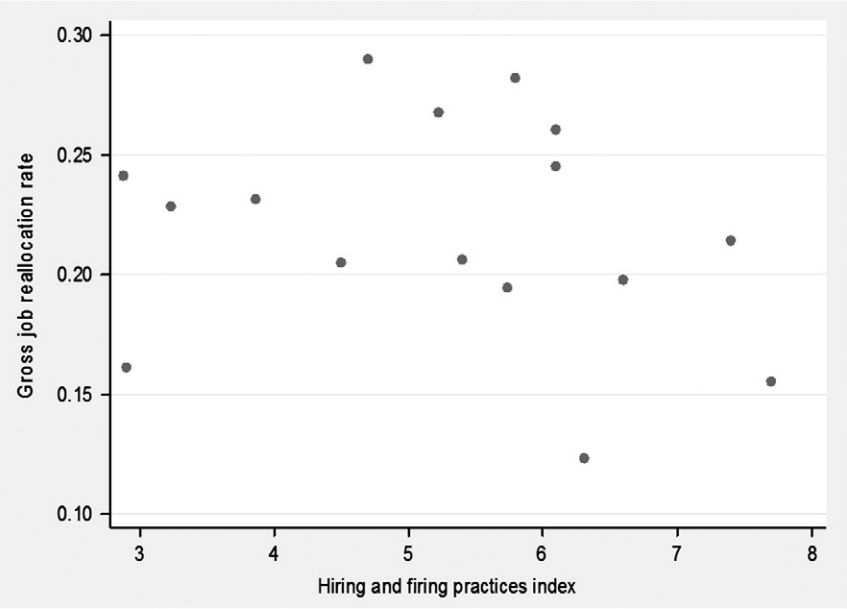

Fig. 2. Scatterplot of hiring and firing regulations versus gross job reallocation, manufacturing.
Source: Own calculations based on harmonized firm-level database and Gwartney et al. (2005); see main text for details.

4.3. Regulations in labor and product markets

In the empirical analysis, we consider synthetic indicators of the stringency of regulations in the labor and product markets, as well as the degree of enforcement of laws and regulations. Our primary source for these is the "Economic Freedom of the World (EFW)" database (see Gwartney et al., 2005). This database has been developed under the auspices of the Fraser Institute in Canada with the aid of a worldwide network of economists and research institutes. In particular, we use indicators referring to hiring and firing regulations, regulation of business activities and integrity of the legal system.

Other indicators of the stringency of labor regulations in developing and emerging economies are available in the literature (e.g., the World Bank Doing Business database), but they generally refer to the most recent past and may thus not properly capture the regulatory environment over the period covered by our data (the 1990s). By contrast, the EFW tracks changes in regulations over time and is thus more suitable for our analysis of job flows that have indeed been influenced by policy changes over the period covered by our data (see Table C.1 for more detailed definitions of the variables used in our analysis and Table C.2 for their summary statistics).

The EFW indicator of hiring and firing regulations is measured on a scale of 0 to 10, with 10 being the worst (most restrictive). The average of this indicator is the highest in transition countries (5.70), followed by the OECD sample (5.43) and Latin America (4.68). This synthetic indicator passes simple validation tests. For example, its correlation with a similar indicator of employment protection legislation developed by the OECD is 0.85, statistically significant at the 1% level.[26]

In the sensitivity analysis, we also consider an EFW synthetic indicator of regulations in the product market. Regulations affecting markets for goods and services have a strong impact on the degree of competition and the pace and effectiveness of reallocation of resources, including labor. Thus, more restrictive regulations that stifle product market competition are also likely to influence job flows. The business regulation indicator is a simple average of five different indicators[27] that are designed to identify the extent to which regulatory restraints and bureaucratic procedures limit competition and the operation of goods and services markets. Business regulation is measured on a scale from 0 to 10, with 10 being the most restrictive. This indicator is on average the highest in Latin America (4.21), followed by transition countries (3.32) and OECD countries (3.07).

Previous research (see, e.g., Caballero et al., 2004; Heckman and Pages, 2004) suggests that the degree of enforcement of labor regulations – as well as other regulations – can significantly affect their impact on the economy. Available indicators suggest a significant variation in the rules of law and the degree of enforcement of laws and regulations in our sample of OECD, Latin American and transition economies. Not only are some firms and jobs not registered in Latin America and increasingly in the transition economies and some southern European countries, registered firms may also not fully comply with the existing rules and regulations. As an indication of the different degrees of enforcement of laws and regulations, we consider the EFW law and order indicator (based on the Political Risk Component I (Law and Order) from the International Country Risk Guide, ranging from 0 to 10, 10 being the worst).[28] The indicator shows the highest compliance with laws and regulations in the OECD sample of countries (average of 0.47), followed by the transition economies (average of 1.76), and by the Latin American countries (average of 4.95).

[26] We check the robustness of our results by using an alternative measure of employment protection legislation, the OECD EPL index. Since this measure is not available for Latin America and transition countries in the 1990s, we augmented it in two ways. First, for transition countries we used data on EPL collected by Haltiwanger et al. (2003). Second, for Latin America we imputed EPL by regressing a measure of hiring and firing regulations from the EFW on EPL for transition and OECD countries and then using the estimated coefficient to calculate EPL. EPL is measured on a scale from 0 to 4, with 4 being the worst (most restrictive). It is on average the strictest in OECD (2.35) and the least strict in Latin America (1.73).

[27] The detailed indicators used to construct the synthetic indicator are: price controls, administrative conditions and new business, time with government bureaucracy, starting a new business, and irregular payments.

[28] Micco and Pages (2007) also make an attempt at controlling for different degrees of enforcement of regulations by using an indicator of rules of laws and government effectiveness (see Kaufmann et al., 2004). We used the EFW index of law and order because it is available for the time period for which our job flows data are available for the different countries.

To control for possibly differing degrees of enforcement of laws and regulations we adjust our regulatory variable as follows[29]:

$$R_{c,adj} = \left(1 - \frac{Law\&Order}{10}\right) \times R_c, \quad (3)$$

and the core model specification from Eq. (2) is modified to reflect this as follows:

$$JFlow_{isc} = \beta_0 + \sum_{is=1}^{I\times S} \gamma_{is} D_{is} + \sum_{c=1}^{C} \gamma_c D_c + \beta_2 \left(USJFlow_{is} \times R_{c,adj}\right) + \epsilon_{isc}. \quad (4)$$

4.4. Regulations and job flows

Tables 4 and 5 present the empirical results of our policy-augmented job flow regressions. We use a difference-in-difference analysis by focusing on the variation of job flows across industry × size classes within each country. The estimated coefficient on the interaction between the US job flow and the enforcement-adjusted hiring and firing regulations (Table 4) is strongly significant overall, and in each of the subregions when we allow the coefficient of the interaction to vary. Intrinsically more volatile industries and size classes present lower levels of gross job turnover relative to the less volatile industries and size classes in countries with more stringent hiring and firing regulations. It should be stressed that the results are broadly robust to the use of hiring and firing regulations that are not adjusted for the degree of enforcement. We have also estimated our preferred specification – column (1) in Table 4 – separately for job creation and job destruction. The estimated coefficients are negative and significant at 1% for both, but the absolute magnitude is largest for job creation (i.e., the estimated coefficient in the job creation equation is −0.132 (standard error 0.027) and in the job destruction equation it is −0.085 (standard error 0.015)).

How sizeable is the estimated impact of hiring and firing regulations on job flows? Using the coefficient on the interaction term in column (1) of Table 4, we estimate that the difference in job reallocation in the industry × size cells with a high flexibility requirement (90th percentile of the flexibility distribution in the US, corresponding to a gross job turnover of 40.2%) and industry × size cells with a low flexibility requirement (10th percentile of the same distribution, corresponding to a gross job turnover of 13.2%) will be cut by about one half (14.3 percentage points) in a country at the 90th percentile of the index of hiring and firing regulations (such as Slovenia or Portugal) compared with a country at the 10th percentile of the hiring and firing regulations (such as USA or UK).[30]

There are a number of reasons why it is important to assess the robustness of our results on labor (hiring and firing) regulations to the inclusion of regulations in product markets. First, the exclusion of product market regulations may lead to an omitted variable bias insofar as regulations in different markets tend to be highly correlated, i.e. countries that impose strict rules of hiring and firing also tend to impose more restrictive regulations on the goods and services markets.[31]

Table 4
Job flows and the role of labor regulations (difference-in-difference analysis).
Source: Own calculations based on harmonized firm-level database.

	(1)	(2)
USA SUM × EPL (Adj)	−0.1052***	
	[0.0149]	
USA SUM × EPL (Adj) × EU		−0.0890***
		[0.0128]
USA SUM × EPL (Adj) × transition		−0.0689***
		[0.0206]
USA SUM × EPL (Adj) × LAC		−0.0561***
		[0.0237]
Country effects	Yes	Yes
Industry × size effects	Yes	Yes
Observations	940	940
Adjusted R-squared	0.87	0.87

All regressions are weighted by the total employment in each country, industry and size cell and include an intercept. Omitted country is Slovenia and omitted industry × size is food products, beverages and tobacco sector with <20 workers size class. Robust standard errors in brackets. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. USA SUM: industry × size job reallocation in the US. EU denotes the OECD European countries. Transition denotes the countries in central and eastern Europe. LAC denotes the countries in Latin America. EPL (Adj) is an indicator of stringency of hiring and firing regulations adjusted to take into account different degrees of enforcement of regulations (see main text).

There are also specific aspects of product market regulations that can influence job flows over and above labor regulations. For example, since a significant fraction of overall job flows is due to the entry and exit of firms, regulations affecting the start-up of a new business, as well as bankruptcy rules that affect the exit of low performing units, may affect job flows directly and the way incumbents react to strict labor regulations. Koeniger and Prat (2007), for example, argue that product and labor market regulations are complementary: by isolating incumbents from the competition of potential entrants, barriers to entry allow incumbents to bear the firing costs more easily. Likewise,

Table 5
Job flows and the role of labor and product market regulations (difference-in-difference analysis).
Source: Own calculations based on harmonized firm-level database.

	(1)	(2)
USA SUM × EPL (Adj)	−0.1220***	
	[0.0228]	
USA SUM × EPL (Adj) × EU		−0.0945***
		[0.0271]
USA SUM × EPL (Adj) × transition		−0.0779**
		[0.0379]
USA SUM × EPL (Adj) × LAC		−0.2846***
		[0.0928]
USA SUM × Bus. Reg. (Adj)	0.0399	
	[0.0323]	
USA SUM × Bus. Reg. (Adj) × EU		0.0201
		[0.0385]
USA SUM × Bus. Reg. (Adj) × transition		0.0301
		[0.0725]
USA SUM × Bus. Reg. (Adj) × LAC		0.2918**
		[0.1153]
Country effects	Yes	Yes
Industry × size effects	Yes	Yes
Observations	940	940
Adjusted R-squared	0.87	0.87

All regressions are weighted by the total employment in each country, industry and size cell and include an intercept. Omitted country is Slovenia and omitted industry × size is food products, beverages and tobacco sector with <20 workers size class. Robust standard errors in brackets. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. USA SUM: industry × size job reallocation in the US. EU denotes the OECD European countries. Transition denotes the countries in central and eastern Europe. LAC denotes the countries in Latin America. EPL (Adj) is an indicator of stringency of hiring and firing regulations adjusted to take into account different degrees of enforcement of regulations. Bus. Reg. (Adj) is an indicator of stringency of business regulations adjusted to take into account different degrees of enforcement of regulations (see main text).

[29] There is no indication in Gwartney et al. (2005) that the original regulatory variables consider the enforcement of regulations in addition to the statutes.

[30] The estimated value is obtained as follows:

$$\beta\left[\left(USJFlow^{90^{th}} - USJFlow^{10^{th}}\right)\left(R_{adj}^{90^{th}} - R_{adj}^{10^{th}}\right)\right]$$

where β is the estimated coefficient, *USJFlow* and R_{adj} are the job reallocation in the US and the indicator of hiring and firing regulations corrected for the degree of enforcement, respectively. Micco and Pages (2007), using a difference-in difference-approach, also estimated a similar effect - that is to say, a cut by about one half of the difference between the job flows of the industries with high flexibility requirements and those with low flexibility requirements by moving from a country with low to a country with high hiring and firing regulations. Their country sample and period of observation are different from ours.

[31] There is also ample evidence that regulations in product and labor market tend to be correlated across countries (see e.g. Nicoletti and Scarpetta, 2005).

regulations affecting price-setting by firms and their relations with the public administration and their clients can all influence incentives for firms to expand, adopt new technologies and adjust their workforce.

To assess the robustness of our empirical results we thus augment our job flows specification by adding a synthetic indicator of the stringency of business sector regulations. As for labor regulations, we adjust this variable for the degree of enforcement (Table 5) and interact it with the US gross job reallocation.[32] The estimated effects of labor regulations on job flows remain strongly significant overall and in the different regions. By contrast, the estimated coefficient of business regulations is estimated with a large standard error overall. When we differentiate the coefficient by region, we find that the estimated effect of business regulations is even positive and significant for Latin American countries.[33]

A related possibility is that there is an interaction effect operating between labor market regulation and product market regulation. In unreported results (available upon request), we included the interaction between enforcement-adjusted labor market regulation and product market regulation in our preferred specification (column (1), Table 4). When we include the interaction alone as the policy indicator, i.e., without underlying separate effects for labor market and product market regulation, the estimated coefficient is negative and significant at 1% level of significance. However, when we include the two underlying policy variables as well as the interaction in the specification, i.e., the enforcement-adjusted labor and product market regulation indicators, each interacted with US job reallocation, the coefficient on the policy-interaction variable is no longer significant. Instead, the estimated coefficient on US job reallocation interacted with enforcement adjusted labor market regulation is negative and significant at 1% level of significance (as in the original specification).

So far we have focused on the effects of labor regulations on overall job reallocation. It is also interesting to shed some light on whether such regulations have a different impact on the different margins of reallocation, namely on job flows due to the entry and exit of firms in the market and those due to reallocation among incumbents (see Table 6).[34]

Column (1) of Table 6 shows the results of estimating the job flow regressions for entering and exiting firms, controlling for labor market regulations corrected by the degree of enforcement. Column (2) does the same for continuing firms. The results suggest a negative and statistically significant effect of labor market regulation (interacted with US job reallocation) on labor mobility generated by both entering and exiting firms as well as continuing firms, although labor market regulations have a stronger estimated effect on the labor mobility generated by entry/exit than on that generated by continuers.[35]

Table 6
Job flows by entering, exiting and continuing firms — the role of labor market regulations (difference-in-difference analysis).
Source: Own calculations based on harmonized firm-level database.

	Entry and exit	Continuers
	(1)	(2)
USA SUM (entry and exit) × EPL (Adj)	−0.1100***	
	[0.0165]	
USA SUM (continuers) × EPL (Adj)		−0.0513**
		[0.0252]
Country effects	Yes	Yes
Industry × size effects	Yes	Yes
Observations	920	934
Adjusted R-squared	0.89	0.78

All regressions are weighted by the total employment in each country, industry and size cell and include an intercept. Omitted country is Slovenia and omitted industry × size is food products, beverages and tobacco sector with <20 workers size class. Robust standard errors in brackets. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. USA SUM (entry and exit): industry × size job reallocation due to entering and exiting firms in the US. USA SUM (continuers): industry × size job reallocation due to continuing firms in the US. EPL (Adj) is an indicator of stringency of hiring and firing regulations adjusted to take into account different degrees of enforcement of regulations (see main text).

Overall, these results confirm the importance of labor market regulations in shaping labor adjustment patterns, particularly so in those industries and size classes where technological and market factors require more frequent employment changes. Controlling for other regulations influencing firm behavior does not significantly alter the results. There is also evidence in our data that labor market regulations are more important for entering and exiting firms than for continuing firms.

4.5. Sensitivity analysis

In the empirical analysis, we control for country and industry × size effects, as well as for unobservable effects using a difference-in-difference approach. Moreover, we test the robustness of results for hiring and firing regulations by including other regulatory variables. In addition, we test the sensitivity of our results by using excess job reallocation instead of gross job reallocation, restricting our analysis to industry × size cells with more than five firms in a given cell and to manufacturing industries only (not reported here but available on request). However, the results could be affected in two additional ways. First, the use of quasi panel data may still run the risk that results are affected by the inclusion of a specific country or industry in the sample that drives the results in a given direction. The use of an unbalanced panel on the industry dimension makes this risk potentially more serious. Second, the use of industry × size characteristics in the US (benchmark country) as a proxy for the technological and market-driven differences in job reallocation in the absence of policy-induced adjustment costs introduces a measurement error which can result in either attenuation (a bias toward zero) or amplification biases. The attenuation bias could arise because of measurement errors in the US job flow data. However, benchmarking industry × size job flows in the US may also lead to an amplification bias to the extent they may be a better proxy for industry × size characteristics in similar countries. We address these two issues in turn.

4.5.1. Robustness of results to changes in the sample

To test for the robustness of results to changes in the sample, we re-estimate our preferred specification – column (1) in Table 4 – removing one country, or one industry, at a time from the sample. The results in Fig. 3 show a remarkable stability of the estimated coefficient for the interaction term to changes in the sample along the country or the industry dimension. The point coefficient estimates for the interaction term are always negative and statistically significant. The coefficient is somewhat sensitive to the exclusion of France, Italy and Mexico among countries and the trade and restaurant sector, with all leading

[32] We have also used US employment-weighted firm turnover rather than US job flows as the industry × size interacting factor: the results are largely similar to those reported in the paper and are available on request. We find some sensitivity in the specifications that also interact with region dummies but the robustness of the labor regulations holds in this alternative.

[33] There are models that yield a positive relationship between business regulations impacting entry and exit and job turnover. For example, Koeniger and Prat (2007) have a model with both intensive and extensive (i.e. through firm entry and exit) margins of adjustment, and fixed and/or start-up costs imposed by product market regulations. They find that product market regulations lead to higher job turnover, as the competition for workers is alleviated by the firm selection effect, the costs of adjusting the labor force decrease and thus firms have less incentive to smooth out their labor demand schedule.

[34] We focus on the combined flows due to entry and exit of firms because of the very high correlations between entry and exit across industries in most countries. This in turn suggests that entry and exit are largely part of a creative destruction process in which entry and exit reflect within industry reallocation reflecting idiosyncratic differences across firms within industries (see Bartelsman et al., 2004 for evidence based on the same dataset used in this paper, as well as Geroski, 1991; Baldwin and Gorecki, 1991).

[35] In Table 6, we use the US job reallocation due to entry and exit as the propensity for reallocation due to entering and exiting firms and the US job reallocation due to continuers as the propensity for reallocation due to continuers. We have also considered alternative specifications where for both propensities we use the overall job reallocation for the industry × size class and obtain very similar results. We also estimate the job flow regressions for entering and exiting firms separately and find that labor market regulations affect both entry and exit margins.

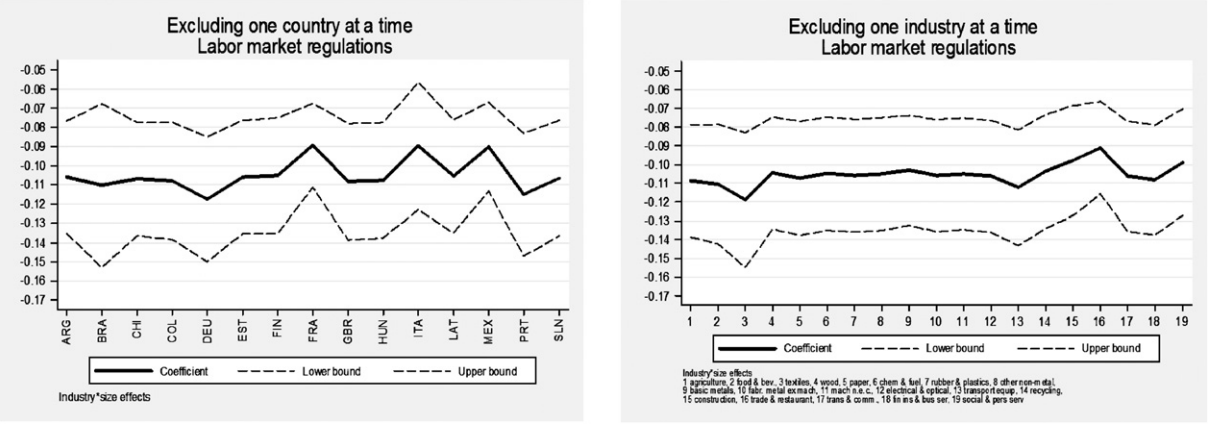

Fig. 3. Sensitivity analysis: Estimated Coefficient on enforcement adjusted hiring and firing regulations interacted with US job reallocation and 95% confidence intervals, excluding one country or one industry at a time, labor market regulations (column (1) from Table 4).
Source: Own calculations based on harmonized firm-level database.

to a slightly weaker (but still statistically significant) estimated effect of regulations.

4.5.2. Robustness of results to using an alternative benchmark

To address the potential source of bias resulting from the use of the US as the benchmark for the industry × size characteristics, we used an alternative approach proposed by Ciccone and Papaioannou (2010) to estimate the industry × size intrinsic job flow instead of using US industry × size job flow as a benchmark. In particular, we estimate the technological and market-driven (i.e. in the absence of policy-induced distortions) industry × size job flow rates by regressing job flow rates measured at a detailed industry × size level on country dummies, industry × size dummies and country-level enforcement adjusted regulation interacted with industry × size dummies using data for all countries except the US:

$$JFlow_{isc} = \sum_{c=1}^{C} \gamma_c D_c + \sum_{is=1}^{I\times S} \gamma_{is} D_{is} + \sum_{is=1}^{I\times S} \beta_{is}\left(D_{is} \times R_{c,adj}\right) + \nu_{isc} \quad (5)$$

where γ_{is} captures the extent of industry × size job flow in a country not subject to regulations, which is subject to world average supply and demand shocks. We then obtain the estimate of global job flow as predicted job flow in a country with low enforcement-adjusted regulations (in practice, US):

$$\widehat{JFlow^{*}_{is}} = \sum_{is=1}^{I\times S} \widehat{\gamma_{is}} D_{is} + \sum_{is=1}^{I\times S} \widehat{\beta_{is}}\left(D_{is} \times R_{US,adj}\right). \quad (6)$$

Returning to the main specification Eq. (4), we instrument $USJFlow_{is} \times R_{c,adj}$ with $\widehat{JFlow^{*}_{is}} \times R_{c,adj}$, using 2SLS. In the corresponding first stage, we do a least-squares regression of $USJFlow_{is} \times R_{c,adj}$ on country fixed effects, industry × size fixed effects and $\widehat{JFlow^{*}_{is}} \times R_{c,adj}$.

Regressions presented in Table 4 are replicated using the Ciccone and Papaioannou (2010) approach in Table 7.[36] Our main results are very robust to using this alternative benchmark with the absolute size of the coefficient in column (1) being about 30% higher than the absolute size of the corresponding coefficient in Table 4. Using the coefficient on the interaction term in column (1) of Table 7, the difference in job reallocation in the industry × size cells with a high flexibility requirement (90th percentile of the flexibility distribution of the alternative benchmark job reallocation measure) and industry × size cells with a low flexibility requirement (10th percentile of the flexibility distribution of the alternative job reallocation measure) will be reduced by about 18.7 percentage points in a country at the 90th percentile of the index of hiring and firing regulations compared with a country at the 10th percentile of the hiring and firing regulations. The magnitude of the impact is about 4.3 percentage points higher than the one based on Table 4.

5. Conclusion

This paper exploits a rich, new database with harmonized indicator data on job flows across industries and size classes for 16 industrial and emerging economies over the past decade. We find that all countries in our sample exhibit sizable annual gross job flows. Industry and size-class effects together account for a very large share of the overall variability in job flows across country, industry and size class cells (over 50%). Interestingly, the most important factor here is the employer size. Small businesses exhibit a substantially higher pace of job creation and destruction and this pattern is pervasive across industries and countries. Industry effects also play a significant, albeit much smaller, role in shaping job flows. Taken together, it is clear that some form of

Table 7
Job flows and the role of labor regulations (difference-in-difference analysis) 2SLS estimates.
Source: Own calculations based on harmonized firm-level database.

	(1)	(2)
USA SUM × EPL (Adj)	−0.1369***	
	[0.0090]	
USA SUM × EPL (Adj) × EU		−0.1218***
		[0.0104]
USA SUM × EPL (Adj) × transition		−0.1020***
		[0.0193]
USA SUM × EPL (Adj) × LAC		−0.0956***
		[0.0195]
Country effects	Yes	Yes
Industry × size effects	Yes	Yes
Observations	940	940
R-squared	0.88	0.88

*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. See note to Table 4 for details on these regressions. Interactions between enforcement adjusted hiring and firing regulations and intrinsic industry × size job reallocation (US job reallocation) are instrumented with interactions between estimated global (non-US) industry × size job reallocation and enforcement adjusted hiring and firing regulations, following the Ciccone and Papaioannou (2010) approach as described above (see Eq. (6)).

[36] In the first stage, the point estimate on $\widehat{Flow^{*}_{is}} \times R_{c,adj}$ is 1.01 with a t-statistic of 53.52 and $R^2 = 0.99$.

technology, cost and demand factors that are common across countries account for the bulk of the variation in job flows. Nevertheless, even after controlling for industry/technology and size factors, there remain significant differences in job flows across countries that could reflect differences in business environment conditions.

Our harmonized indicators dataset allows us to look at two factors shaping the business environment — regulations on the hiring and firing of workers and product market regulations. To minimize the possible endogeneity and omitted variable problems associated with cross-country regressions, we use a difference-in-difference approach. The empirical results suggest that stringent hiring and firing regulations (and their consistent enforcement) reduce job turnover, especially in industry and size-class cells that inherently exhibit more job turnover. To capture the latter, we use the US patterns as a benchmark to identify and quantify industry × size class cells with inherently higher job turnover. Labor regulations also appear to distort the patterns of flows across industry and size classes within a country. Stringent labor regulations reduce both the intensive (continuing firms) and extensive (entry/exit) margins of job creation and destruction. The larger quantitative impact is on the extensive margin. The importance of the extensive margin highlights both the importance of having job flow measures inclusive of entry and exit and for being able to distinguish between the extensive and intensive margins. Controlling for product market regulations does not alter these results significantly. The results are robust to changes in the sample as well as to using an alternative estimation approach with a global benchmark rather than using the US as a benchmark.

Much work remains to be done to understand the implications of our findings. The results provide evidence that stringent labor regulations have an impact on reallocation dynamics. It is a much larger step to demonstrate that stringent labor regulations have an adverse impact on the efficient allocation of labor in a manner consistent with the predictions of Hopenhayn and Rogerson (1993). To explore the latter, we need to measure not only reallocation but also productivity at the micro level. A number of studies have found that allocative efficiency is important for understanding differences in the level and growth of productivity across time, industries and countries (see, e.g., Foster et al., 2001; Bartelsman et al., 2009). Putting those findings together with those in this paper certainly suggests that stringent labor market regulations may have an important adverse impact on allocative efficiency and in turn productivity levels and growth. However, much work (including additional data infrastructure development) is needed to bring all of the pieces together to explore these important issues.

Appendix A

Table A.1
Data sources used for firm demographics and job flows.

Country	Source	Period	Max. industry coverage (number of industries)	Threshold
OECD				
Finland	Business register	1988–1998	All (17)	Emp ≥ 1
France	Fiscal database	1989–1997	All (17)	Turnover: Man: Euro 0.58 m Serv: Euro 0.17 m
Germany (west)	Social security	1977–1999	All but civil service, self employed (11)	Emp ≥ 1
Italy	Social security	1986–1994	All (19)	Emp ≥ 1
Portugal	Employment-based register	1983–1998	All but public administration (19)	Emp ≥ 1
United Kingdom	Business register	1980–1998	Manufacturing (10)	Emp ≥ 1
US	Business register	1988–1997	Private businesses (19)	Emp ≥ 1
LAC				
Argentina	Register, based on integrated System of pensions	1995–2002	All (19)	Emp ≥ 1
Brazil	Census	1996–2001	Manufacturing (13)	Emp ≥ 1
Chile	Annual industry Survey (ENIA)	1979–1999	Manufacturing (13)	Emp ≥ 10
Colombia	Annual manufacturing Survey (EAM)	1982–1998	Manufacturing (13)	Emp ≥ 10
Mexico	Social security	1985–2001	All (17)	Emp ≥ 1
Transition				
Estonia	Business register	1995–2001	All (19)	Emp ≥ 1
Hungary	Fiscal register (APEH)	1992–2001	All (19)	Emp ≥ 1
Latvia	Business register	1996–2002	All (18)	Emp ≥ 1
Slovenia	Business register	1992–2001	All (19)	Emp ≥ 1

Table A.2
List of industries used in the analysis.

OECD STAN industry name	ISIC Rev.3 Code
Agriculture, hunting, forestry and fishing	1–5
Food products, beverages and tobacco	15–16
Textiles, textile products, leather and footwear	17–19
Wood and products of wood and cork	20
Pulp, paper, paper products, printing and publishing	21–22
Chemicals and fuel	23–24
Rubber and plastics products	25
Other non-metal mineral products	26
Basic metals	27
Fabricated metal products except machinery and equipment	28
Machinery and equipment, n.e.c.	29
Electrical and optical equipment	30–33
Transport equipment	34–35
Recycling	37
Construction	45
Wholesale and retail trade, restaurants and hotels	50–55
Transport, storage and communications	60–64
Financial, insurance, real estate and business services	65–74
Community, social and personal services	75–99

Table B.1
Average job flows in the 1990s, overall and by region, total economy (unbalanced panel). Source: Own calculations based on harmonized indicators database.

Variable	Obs	Mean	Std. Dev.	Min	Max
Overall					
Job creation rate	1048	0·147	0·067	0·000	0·647
Job destruction rate	1048	0.131	0.062	0.000	0.419
Net employment growth	1048	0.015	0.065	−0.299	0.419
Job reallocation rate	1048	0.278	0.112	0.000	0.875
Excess job reallocation rate	1048	0.231	0.098	0.000	0.732
Job creation rate (entry)	1048	0.055	0.043	0.000	0.357
Job destruction rate (exit)	1048	0.046	0.029	0.000	0.216
OECD					
Job creation rate	448	0.127	0.046	0.033	0.288
Job destruction rate	448	0.127	0.060	0.029	0.411
Net employment growth	448	0.000	0.046	−0.282	0.148
Job reallocation rate	448	0.254	0.096	0.072	0.57
Excess job reallocation rate	448	0.223	0.085	0.058	0.472
Job creation rate (entry)	448	0.045	0.030	0.003	0.195
Job destruction rate (exit)	448	0.045	0.028	0.000	0.216

(continued on next page)

Table B.1 (*continued*)

Variable	Obs	Mean	Std. Dev.	Min	Max
LAC					
Job creation rate	300	0.148	0.061	0.033	0.431
Job destruction rate	300	0.140	0.066	0.041	0.419
Net employment growth	300	0.008	0.053	−0.214	0.286
Job reallocation rate	300	0.288	0.114	0.086	0.785
Excess job reallocation rate	300	0.248	0.103	0.066	0.732
Job creation rate (entry)	300	0.056	0.040	0.000	0.227
Job destruction rate (exit)	300	0.053	0.032	0.003	0.152
Transition					
Job creation rate	300	0.174	0.088	0.000	0.647
Job destruction rate	300	0.128	0.061	0.000	0.385
Net employment growth	300	0.046	0.087	−0.299	0.419
Job reallocation rate	300	0.303	0.123	0.000	0.875
Excess job reallocation rate	300	0.227	0.109	0.000	0.608
Job creation rate (entry)	300	0.070	0.056	0.000	0.357
Job destruction rate (exit)	300	0.039	0.025	0.000	0.135

Table C.1
Definitions of institutional variables.

Variable	Definition
Hiring and Firing regulations	Flexibility in hiring and firing (5B(ii)) from EFW, hiring and firing restrictions of companies are determined by private contract (World Economic Forum: Global Competitiveness Report); scale [0,10], 10 being the worst.
Business regulations	Regulation of business activities (5c) from EFW (World Economic Forum: Global Competitiveness Report); scale [0,10], 10 being the worst.
Law and order	Integrity of Legal System (2e) from EFW, which is based on Political Risk Component I (Law and Order) from the International Country Risk Guide; scale [0,10], 10 being the worst.

Table C.2
Institutional variables, 1990s.
Source: Own calculations based on harmonized firm-level database and Gwartney et al. (2005).

Variable	Mean	Std. Dev.	Min	Max
Overall				
Hiring and firing regulations	5.261	1.515	2.878	7.700
Law and order adj. Hiring and Firing Regulations	4.113	2.019	0.000	7.209
Business regulations	3.490	1.389	1.100	5.900
Law and order adj. business regulations	2.490	1.233	0.000	4.600
Law and order	2.280	2.818	0.000	10.000
OECD				
Hiring and firing regulations	5.427	1.804	2.878	7.400
Law and order adj. hiring and firing regulations	5.084	1.559	2.878	6.600
Business regulations	3.074	1.682	1.100	5.600
Law and order adj. business regulations	2.822	1.349	0.000	4.600
Law and order	0.469	1.121	0.000	3.000
LAC				
Hiring and firing regulations	4.679	0.943	3.230	5.740
Law and order adj. hiring and firing Regulations	2.249	1.642	0.000	4.431
Business regulations	4.206	1.297	2.617	5.900
Law and order adj. business regulations	1.811	1.321	0.000	3.320
Law and order	5.230	3.175	2.280	10.000
Transition				
Hiring and firing regulations	5.696	1.705	3.586	7.700
Law and order adj. hiring and firing regulations	4.742	1.846	3.079	7.209
Business regulations	3.323	0.669	2.650	4.200
Law and order adj. business regulations	2.757	0.716	1.776	3.486
Law and order	1.763	1.119	0.637	3.300

References

Asplund, Marcus, Nocke, Volker, 2006. Firm turnover in imperfectly competitive markets. Rev. Econ. Stud. 73 (2), 295–327.

Baldwin, John R., Gorecki, P.K., 1991. Entry, exit and productivity growth. In: Geroski, Paul A., Schwalbach, Joachim (Eds.), Entry and Market Contestability: An International Comparison. Blackwell, Oxford, pp. 244–256.

Bartelsman, Eric J., Haltiwanger, John C., Scarpetta, Stefano, 2004. Microeconomic evidence of creative destruction in industrial and developing countries. IZA Working Paper No. 1374. (October). Available at: http://www.ftp.iza.org/dp1374.pdf. Last accessed: September 11, 2012.

Bartelsman, Eric J., Haltiwanger, John C., Scarpetta, Stefano, 2009. Measuring and analyzing cross-country differences in firm dynamics. In: Dunne, Timothy, Bradford Jensen, J., Roberts, Mark J. (Eds.), Producer Dynamics: New Evidence from Micro Data. NBER.

Bentolila, Samuel, Bertola, Giuseppe, 1990. Firing costs and labor demand: how bad is eurosclerosis? Rev. Econ. Stud. 57 (3), 381–402 (July).

Bertola, Giuseppe, Rogerson, Richard, 1997. Institutions and labor reallocations. Eur. Econ. Rev. 41 (6), 1147–1171 (June).

Boeri, Tito, 1999. Enforcement of employment security regulations, on-the-job search and unemployment duration. Eur. Econ. Rev. 43 (1), 65–89 (January).

Caballero, Ricardo J., Hammour, Mohamad L., 2000. Institutions, restructuring, and macroeconomic performance. NBER Working Paper No. 7720 (May). Available at: http://www.nber.org/papers/w7720. Last accessed: September 11, 2012.

Caballero, Ricardo J., Engel, Eduardo M.R.A., Haltiwanger, John C., 1997. Aggregate employment dynamics: building from microeconomic evidence. Am. Econ. Rev. 87 (1), 115–137.

Caballero, Ricardo J., Cowan, Kevin N., Engel, Eduardo M.R.A., Micco, Alejandro, 2004. Effective labor regulation and microeconomic flexibility. NBER Working Paper No. 10744 (September).

Ciccone, Antonio, Papaioannou, Elias, 2010. Estimating Cross-industry cross-country models using benchmark industry characteristics. CEPR Discussion Paper No. 8056 (October). Available at: https://sites.google.com/site/papaioannouelias/research/working-papers. Last accessed: June 6, 2013.

Classens, Stijn, Laeven, Luc, 2003. Financial development, property rights and growth. J. Financ. 58 (6), 2401–2436 (December).

Davis, Steven J., Haltiwanger, John C., 1999. On the driving forces behind cyclical movements in employment and job reallocation. Am. Econ. Rev. 89 (5), 1234–1258 (December).

Davis, Steven J., Haltiwanger, John C., Schuh, Scott, 1996. Job Creation and Destruction. The MIT Press, Cambridge, Massachusetts. 260 pages.

Dunne, Timothy, Roberts, Mark J., Samuelson, Larry, 1988. Patterns of firm entry and exit in U.S. manufacturing industries. RAND J. Econ. 19 (4), 495–515 (Winter).

Dunne, Timothy, Roberts, Mark J., Samuelson, Larry, 1989. Plant turnover and gross employment flows in the U.S. manufacturing plants. J. Labor Econ. 7 (1), 48–71 (January).

EUROSTAT, 1998. Enterprises in Europe, data 1994–95. Fifth Report of the Eropean Comission. EUROSTAT, Luxembourg.

Foster, Lucia, Haltiwanger, John C., Krizan, C.J., 2001. Aggregate productivity growth: lessons from microeconomic evidence. In: Dean, Edward, Harper, Michael, Hulten, Charles (Eds.), New Developments in Productivity Analysis. University of Chicago Press.

Foster, Lucia, Haltiwanger, John C., Krizan, C.J., 2002. The link between aggregate and micro productivity growth: evidence from retail trade. NBER Working Paper No. 9120. Available at: http://www.nber.org/papers/w9120. Last accessed: September 11, 2012.

Foster, Lucia, Haltiwanger, John C., Krizan, C.J., 2006. Market selection, reallocation, and restructuring in the U.S. retail trade sector in the 1990s. Rev. Econ. Stat. 88 (4), 748–758 (November).

Geroski, Paul A., 1991. Market Dynamics and Entry. Basil Blackwell, Oxford, UK, Cambridge, USA. 306 pages.

Geroski, Paul A., 1995. What do we know about entry? Int. J. Ind. Organ. 13 (4), 421–440.

Gertler, Mark, Gilchrist, Simon, 1994. Monetary policy, business cycles, and the behavior of small manufacturing firms. Q. J. Econ. 109 (2), 309–340 (May).

Griliches, Zvi, Regev, Haim, 1995. Firm productivity in Israeli industry 1979-1988. Econometrica 65 (1), 175–203.

Gwartney, James, Lawson, Robert, Gartzke, Erik, 2005. Economic Freedom of the World. 2005 Annual Report. The Fraser Institute, Vancouver, B.C. Available at: http://www.freetheworld.com/2005/2005_Full_Report.pdf. Last accessed: September 11, 2012.

Haltiwanger, John C., Scarpetta, Stefano, Vodopivec, Milan, 2003. How Institutions Affect Labor Market Outcomes: Evidence from Transition Countries. Mimeo (April).

Haltiwanger, John C., Scarpetta, Stefano, Schweiger, Helena, 2006. Assessing job flows across countries: the role of industry, firm size and regulations. IZA Discussion Paper No. 2450. Available at: http://ftp.iza.org/dp2450.pdf. Last accessed: September 11, 2012.

Haltiwanger, John C., Jarmin, Ron S., Miranda, Javier, 2013. Who creates jobs? Small vs. large vs. young. Rev. Econ. Stat. 95 (2), 347–361 (August).

Heckman, James J., Pages, Carmen (Eds.), 2004. Law and Employment: Lessons from Latin America and the Carribean. NBER Conference Series Report. University of Chicago Press, Chicago and London.

Hopenhayn, Hugo, Rogerson, Richard, 1993. Job turnover and policy evaluation: a general equilibrium analysis. J. Polit. Econ. 101 (5), 915–938.

Horvath, Michael, 1998. Cyclicality and sectoral linkages: aggregate fluctuations from independent sectoral shocks. Rev. Econ. Dyn. 1 (4), 781–808 (October).

Jovanovic, Boyan, 1982. Selection and the evolution of industry. Econometrica 50 (3), 649–670.

Kaufmann, David, Kraay, Aart, Mastruzzi, Massimo, 2004. Governance matters III: governance indicators for 1996, 1998, 2000, and 2002. World Bank Econ. Rev. 18 (2), 253–287.
Klapper, Leora, Laeven, Luc, Rajan, Raghuram G., 2006. Entry regulation as a barrier to entrepreneurship. J. Financ. Econ. 82 (3), 591–629.
Koeniger, Winfried, Prat, Julien, 2007. Employment protection, product market regulation and firm selection. Econ. J. 117 (521), 302–322.
Kugler, Adriana, 2007. The effects of employment protection in Europe and the USA. Els Opuscles del CREI (18), 1–48.
Long Jr., John B., Plosser, Charles I., 1987. Sectoral vs. aggregate shocks in the business cycle. Am. Econ. Rev. 77 (2), 333–336 (May).
Melitz, Marc, 2003. The impact of trade on intra-industry reallocation and aggregate industry productivity. Econometrica 71 (6), 1695–1725.
Messina, Julián, Vallanti, Giovanna, 2007. Job flow dynamics and firing restrictions: evidence from Europe. Econ. J. 117 (521), 279–301 (June).
Micco, Alejandro, Pages, Carmen, 2007. The economic effects of employment protection: evidence from international industry-level data. IADB Working Paper No. 592 (December). Available at: http://www.iadb.org/en/research-and-data/publication-details,3169.html?displaytype=&pub_id=WP-592. Last accessed: September 11, 2012.
Mortensen, Dale T., Pissarides, Christopher A., 1994. Job creation and job destruction in the theory of unemployment. Rev. Econ. Stud. 61 (3), 397–415.
Nickell, Stephen, Layard, Richard, 1999. Labor market institutions and economic performance. In: Ashenfelter, Orley, Layard, Richard (Eds.), Handbook of Labor Economics, Vol. 3C. Handbooks in Economics, Vol. 5, pages 3029–3084. Elsevier Science, North Holland, Amsterdam, New York and Oxford.
Nicoletti, Giuseppe, Scarpetta, Stefano, 2005. Product market reforms and employment in OECD countries. OECD Economics Department Working Paper No. 472. Available at: http://dx.doi.org/10.1787/463767160680. Last accessed: September 11, 2012.
Nilsen, Oivind A., Salvanes, Kjell G., Schiantarelli, Fabio, 2007. Employment changes, the structure of adjustment costs, and plant size. Eur. Econ. Rev. 51 (3), 577–598 (April).
Olley, G. Steven, Pakes, Ariel, 1996. The dynamics of productivity in the telecommunications equipment industry. Econometrica 64 (6), 1263–1297.
Pages, Carmen, Pierre, Gaelle, Scarpetta, Stefano, 2009. Job Creation in Latin America and the Caribbean: Recent Trends and the Policy Challenges. World Bank, Washington, D.C. 480 pages.
Pakes, Ariel, Ericson, Richard, 1998. Empirical implications of alternative models of firm dynamics. J. Econ. Theory 79 (1), 1–45.
Rajan, Raghuram G., Zingales, Luigi, 1998. Financial dependence and growth. Am. Econ. Rev. 88 (3), 559–586 (June).
Sutton, John, 1997. Gibrat's legacy. J. Econ. Lit. 35 (1), 40–59.
World Bank, 2004. A better investment climate for everyone. World Development Report 2005. World Bank, Washington, D.C.