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Assessing Job Flows across Countries:

The Role of Industry, Firm Size, and Regulations*

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Abstract

This paper reviews the process of job creation and destruction across a sample of 16 industrial and emerging economies over the past decade. It exploits a harmonized firm-level data-set drawn from business registers and enterprise census data. The paper assesses the importance of technological factors that characterize different industries in explaining cross-country differences in job flows. It shows that industry effects play an important role in shaping job flows at the aggregate level. Even more importantly, differences in the size composition of firms - within each industry - explain a large fraction of the overall variability in job creation and destruction. However, 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. In this paper, we look at one factor shaping the business environment, namely, regulations on hiring and firing of workers. To minimize 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 costs reduce job turnover, especially in those industries that require more frequent labor adjustment. Regulations also distort the patterns of industry/size flows. Within each industry, medium and large firms are more severely affected by stringent labor regulations, while small firms are less affected, probably because they are partially exempted from such regulations or can more easily circumvent them.

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Keywords: gross job flows, firm dynamics, firm size, product and labor market regulations, firm-level data.

1 Introduction

Over the past decade, 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], Foster et al. [2002] and 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 conditions and institutional factors play a major role in shaping the magnitude of job flows and their characteristics (Davis et al. [1996]). For example, smaller businesses are inherently more dynamic, in part because they tend to be young ventures and adjust through a learning-by-doing process (Dunne et al. [1988], Dunne et al. [1989]). In addition, some industries have inherently higher job flows (Foster et al. [2002] report that job flows in the United States retail sector are 1.5 times higher than in the manufacturing sector) than others in all countries, given the smaller size of their typical business and lower inherent entry costs.

Technological and market driven factors are coupled with a host of regulations in driving job flows. For example, regulations affecting start-up costs or bankruptcy procedures are likely to affect firm turnover and the associated labor mobility. Likewise, employment protection legislation may stifle labor reallocation by raising labor adjustment costs. Assessing the role of regulations in affecting job flows, over and above that played by technological and market-driven factors, is of great importance. While labor reallocation is indeed important to promote productivity growth, it is also painful for the affected workers, who face significant search and other adjustment costs (see for example Mortensen and Pissarides [1999a], Mortensen and Pissarides [1999b] and Caballero and Hammour [2000b]). Several models predict that labor regulations reduce gross job flows (e.g. Bertola [1992], Hopenhayn and Rogerson [1993]), but the empirical evidence is still inconclusive. While several empirical papers find a negative effect of employment protection legislation on unemployment (Bentolila and Bertola [1990], Nickell and Layard [1999]), the effects on job reallocation are more nuanced (Bertola and Rogerson [1997], Boeri [1999]). Countries with different types of labor regulations are observed to have fairly similar gross job flows. The lack of a causal relationship between regulations and gross job flows at the aggregate level may be due to different 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 countries with strict regulations also tend to have institutions

that restrict the ability of firms to adjust wages in response to a shock (e.g. centralized wage bargaining). A more fundamental problem is that cross-country analyses of job flows may be flawed by severe omitted variable problems and measurement errors, including differences in the distribution of activity across industries and size of firms, as well as different cut-off points in the enterprise surveys from which job flow data are obtained.

In this paper, we draw from a harmonized and integrated firm-level dataset including 16 developed, emerging and transition economies. With these data, we explore the industry and size dimensions of the job flows in detail and relate them to institutional differences across countries.[1] To give a preview of our 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. These vary significantly and systematically across industries, pointing to technological and market-driven factors, but especially across firms of different sizes. However, there are notable cross-country differences even after controlling for industry and size effects. Thus, we develop a formal test of the links between hiring and firing regulations and jobs flows in this paper, and also test for the robustness of our results to the inclusion of other regulations affecting business operations. We use a difference-in-difference approach whereby we identify an industry and size class's baseline job reallocation from the United States data. Under the assumption that regulations in the United States are among the least restrictive in our sample, the baseline should proxy for the technological and market driven job turnover in the absence of policy-induced adjustment costs. Under the additional assumption that this technological and market driven demand for labor reallocation carries over to other countries, we assess whether industries that require more labor mobility are disproportionately affected by regulations that raise adjustment costs. The advantage, compared with standard cross-country/cross-industry empirical studies, is that we exploit within country differences between industry/sizes 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 misspecifications.

Interestingly, we find support for the general hypothesis that hiring and firing costs reduce turnover, especially in those industries that require more frequent labor adjustment. Regulations also distort the patterns of industry/size flows. Within each industry, medium

[1] To our knowledge, the only other paper that econometrically analyzes the effects of labor regulations on gross job flows across countries is Micco and Pages [2004]. Their paper exploits sectoral gross job flows data for manufacturing for 18 countries. We extend their work by also including the service industry for a subset of countries and, more importantly, by controlling for industry specific differences in firm size. In addition, our data allow distinguishing between jobs 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.

and large firms are more severely affected by stringent labor regulations, while small firms are less affected, probably because they are partially exempt from such regulations or can more easily circumvent them. Moreover, stringent labor regulations have more of an impact on job flows for small and medium entering and exiting firms, as well as continuing firms of all sizes, whereas product market regulations are more important for shaping the job flows of large entering and exiting firms, and do not play much of a role for continuing firms.

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 presents the results from the analysis of variance. Section 5 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. Finally, section 6 provides our concluding remarks.

2 Data

Our analysis of job flows draws from a harmonized firm-level database that involves 16 industrial, developing and emerging economies (Germany, Finland, France, Italy, Portugal, the United Kingdom and the United States, Estonia, Hungary, Latvia, Slovenia, Argentina, Brazil, Chile, Colombia and Mexico) and covers the 1990s (the time period covered varies by country - see Table 1).[2] The data collection was conducted by an active participation of local experts in each of the countries, and involved the harmonization of key concepts to the extent possible (such as entry and exit of firms, job creation and destruction, and the unit of measurement), as well as the definition of common methods to compute the indicators (see Bartelsman et al. [2005] for details).[3]

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

Unit of observation: Data used tend to conform to the following definition:"an organizational unit producing goods or services which benefits from a

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

[3]Micco and Pages [2004] compiled a dataset from different country sources covering 2-digit manufacturing sector information for 18 countries. Their dataset does not include transition countries, and does not allow differentiating job flows by firm status and firm size for all the countries.

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: Special efforts have been made to organize the data 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 firm-level and job flows data come from business registers (Finland, the United Kingdom and the United States, Estonia, Latvia, Slovenia), social security databases (Germany, Italy, Mexico) or corporate tax rolls (Argentina, France, Hungary) (Table 1). Annual industry surveys are generally not the best source for firm demographics, due to sampling and reporting issues, but have been used nonetheless 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.

Table 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 $\geq$ 1
France	Fiscal database	1989-1997	All (17)	Turnover: Man: Euro 0.58m Serv: Euro 0.17m
Germany (West)	Social security	1977-1999	All but civil service, self employed (11)	Emp $\geq$ 1
Italy	Social security	1986-1994	All (19)	Emp $\geq$ 1
Portugal	Employment-based register	1983-1998	All but public administration (19)	Emp $\geq$ 1
United Kingdom	Business register	1980-1998	Manufacturing (10)	Emp $\geq$ 1
United States	Business register	1988-1997	Private businesses (19)	Emp $\geq$ 1
LAC				
Argentina	Register, based on Integrated System of Pensions	1995-2002	All (19)	Emp $\geq$ 1
Brazil	Census	1996-2001	Manufacturing (13)	Emp $\geq$ 1
Chile	Annual Industry Survey (ENIA)	1979-1999	Manufacturing (13)	Emp. $\geq$ 10
Colombia	Annual Manufacturing Survey (EAM)	1982-1998	Manufacturing (13)	Emp. $\geq$ 10
Mexico	Social security	1985-2001	All (17)	Emp $\geq$ 1
TRANSITION				
Estonia	Business register	1995-2001	All (19)	Emp $\geq$ 1
Hungary	Fiscal register (APEH)	1992-2001	All (19)	Emp $\geq$ 1
Latvia	Business register	1996-2002	All (18)	Emp $\geq$ 1
Slovenia	Business register	1992-2001	All (19)	Emp $\geq$ 1

Table 2: Job Flows indicators

Job Creation Rate:	$pos_{sict} = \frac{\sum_{i \in SC^+} \Delta E_{sict}}{0.5(E_{sict}+E_{sic,t-1})}$
Job Destruction Rate:	$neg_{sict} = \frac{\sum_{i \in SC^-} \Delta E_{sict}}{0.5(E_{sict}+E_{sic,t-1})}$
Job Creation Rate (Entry):	$pos_{EN,sict} = \frac{\sum_{i \in SC^+,EN} \Delta E_{sict}}{0.5(E_{sict}+E_{sic,t-1})}$
Job Destruction Rate (Exit):	$neg_{EX,sict} = \frac{\sum_{i \in SC^-,EX} \Delta E_{sict}}{0.5(E_{sict}+E_{sic,t-1})}$
Net Employment Growth:	$net_{sic} = pos_{sic} - neg_{sic}$
Job Reallocation Rate:	$sum_{sic} = pos_{sic} + neg_{sic}$
Excess Job Reallocation Rate:	$exc_{sic} = pos_{sic} - \|neg_{sic}\|$

where i represents industry, s represents size class, c represents country, t represents time and E denotes employment. Capital letters S and C refer to a set of size classes or countries, respectively. The symbol Δ denotes the first-difference operator, $\Delta E_t = E_t - E_{t-1}$. We take averages of *pos* and *neg*, and then calculate *net*, *sum* and *exc*.

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. In Table 2 we define the job creation rate, job destruction rate, net employment growth, job reallocation rate, and excess job reallocation rate (also by firm status: continuing, entering and exiting firms) (see also Davis et al. [1996]).

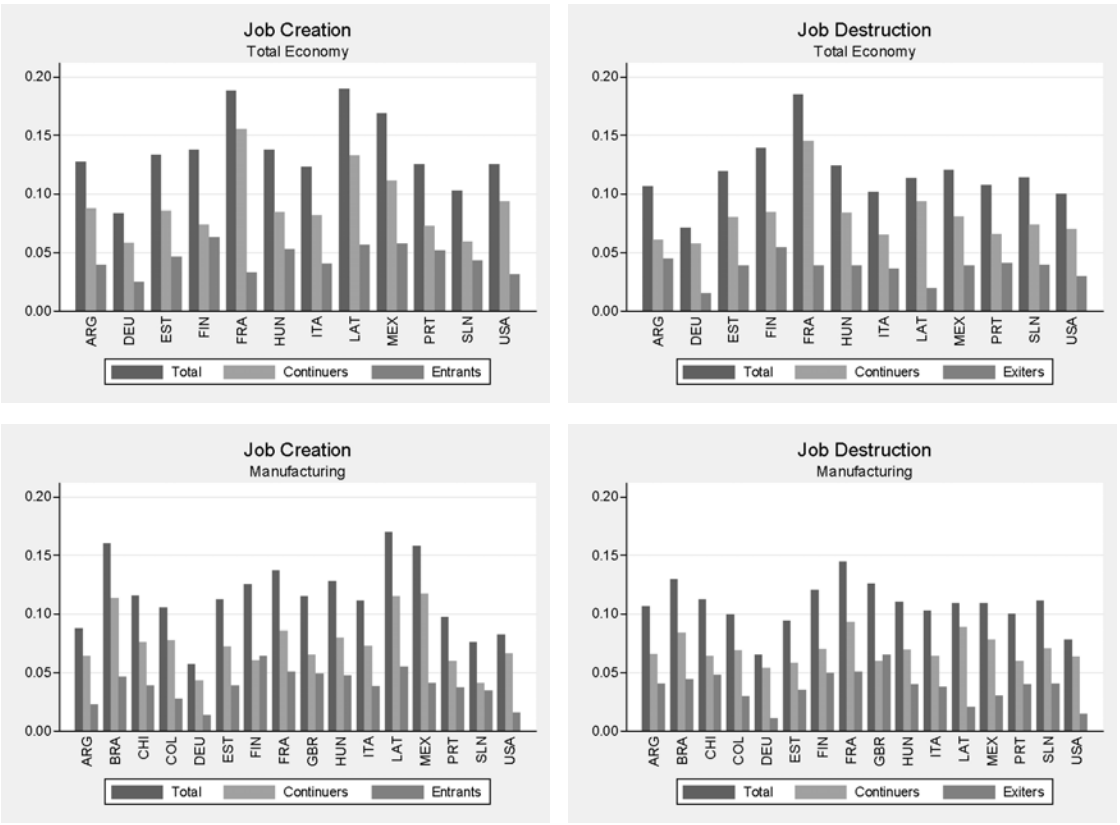
3 Basic Facts about Job Turnover in Industrial and Emerging Economies of Latin America and Central and Eastern Europe

This section explores the main stylized facts emerging from our analysis across countries, industries and firm size: 1) the large magnitude of job flows in all countries, 2) the significant role that firm entry and exit play in total job flows, 3) the different job turnover across firms of different sizes, and 4) the similarities in the industry ranking of job turnover across countries. We review these stylized facts in turn below to motivate our multivariate analysis aimed at assessing the possible role of labor market regulations for job turnover and the magnitude and efficiency of the allocation of labor.

3.1 Large Job Turnover in All Countries

Table 3 presents summary statistics for job flows across industry, size classes and countries, for the total economy. Figure 1 summarizes country level job flows and compares them across countries.

Figure 1: Decomposition of Job Creation and Destruction by Continuing, Entering and Exiting Firms, 1990s, Total Economy and Manufacturing



Source: Own calculations based on harmonized firm-level database.

The first noticeable fact emerging from this cross country comparison is the large magnitude of job flows in all countries. Gross job flows (the sum of job creation and job destruction) range from about 25 percent of total employment on average in the OECD countries, to 29 percent in Latin American countries and to about 30 percent in the transition economies. By contrast, net employment changes were very modest if not nil in the OECD and the Latin America samples, 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.[4]

[4]see Geroski [1995] for a summary of the main stylized facts characterizing firm demographcs.

Table 3: Average Job Flows in the 1990s, Overall and by Region, Total Economy

OVERALL					
Variable	Obs	Mean	Std. Dev.	Min	Max
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
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

Source: Own calculations based on harmonized firm-level database.

3.2 Firm Dynamics Play a Major Role in Total Job Flows

The second main stylized fact emerging from our analysis of job flows is the strong contribution of the creative destruction process. Indeed, entering and exiting firms account

for about 30-40 percent of total job flows. Within the OECD sample, the entry of new firms played a particularly strong role in total job creation in Finland in the 1990s (46 and 51 percent of total job creation in total economy and manufacturing, respectively), Slovenia (42 and 46 percent of total job creation) and Portugal (41 and 38 percent of total job creation). At the same time, the exit of obsolete firms also accounted for a significant fraction of overall job destruction, particularly so in Argentina (42 and 38 percent of total job destruction), Finland (39 and 41 percent of total job destruction) and Portugal (38 and 40 percent of total job destruction). In transition countries, entry was more important in the early years of transition and exit in the second half of the 1990s, both for the total economy and in manufacturing.[5]

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 new firms as the economies progressed towards a market economy. Indeed, entering firms created 40.2 percent of jobs in transition countries, compared to 35.4 percent in the OECD countries. In addition, job destruction due to exit represented 35.4 percent of total job destruction in the OECD countries, but only 30.5 percent in transition countries. Findings are similar if we focus only on industries within manufacturing.

3.3 Small and Large Firms Contribute the Most to Job Flows

Small firms account for the vast majority of total firm dynamics in all countries in our sample. However, their contribution to overall job reallocation, while still important, is less dominant. Figure 2 presents job reallocation rates by firm size classes. In general, job reallocation is highest in firms with less than 20 employees, and the lowest in firms with 100+ employees. In the United States, job turnover declines monotonically with firm size, and the decline is particularly marked among large units (100+). Latin American countries follow similar patterns to those of the United States, while the European countries, with the exception of France, have a less marked drop of job reallocation among larger units. The transition countries, on the other hand, show a steeper slope in smaller size classes, especially in the early years of transition.

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. Tables 4 and 5 present the percentage of job creation/destruction/reallocation in each size class as a

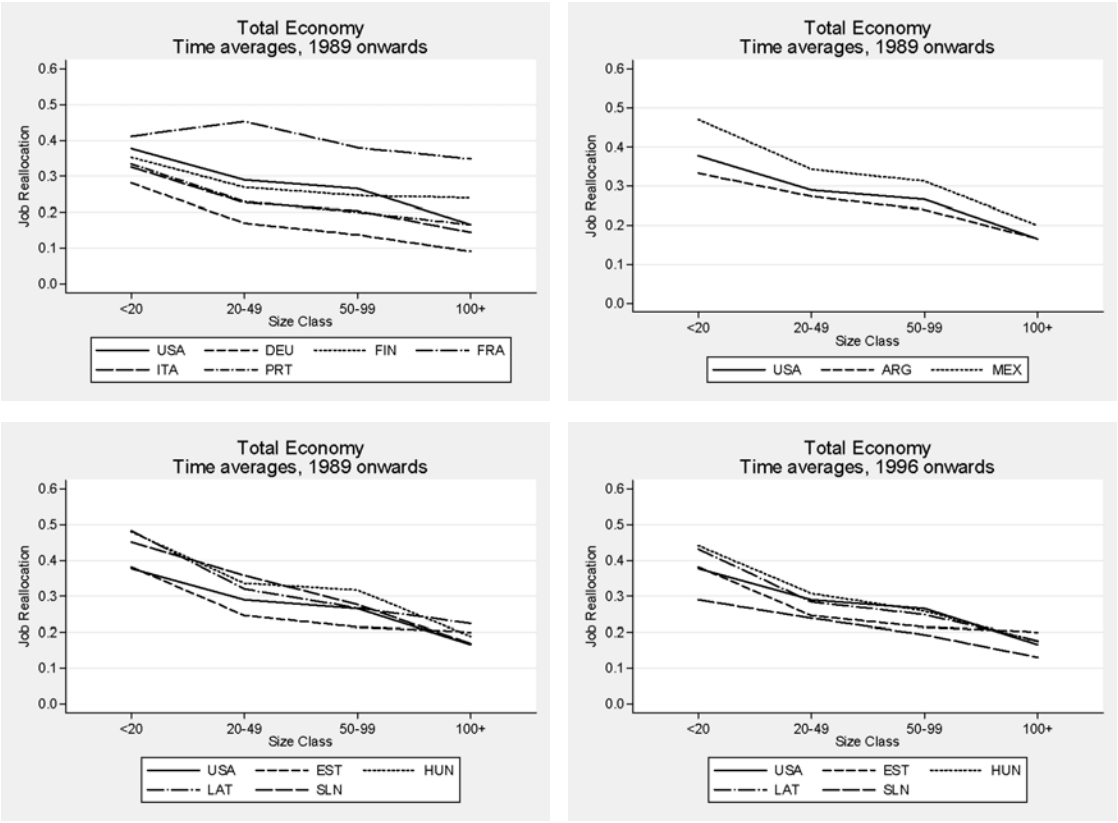
[5]This was especially so in Slovenia, a lot of entry occurred in the early 1990s, since private firms were few and far in between prior to that; exit did not keep up with that early on and was relatively low compared to OECD and other transition countries.

share of total job creation/destruction/reallocation for total economy and manufacturing, respectively:

$$pX_{sic} = \frac{X_{sic}}{X_{ic}} \tag{1}$$

where i denotes industry, s denotes size class and c denotes country. X stands for POS, NEG or SUM, where POS is the number of jobs created, NEG the number of jobs destroyed and SUM the total number of jobs reallocated (created+destroyed).[6]

Figure 2: Job Reallocation across Firms of Different Sizes, Total Economy



Source: Own calculations based on harmonized firm-level database.

In manufacturing, the highest share of jobs was created/destroyed/reallocated by firms in the largest size class: 100+. At the same time, however, the second most important size class in terms of job reallocation is firms with less than 20 employees. In fact, it seems that the number of jobs created/destroyed/reallocated has a U-shaped relationship with

[6]Note that for Chile, Colombia and France, we do not observe some of the smallest firms (in the first two countries, we do not observe firms with less than 10 workers, and for France, firms with sales below a certain threshold are excluded from the sample).

size class in manufacturing. The importance of the smallest size class increased in transition countries over time, and the importance of the largest size class decreased.

At the level of total economy, the highest share of jobs was created/destroyed/-reallocated in the smallest size class in a number of countries (Germany, Italy, Portugal, Argentina, Estonia, Latvia), followed by the largest size class. Again, a similar pattern is observed for transition countries: the smallest size class gained in importance over time, while the largest size class declined in importance.

3.4 Large Disparities in Job Flows Across Industries

To assess the possible role of policy and institutions in shaping the magnitude and effectiveness of job flows, we need to identify the intrinsic need for job mobility that certain industries may have compared to others. Certain industries are exposed to greater variability in demand; may be more exposed to macro shocks; and may be facing a higher pace of technological progress that imposes more frequent retooling of the production process and the associated adjustment of the workforce.

To illustrate the cross-industry variation in job flows, we highlight the U.S. industries with the highest (wood) and the lowest (transport equipment) job flows within manufacturing, as well as the trade and restaurants sector (see Table 6). In wood, the job reallocation rate was 26 percent in the United States, and ranged from only 13 percent in Germany to 37 percent in Brazil. In the United States, incumbent firms were responsible for more than 70 percent of job reallocation, whereas in Great Britain, 53 percent of reallocation was due to entry and exit of firms. In transport equipment, the job reallocation rate was 11.9 percent in the United States, and ranged from 8.3 percent in Germany to 34 percent in Latvia. In Mexico, incumbent firms were responsible for more than 85 percent of job reallocation, whereas in Slovenia, almost 53 percent of reallocation was due to entry and exit of firms. In trade and restaurants, job reallocation ranged from 22.2 percent in Slovenia after 1996 to 38.8 percent in France. In all countries, reallocation in this industry was mostly due to incumbent firms, but this share differs among countries.

Table 4: Percentage of Job Flows in a Certain Size Class, Total Economy, 1990s

	Gross Job Reallocation				**Job Creation**				**Job Destruction**			
Country	<20	20-49	50-99	100+	<20	20-49	50-99	100+	<20	20-49	50-99	100+
Germany	0.467	0.140	0.093	0.300	0.440	0.149	0.102	0.309	0.51	0.129	0.082	0.278
Finland	0.394	0.103	0.067	0.436	0.419	0.088	0.055	0.438	0.369	0.12	0.080	0.431
France	0.173	0.133	0.110	0.584	0.130	0.085	0.103	0.682	0.220	0.185	0.119	0.477
Italy	0.522	0.130	0.073	0.276	0.492	0.142	0.085	0.280	0.568	0.116	0.059	0.256
Portugal	0.457	0.153	0.097	0.292	0.471	0.152	0.094	0.283	0.449	0.152	0.099	0.300
United States	0.315	0.131	0.087	0.467	0.279	0.132	0.089	0.499	0.361	0.130	0.085	0.423
Argentina	0.397	0.154	0.106	0.342	0.367	0.158	0.112	0.362	0.433	0.147	0.097	0.322
Mexico	0.377	0.137	0.099	0.386	0.319	0.137	0.103	0.442	0.462	0.138	0.094	0.307
Estonia (1990s)	0.365	0.172	0.125	0.337	0.414	0.167	0.114	0.306	0.318	0.180	0.139	0.363
Hungary (1990s)	0.273	0.134	0.118	0.475	0.296	0.144	0.107	0.453	0.251	0.125	0.127	0.497
Latvia (1990s)	0.383	0.141	0.104	0.371	0.390	0.137	0.101	0.372	0.376	0.150	0.112	0.363
Slovenia (1990s)	0.227	0.088	0.100	0.585	0.293	0.100	0.090	0.517	0.169	0.076	0.112	0.643
Estonia (late 1990s)	0.365	0.172	0.125	0.337	0.414	0.167	0.114	0.306	0.318	0.180	0.139	0.363
Hungary (late 1990s)	0.317	0.142	0.108	0.433	0.337	0.149	0.106	0.408	0.294	0.132	0.111	0.463
Latvia (late 1990s)	0.421	0.143	0.107	0.328	0.437	0.139	0.107	0.317	0.398	0.150	0.109	0.343
Slovenia (late 1990s)	0.287	0.104	0.099	0.510	0.328	0.121	0.084	0.467	0.244	0.085	0.116	0.555
We do not observe firms with sales below a given threshold in France.												

Source: Own calculations based on harmonized firm-level database.

Table 5: Percentage of Job Flows in a Certain Size Class, Manufacturing, 1990s

	Gross Job Reallocation				**Job Creation**				**Job Destruction**			
Country	<20	20-49	50-99	100+	<20	20-49	50-99	100+	<20	20-49	50-99	100+
Germany	0.344	0.136	0.098	0.422	0.307	0.141	0.110	0.442	0.399	0.135	0.088	0.378
Finland	0.199	0.093	0.073	0.635	0.205	0.088	0.065	0.642	0.201	0.099	0.083	0.618
France	0.258	0.156	0.109	0.477	0.227	0.139	0.105	0.530	0.286	0.175	0.113	0.426
United Kingdom	0.198	0.116	0.102	0.583	0.209	0.116	0.103	0.572	0.183	0.113	0.101	0.604
Italy	0.427	0.142	0.078	0.353	0.421	0.154	0.082	0.343	0.445	0.133	0.074	0.348
Portugal	0.306	0.193	0.137	0.364	0.335	0.197	0.132	0.337	0.289	0.186	0.138	0.386
United States	0.161	0.116	0.096	0.626	0.146	0.119	0.099	0.635	0.180	0.114	0.094	0.612
Argentina	0.331	0.164	0.115	0.389	0.318	0.174	0.123	0.385	0.346	0.155	0.108	0.392
Brazil	0.288	0.145	0.100	0.466	0.290	0.162	0.105	0.443	0.297	0.127	0.092	0.484
Chile	0.069	0.163	0.158	0.610	0.051	0.154	0.154	0.640	0.091	0.174	0.163	0.572
Colombia	0.126	0.172	0.163	0.538	0.095	0.160	0.161	0.585	0.162	0.186	0.165	0.487
Mexico	0.258	0.124	0.103	0.515	0.201	0.115	0.100	0.584	0.343	0.137	0.106	0.414
Estonia (1990s)	0.227	0.172	0.142	0.459	0.246	0.180	0.146	0.429	0.206	0.164	0.137	0.493
Hungary (1990s)	0.159	0.121	0.111	0.609	0.165	0.135	0.117	0.583	0.154	0.107	0.106	0.633
Latvia (1990s)	0.431	0.155	0.110	0.305	0.451	0.157	0.120	0.272	0.400	0.154	0.092	0.354
Slovenia (1990s)	0.100	0.072	0.100	0.728	0.146	0.091	0.102	0.661	0.069	0.058	0.102	0.771
Estonia (late 1990s)	0.227	0.172	0.142	0.459	0.246	0.180	0.146	0.429	0.206	0.164	0.137	0.493
Hungary (late 1990s)	0.172	0.128	0.109	0.591	0.177	0.136	0.111	0.576	0.169	0.119	0.108	0.604
Latvia (late 1990s)	0.453	0.146	0.107	0.293	0.467	0.147	0.120	0.265	0.434	0.146	0.085	0.336
Slovenia (late 1990s)	0.128	0.082	0.108	0.682	0.173	0.112	0.106	0.609	0.099	0.062	0.11	0.729

We do not observe firms with less than 10 workers in Chile and Colombia, and firms with sales below a given threshold are excluded from the sample in France.

Source: Own calculations based on harmonized firm-level database.

Table 6: Cross-Industry Variation in Job Flows

	HIGH - WOOD			LOW - TRANSPORT EQUIPMENT			TRADE AND RESTAURANT		
Country	Gross Job Reallocation	Continuers	Entry & Exit	Gross Job Reallocation	Continuers	Entry & Exit	Gross Job Reallocation	Continuers	Entry & Exit
EU & USA									
Germany	0.130	0.105	0.027	0.083	0.071	0.012			
Finland	0.252	0.156	0.096	0.249	0.135	0.113	0.264	0.158	0.106
France	0.248	0.146	0.102	0.238	0.174	0.064	0.388	0.305	0.083
United Kingdom	0.289	0.132	0.154	0.199	0.109	0.089			
Italy	0.215	0.141	0.074	0.125	0.091	0.034	0.259	0.161	0.098
Portugal	0.226	0.121	0.105	0.197	0.135	0.061	0.260	0.146	0.114
United States	**0.260**	**0.185**	**0.074**	**0.119**	**0.108**	**0.010**	**0.256**	**0.176**	**0.080**
LAC									
Argentina	0.224	0.134	0.090	0.197	0.156	0.041	0.271	0.151	0.121
Brazil	0.370	0.236	0.134	0.228	0.162	0.066			
Chile	0.287	0.151	0.136	0.272	0.163	0.109			
Colombia	0.223	0.133	0.090	0.187	0.135	0.052			
Mexico	0.346	0.228	0.118	0.234	0.200	0.033	0.311	0.182	0.129
TRANSITION, 1990s									
Estonia	0.242	0.140	0.102	0.166	0.117	0.050	0.295	0.194	0.101
Hungary	0.290	0.176	0.114	0.244	0.186	0.058	0.375	0.238	0.137
Latvia	0.292	0.219	0.074	0.330	0.243	0.087	0.298	0.222	0.076
Slovenia	0.191	0.119	0.072	0.252	0.118	0.133	0.263	0.161	0.103
TRANSITION, late 1990s									
Estonia	0.242	0.140	0.102	0.166	0.117	0.050	0.295	0.194	0.101
Hungary	0.262	0.159	0.102	0.259	0.193	0.065	0.338	0.211	0.127
Latvia	0.266	0.192	0.074	0.348	0.280	0.068	0.277	0.208	0.070
Slovenia	0.165	0.109	0.056	0.194	0.107	0.087	0.222	0.146	0.076

Source: Own calculations based on harmonized firm-level database.

3.5 The Correlation of Industry/Size Job Flows Across Countries

We next look at the correlation of industry/size level job flows across countries. A strong influence of market-driven and technological factors in shaping industry job flows should result in a strong correlation across countries. However, as we will see below and as stressed in previous studies (e.g. see Micco and Pages [2004]), industry/size job flows are also influenced by the policy and institutional environment. Lack of correlation may not therefore imply that market-driven and technological factors do not play a significant role, but rather that policy and institutions distort job flows. Job flows are part-and-parcel of the creative destruction process, and an unfavourable institutional environment will cause this process to stagnate (Caballero and Hammour [2000a]). To minimize the possible interference of the policy environment, we also present the rank correlation of industry job flows, which may provide a better proxy for the true correlation if the policy environment affects levels but not the rank order of industry/size flows.

Table 7 presents the industry/size pairwise level correlations, using the United States as the benchmark, for several flow indicators: gross job reallocation, excess job reallocation, job creation by entering firms and job destruction by exiting firms. We use two-digit industry and four size classes. It is noticeable that the cross-country correlations are very high for most countries. Focusing on gross job reallocation, the correlation between the EU average and the United States is 0.71; that between Latin American countries and the United States is 0.83 and that for transition countries is 0.71. Rank correlations (Table 8) are slightly lower than levels correlations for some Latin American countries and higher for the others, but are on average still the highest among regions. Correlations are on average higher if we focus only on manufacturing (not reported here). Industry/size-level correlations with the U.S. are particularly strong for some Latin American countries, e.g. Brazil (0.90) and Colombia (0.91), despite the very different degree of economic development, as well as for Great Britain (0.84). Some of the lowest correlations are found for some EU countries, in particular France (0.47).[7]

[7]We cannot compare the reported results directly with Micco and Pages [2004], since our analysis includes the size dimension in addition to the industry dimension. However, we also conducted the analysis excluding the size dimension (not reported here, but available upon request from the authors), and we find that the pairwise correlation with U.S. gross job reallocation is highest for Mexico (0.91), followed by Brazil (0.84) and Great Britain (0.74). They find the correlation to be the highest with Canada, Great Britain and New Zealand, but our sample covers different time-periods.

Table 7: Pairwise Correlations with the U.S. Job Flows, Total Economy (Unbalanced Panel)

	Gross Job Reallocation	Excess Job Reallocation	Job Creation by Entering Firms	Job Destruction by Exiting Firms
OECD	**0.7057**	**0.6577**	**0.5851**	**0.6900**
Germany	0.8183	0.8074	0.7815	0.8525
Finland	0.6852	0.6025	0.0509	0.4277
France	0.4745	0.3531	0.5845	0.7815
United Kingdom	0.8471	0.8247	0.7129	0.7737
Italy	0.5954	0.5782	0.5504	0.7031
Portugal	0.8134	0.7804	0.8301	0.6012
LAC	**0.8290**	**0.7773**	**0.7848**	**0.8024**
Argentina	0.7670	0.7214	0.7851	0.7527
Brazil	0.9048	0.8383	0.9035	0.7768
Chile	0.7264	0.5556	0.6013	0.7632
Colombia	0.9121	0.8835	0.8780	0.8534
Mexico	0.8345	0.8878	0.7562	0.8660
TRANSITION, 1990s	**0.7057**	**0.6961**	**0.623**	**0.4413**
Estonia	0.6036	0.6554	0.4761	0.1641
Hungary	0.8168	0.8157	0.8174	0.6911
Latvia	0.6616	0.6962	0.5919	0.5960
Slovenia	0.7406	0.6172	0.6065	0.3140
Late 1990s	**0.6771**	**0.6981**	**0.5859**	**0.4500**
Estonia	0.6036	0.6554	0.4761	0.1641
Hungary	0.7911	0.7970	0.8070	0.6622
Latvia	0.5919	0.6644	0.5886	0.6108
Slovenia	0.7216	0.6755	0.4718	0.3629

Source: Own calculations based on harmonized firm-level database.

Table 8: Rank Correlations with the U.S. Job Flows, Total Economy (Unbalanced Panel)

	Gross Job Reallocation	Excess Job Reallocation	Job Creation by Entering Firms	Job Destruction by Exiting Firms
OECD	**0.7007**	**0.6330**	**0.5445**	**0.7030**
Germany	0.8186	0.8154	0.7950	0.8789
Finland	0.6450	0.5269	-0.0089	0.5028
France	0.5083	0.3688	0.5654	0.7423
United Kingdom	0.8672	0.7937	0.6713	0.8168
Italy	0.5880	0.5515	0.5443	0.5999
Portugal	0.7770	0.7418	0.6996	0.6773
LAC	**0.8371**	**0.7908**	**0.8035**	**0.8121**
Argentina	0.8611	0.8255	0.7897	0.7774
Brazil	0.8868	0.7913	0.8956	0.7828
Chile	0.6743	0.5619	0.6358	0.7608
Colombia	0.8996	0.8812	0.8624	0.8586
Mexico	0.8636	0.8940	0.8342	0.8810
TRANSITION, 1990s	**0.7174**	**0.6978**	**0.6240**	**0.4702**
Estonia	0.6785	0.6186	0.5161	0.2981
Hungary	0.8200	0.8108	0.7676	0.7223
Latvia	0.6304	0.7137	0.5481	0.5560
Slovenia	0.7407	0.6479	0.6640	0.3045
Late 1990s	**0.6925**	**0.6874**	**0.5832**	**0.4807**
Estonia	0.6785	0.6186	0.5161	0.2981
Hungary	0.7925	0.7711	0.7529	0.6955
Latvia	0.5854	0.6671	0.5945	0.5792
Slovenia	0.7136	0.6927	0.4691	0.3498

Source: Own calculations based on harmonized firm-level database.

It is also interesting to see that transition economies had a much stronger correlation of their job flow pattern by industry and size class with the United States in the sample that covers the entire 1990s than in the sample focusing on the 1996-2001 period. This could be 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 towards the flow patterns observed in EU countries, with whom they share several policy and institutional factors.

4 Analysis of Variance

In the previous section, we explored the different dimensions of the job flow data across countries, industries and size classes. The next logical step is to assess the relative importance of these different dimensions in explaining the overall variance in our dataset. Tables 9 and 10 present the analysis of variance of job flows, for the unbalanced total economy[8] and manufacturing samples, respectively. We consider industry, size, country and industry*size effects separately, and, in addition, differentiate the analysis of variance by region (OECD, transition, Latin America).

It is noticeable that technological and market structure characteristics that are reflected in the industry-specific effects explain only 6.8 percent of variation in overall cross-country gross job reallocation (Table 9), although they account for a higher share in Latin America (23.3 percent). By contrast, differences in the size structure of firms explain as much as 40.0 percent of the total variation in cross-country gross job reallocation in all regions, and play an even more important role in transition countries at the beginning of the 1990s. This fact is again in accordance with the characteristics of transition, as already mentioned in the previous section. Even country effects explain more of the variation in gross job reallocation than the industry effects, except in Latin America, so even though there are similarities among countries within a region, there is still variation between them. Overall, the combined industry*size effects can explain the bulk of the variation in gross job reallocation: 55.6 percent overall, 55.8 percent in OECD countries, 73.3 percent in Latin American countries and 72.3 percent in transition countries (66.9 percent, if we look only at the second half of the 1990s).

Gross job reallocation consists of job creation and job destruction, so we now turn

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

to these two categories of job flows for further insight. We also further distinguish job creation by new firms and by incumbents and job destruction by exiting firms and by those that survive but downsize (we report only the results for job creation by new firms and job destruction by exiting firms; other results are available upon request from the authors). A number of interesting features emerge:

- *Industry effects.* These explain about 6.7 percent of variation in job creation and 6.1 percent of variation in job destruction, but there are significant differences among the three regions. Industry effects account for a much larger share of the overall variation (30.8 percent) in job creation in Latin America, slightly less than half of this in OECD countries, and only 7.3 percent in transition countries. In the early phases of transition, creation of jobs occurred across all industries, whereas they were more concentrated in certain industries in OECD countries and especially in Latin America: 14.4 percent of the variation in job destruction in Latin America can be explained by industry effects, but only 8.9 percent in OECD countries.
- *Size effects.* Both in the case of job creation and job destruction, size effects alone account for a significant share of the total variation (30.0 and 41.0 percent, respectively). Looking at results by region reveals that size effects can account for 54.0 percent of variation in job creation in transition countries, but only 28.6 percent of variation in job destruction. In Latin America, the results are the opposite: size effects can account for 63.0 percent of variation in job destruction, but only for 21.4 percent of job creation.
- *The role of entry and exit of firms.* 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 59.5 percent of the heterogeneity in job creation by new firms and 70.0 percent of the variation in job destruction by exiting firms. In the OECD countries, size heterogeneity plays a smaller role in both job creation and destruction by entering and exiting firms. In the transition economies there is a strong difference between 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.

How should one interpret these different sources of variability of job flows? Not surprisingly, in all regions size heterogeneity looms large among new firms depending on market conditions, but also upon regulations that may affect the optimal size of entry. This seems particularly the case in Latin America where industries with many new micro entrants coexist with those where entry size is larger. But size heterogeneity also explains a significant fraction of the variance in job destruction due to firm exit: in some industries,

small young businesses often fail, while in others, more mature large firms tend to decline. By contrast, in transition economies there is more variability in the size structure of new firms than among those that exit the market. A large number of new businesses entered the market, filling different niches of activities that were largely underdeveloped under central planning, while job destruction occurred more evenly in firms of different sizes; many large obsolete firms closed, but so did many relatively small new ventures. In transition economies, country effects account for 20.3 percent of the variation in job destruction by exiting firms, but only 6.5 percent of the variation in job creation by entering firms. This is suggestive of cross-country differences in the enterprise restructuring and its impact on firm closure and downsizing.[9]

To summarize, the analysis of variance of job flows suggests a significant role for the size composition - a factor that was not considered in previous studies - as well as differences across and within regions. Technological and market structure characteristics (e.g. the industry effects) seem to play a relatively smaller role in explaining cross-country differences in job flows.

[9]See Haltiwanger and Vodopivec [2003] and World Bank [2004].

Table 9: Analysis of Variance, Total Economy (Unbalanced Panel)

	Job Creation	Job Destruction	Net Employment Growth	Gross Job Reallocation	Excess Job Reallocation	Job Creation - Entry	Job Destruction - Exit
INDUSTRY EFFECTS							
All	0.0670	0.0613	0.0554	0.0675	0.0538	0.0164	0.0500
OECD	0.1492	0.0892	0.1164	0.1104	0.0509	0.0229	0.0706
LAC	0.3076	0.1438	0.1568	0.2327	0.1655	0.1159	0.1049
Transition (1990s)	0.0644	0.0931	0.1525	0.0341	0.0877	0.0486	0.0938
Transition (late 1990s)	0.0731	0.0665	0.1350	0.0344	0.0790	0.0399	0.0827
SIZE EFFECTS							
All	0.3003	0.4100	0.0021	0.4706	0.4591	0.4325	0.3373
OECD	0.3027	0.3738	0.0605	0.4139	0.4468	0.4439	0.3127
LAC	0.2142	0.6300	0.2557	0.4777	0.5093	0.5950	0.7000
Transition (1990s)	0.5400	0.2861	0.1443	0.6149	0.4706	0.4858	0.1236
Transition (late 1990s)	0.4309	0.2488	0.0708	0.5268	0.4945	0.4412	0.1441
COUNTRY EFFECTS							
All	0.2138	0.1252	0.1975	0.1648	0.1435	0.1453	0.1996
OECD	0.1576	0.2009	0.1113	0.2019	0.1885	0.1253	0.2829
LAC	0.3041	0.0419	0.1808	0.1588	0.1276	0.1133	0.0255
Transition (1990s)	0.0570	0.0867	0.0974	0.0512	0.0865	0.0653	0.2031
Transition (late 1990s)	0.0997	0.0445	0.0681	0.0851	0.0933	0.0645	0.1719
INDUSTRY*SIZE EFFECTS							
All	0.3861	0.4964	0.0904	0.5558	0.5263	0.4624	0.4097
OECD	0.4888	0.5041	0.2421	0.5579	0.5215	0.5018	0.4053
LAC	0.5574	0.8079	0.5062	0.7326	0.6998	0.7364	0.8478
Transition (1990s)	0.6856	0.4685	0.3998	0.7233	0.6186	0.5956	0.3004
Transition (late 1990s)	0.5978	0.4736	0.3417	0.6692	0.6493	0.5676	0.3189

Source: Own calculations based on harmonized firm-level database.

Table 10: Analysis of Variance, Manufacturing

	Job Creation	Job Destruction	Net Employment Growth	Gross Job Reallocation	Excess Job Reallocation	Job Creation - Entry	Job Destruction - Exit
INDUSTRY EFFECTS							
All	0.0126	0.0432	0.0431	0.0207	0.0129	0.0093	0.0484
OECD	0.0377	0.0681	0.1729	0.0358	0.0136	0.0135	0.0691
LAC	0.0397	0.0429	0.0626	0.0371	0.0172	0.0196	0.0464
Transition (1990s)	0.0344	0.072	0.0902	0.0257	0.0577	0.0402	0.0655
Transition (late 1990s)	0.0387	0.0469	0.0695	0.0251	0.0529	0.0244	0.0666
SIZE EFFECTS							
All	0.3307	0.4572	0.0046	0.5231	0.4903	0.4120	0.3555
OECD	0.4202	0.4786	0.0727	0.5254	0.5053	0.4083	0.3252
LAC	0.3112	0.6997	0.2919	0.5946	0.5737	0.6780	0.7441
Transition (1990s)	0.5315	0.2608	0.1302	0.5940	0.4678	0.4327	0.1031
Transition (late 1990s)	0.4188	0.2257	0.0660	0.5116	0.5086	0.3937	0.1217
COUNTRY EFFECTS							
All	0.2627	0.1217	0.2310	0.1868	0.1783	0.1620	0.2351
OECD	0.1937	0.1710	0.0757	0.1981	0.2164	0.1680	0.3753
LAC	0.454	0.0538	0.2244	0.2157	0.1874	0.1446	0.0388
Transition (1990s)	0.0458	0.1033	0.0947	0.0508	0.1062	0.0589	0.2157
Transition (late 1990s)	0.1113	0.0449	0.0999	0.0761	0.1112	0.0608	0.1919
INDUSTRY*SIZE EFFECTS							
All	0.3649	0.5265	0.0811	0.5641	0.5171	0.4371	0.4274
OECD	0.4862	0.5894	0.3134	0.5930	0.5408	0.4505	0.4171
LAC	0.3724	0.7695	0.4003	0.6519	0.6081	0.7143	0.8235
Transition (1990s)	0.6548	0.4303	0.3295	0.7029	0.5831	0.5407	0.2536
Transition (late 1990s)	0.5563	0.4489	0.2741	0.6605	0.6390	0.5214	0.2797

Source: Own calculations based on harmonized firm-level database.

5 Empirical Analysis

5.1 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 two important results discussed in the previous sections: 1) a significant share of the total variance in job flows observed in the data is explained by industry*size effects, and 2) there is a high correlation of industry/size job flows across countries. These 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 varies systematically by industry and size class. For example, demand characteristics in some industries imply that firms face higher volatility in their product demand than other industries. Likewise, technological characteristics may require more frequent re-tooling of the production process with 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 adjust frequently 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.

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. To the extent that institutions vary more by country than industry and size, our working hypothesis is that the impact of institutions that impede 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 churning in a particular sector hence depends on the distribution of productivity shocks (z) and adjustment costs.

A simple (S, s) model with fixed costs of adjustment can be used to illustrate the logic behind our argument. First, consider two sectors, 1 and 2, where sector 2 has a higher variance of productivity shocks and both sectors have the same thresholds of adjustment, $z_{\circ 1} = z_{\circ 2}$ and $z_1^\circ = z_2^\circ$, as illustrated in Panel A of Figure 3 where $F_1(z)$ and $F_2(z)$ represent the probability density function of productivity shocks. Sector with a higher variance of productivity shocks has a larger fraction of firms in the tails - the range of activity where the firms adjust to the new conditions. Hence, as our working hypothesis suggests, more volatile sectors are more sensitive to regulations or institutional factors that

raise adjustment costs for firms, since they have a higher fraction of firms in the range of activity.

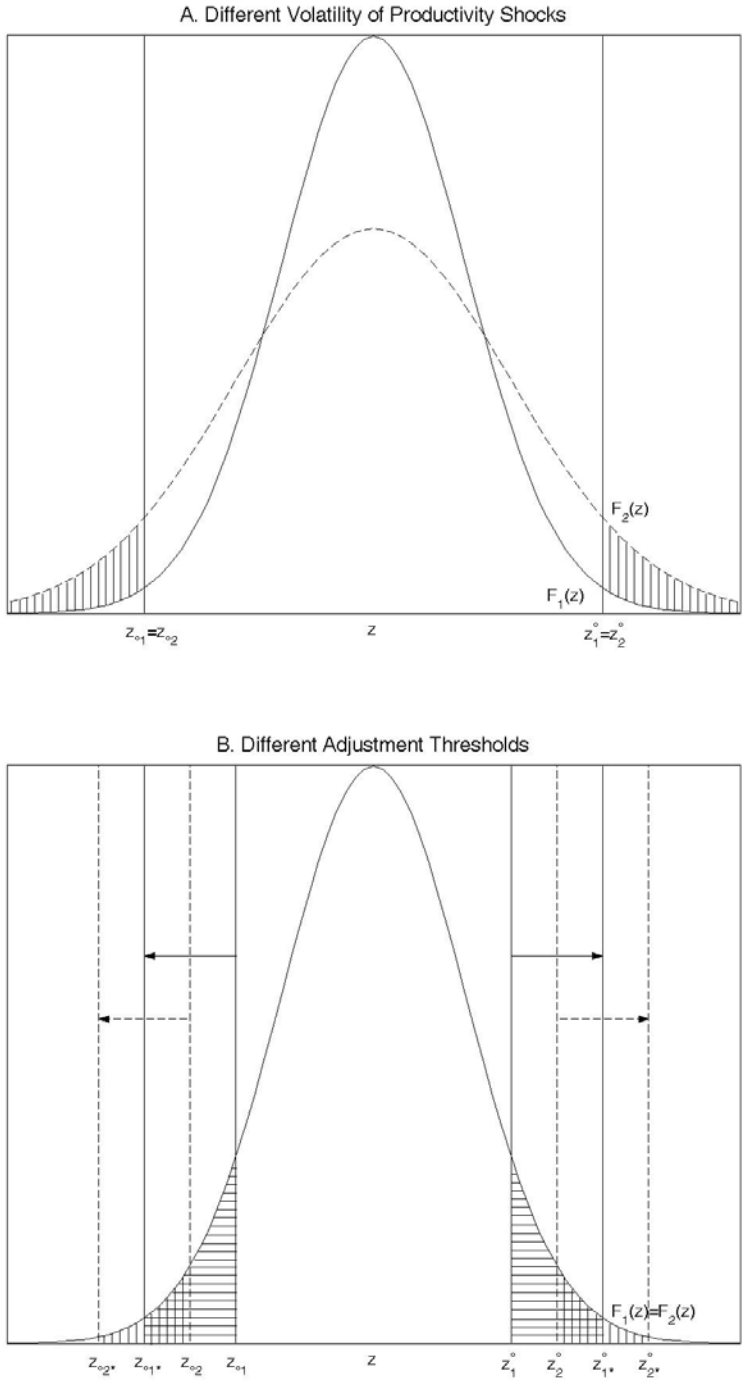
Second, Panel B of Figure 3 considers the case of two sectors with the same variance of productivity shocks; however sector 2 has higher adjustment costs and hence a wider range of inactivity (which is illustrated by $z_{o2} < z_{o1}$ and $z_2^\circ > z_1^\circ$). If adjustment costs in a country increase for both sectors because of more stringent regulations - for example, stricter employment protection legislation - the thresholds will be pushed to $z_{o1*} < z_{o1}$, $z_{1*}^\circ < z_1^\circ$, $z_{o2*} < z_{o2}$ and $z_{1*}^\circ < z_1^\circ$. Sectors with originally lower adjustment costs will be more adversely affected, since increase in adjustment costs will push a higher fraction of firms from the range of adjustment (reallocation) to the range of inactivity (no reallocation).

5.2 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]).[10] The test is constructed as follows: we identify an industry/size propensity for job reallocation from the United States data. Under the assumption that regulations in the labor and goods markets in the United States are among the least restrictive in our sample, variation in job reallocation across industry/size cells in the United States 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. The advantage of our approach compared to standard cross-country/cross-industry empirical studies 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 problems of omitted variable bias and other misspecifications.

[10]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. [2004]) and in the analysis of job flows (Micco and Pages [2004]).

Figure 3: Distribution of productivity shocks and fixed adjustment costs - two-sector case



Our different model specifications used in the empirical analysis can be summarized as follows:

i) *baseline specification*

$$JFlow_{sic} = \beta_0 + \beta_1 USJFlow_{si} + \sum_{c=1}^{C} \gamma_c D_c + \epsilon_{sic} \tag{2}$$

where D_c are country c ($c = 1, \ldots, C$) dummies, $USJflow_{si}$ is the U.S. job flow variable in size class s and industry i, and ϵ is the iid error term. This specification will give us a sense about the link between cross industry/size differences in gross job flows between the United States and other countries in our sample.

ii) *cross-sectional analysis of regulation*

$$JFlow_{sic} = \beta_0 + \beta_1 USJFlow_{si} + \beta_2 Regulation_c + \sum_{m=1}^{M} \delta_m D_m + \epsilon_{sic} \tag{3}$$

We have now added a regulatory variable that only varies across countries and thus requires removing the country dummies. To partially control for the omitted fixed effect, we can introduce regional dummies ($D_m, m = 1, \ldots, M$), although we have shown before that there is significant heterogeneity within each region.

iii) *difference-in-difference with interaction*

$$\begin{aligned} JFlow_{sic} =& \beta_0 + \beta_1 USJFlow_{si} + \beta_2 \left(USJflow_{si} Regulation_c\right) \\ &+ \sum_{c=1}^{C} \gamma_{r=c} D_c + \epsilon_{sic} \end{aligned} \tag{4}$$

Here we examine whether the difference in industry/size job flows between high and low volatility industry/size cells is smaller in highly regulated countries compared to the U.S. benchmark. By including the regulatory variable only in interaction with the U.S. job flow measure, we can control for unobserved country fixed effects.

The multivariate version of this specification, in which we consider more than one

regulatory variable together, can be written as follows:

$$JFlow_{sic} = \beta_0 + \beta_1 USJFlow_{si} + \sum_{k=1}^{K} \beta_{2,k} \left(USJflow_{si} Regulation_{c,k}\right) + \sum_{c=1}^{C} \gamma_{r=c} D_c + \epsilon_{sic} \tag{5}$$

where $k = 1, \ldots, K$ is the number of regulatory variables used.

The measure of job flows used in the empirical analysis is the sum of job creation and job destruction rates (sum). In Appendix B, we also report the same specifications discussed above for excess job reallocation, that is, the difference between the sum and the (absolute value of) net employment change. As shown in Appendix B, the results are largely unaffected by the use of this alternative measure of job flows.

All our variables are time averages over the available annual observations. The sample is unbalanced and covers fewer years for some countries than others (see Table 1). Time averaging allows us 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 (and thus could be captured by common time dummies). We also consider two sample periods: 1) 1989 to 2001, and 2) the same sample for OECD and Latin American countries and the sample from 1996 onwards for the transition economies. The choice of the second sub-sample 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 standard of the OECD countries, and also became more balanced within each industry/size cell. 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.

5.3 Regulations in Labor and Product Markets

Before moving into the analysis of the empirical results, we briefly discuss our regulatory indicators. 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 and Lawson [2004]). 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 practices, regulation of business activities and integrity of the legal system.

Despite other indicators available in the literature for developing and emerging economies (e.g., the World Bank Doing Business database), 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 11 for details on the regulatory variables).

Table 11: Institutional Variables, 1990s

OVERALL				
Variable	Mean	Std. Dev.	Min	Max
Hiring and Firing Practices	5.261	1.515	2.878	7.700
Law&Order adj. Hiring and Firing Practices	4.113	2.019	0.000	7.209
Business Regulations	3.490	1.389	1.100	5.900
Law&Order adj. Business Regulations	2.490	1.233	0.000	4.600
Law and Order	2.280	2.818	0.000	10.000
EU & USA				
Hiring and Firing Practices	5.427	1.804	2.878	7.400
Law&Order adj. Hiring and Firing Practices	5.084	1.559	2.878	6.600
Business Regulations	3.074	1.682	1.100	5.600
Law&Order adj. Business Regulations	2.822	1.349	1.100	4.600
Law and Order	0.469	1.121	0.000	3.000
LAC				
Hiring and Firing Restrictions	4.679	0.943	3.230	5.740
Law&Order adj. Hiring and Firing Restrictions	2.249	1.642	0.000	4.431
Business Regulations	4.206	1.297	2.617	5.900
Law&Order adj. Business Regulations	1.811	1.321	0.000	3.320
Law and Order	4.949	2.769	2.280	10.000
TRANSITION				
Hiring and Firing Restrictions	5.696	1.705	3.586	7.700
Law&Order adj. Hiring and Firing Restrictions	4.742	1.846	3.079	7.209
Business Regulations	3.323	0.669	2.650	4.200
Law&Order adj. Business Regulations	2.757	0.716	1.776	3.486
Law and Order	1.763	1.119	0.637	3.300

Source: Own calculations based on harmonized firm-level database and Gwartney and Lawson [2004].

The EFW indicator of hiring and firing restrictions 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 percent level.[11]

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: price controls; administrative conditions and new business; time with government bureaucracy; starting a new business; and irregular payments. These five indicators 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).

The EFW indicator of law and order is measured on a scale of 0 to 10, with 10 being the worst. The average of this indicator is highest in Latin America (4.95), followed by transition countries (1.76) and the OECD sample (0.47). Appendix A contains more detailed definitions of the variables used in our analysis.

5.4 The Baseline Specification

In our empirical investigation, we start with a baseline specification in which we only include the U.S. job flow benchmark and the country dummies (equation (2). We then test for differences in the estimated coefficient of the U.S. job flow benchmark across the three regions for which we have data (OECD countries, Latin America and transition economies). Further, we allow the coefficient of the U.S. job flow variable to vary by firm size class.

[11] 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 early 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 practices from the Fraser Institute 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).

Table 12 presents the results for these three alternative specifications and for the two samples discussed above (1989-2001 for all countries, and restricted to 1996-2001 for transition economies). As expected, the estimated coefficient of the U.S. job flow is 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 reallocation in the U.S. is less than one. This finding is interesting by itself since it suggests that market driven and technological factors are not perfectly correlated across countries. Or put differently, it is consistent with the view that countries around the world have factors that impede the reallocation process.[12]

If we then allow the coefficient on the U.S. job flow to vary by region (EU, Latin America and transition economies), we notice that there is a closer link between cross industry/size differences in gross job flows between the United States and the Latin American countries than between the United States and the European Union countries. If we restrict the analysis to the 1996-2001 period for the transition economies, we see that the estimated coefficient on U.S. job flows (column (5)) declines to a level that is not statistically different from that of the EU countries. In other words, as the process of economic transformation has progressed, the transition economies have seen the pace of job reallocation slow down and the cross-industry/size variance converge towards the values observed in the EU countries.

The next step in our preliminary analysis is to differentiate the coefficient on the U.S. job flow by firm size. Perhaps not surprisingly, we find 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 United States 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 frictionless economy. For larger firms, regulations are likely to be more binding, especially in those industries that are inherently more volatile.

[12] Appropriate caution needs to be used in interpreting the magnitude of the coefficient since measurement error can drive the coefficient below one. Still, we find it interesting that this coefficient is, in general, 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.

5.5 Regulations and Job Flows

The next step in our analysis is to look at the possible impact that labor regulations have on observed job flows (Table 13). We focus on the restricted sample for the transition economies as discussed above. The first specification (column (1)) is a simple cross-country estimate in which we include the U.S. job flow benchmark and the labor regulation indicator, but we do not interact the latter with the U.S. benchmark. These results are only preliminary, not least given the possible omitted variable bias due to the exclusion of country fixed effects. The estimated coefficient of the synthetic indicator of the stringency of hiring and firing regulations is negative and statistically significant at the 1 percent level. This result is largely unchanged if we allow the coefficient on the U.S. job flow benchmark to vary across the three regions (column (2)).

The next step is moving to the difference-in-difference analysis by focusing on the variation of job flows across industry/size classes within each country. Column (3) presents the basic model with the U.S. job flow benchmark and its interaction with the hiring and firing labor regulation variable, plus country fixed effects (as in equation (4) above). We find that the interaction term is negatively signed but not statistically significant at the conventional level. This result holds even if we differentiate the effect of labor regulations by region.

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 - varies across our sample of countries that include the OECD countries, 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 degree of enforcement of laws and regulations, we consider the law and order indicator from the Fraser Institute (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).[13] The indicator shows the highest compliance with laws and regulations in the OECD sample of countries (average of 0.56), followed with the transition economies (average of 1.76), and by the Latin American countries (average of 4.96).

To control for possibly differing degrees of enforcement of laws and regulations we

[13]Micco and Pages [2004] 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 Fraser 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.

adjust our regulatory variable as follows (R is the regulatory variable):[14]

$$R_{c,adj} = \left(1 - \frac{Law\&Order}{10}\right) \cdot R_c \tag{6}$$

Columns (5) and (6) in Table 13 show the estimated effect of the interaction between the U.S. job flow and the adjusted labor regulation variable without and with differentiation by region. It is indeed noticeable that, once we control for the difference in the degree of enforcement across countries, the interaction between hiring and firing regulations and U.S. job flows becomes strongly significant overall (column (5)), and in each of the sub regions (column (6)) when we allow the coefficient of the interaction to vary. In other words, once we control for enforcement, we find that 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. Interestingly, once we control for the enforcement of labor regulations, the estimated coefficient of the technology variable (the U.S. job flow benchmark) is closer to unity. Thus a significant fraction of less than perfect correlation in the magnitude of job flows in the countries in the sample with the United States can be explained by restrictive labor regulations that raise labor adjustment costs.

How sizeable is the estimated impact of labor regulation on job flows? Given our estimation approach, we consider the effect of labor regulations in reducing job reallocation between two industries at the extremes of the labor flexibility requirement. Using the coefficient on the interaction term in column (5) of Table 13, we estimate that the difference in job reallocation between industry/size cells with a high flexibility requirement (90^{th} percentile of the flexibility distribution in the United States) and industry/size cells with a low flexibility requirement (10^{th} percentile of the same distribution) will be 4.5 percentage points lower in a country with the highest index of hiring and firing regulations compared to the United States, the country with the least restrictive regulations. Considering that the average job reallocation rate is around 25 percent in the sample used in the regression, the estimated impact is indeed sizeable.[15]

[14] There is no indication in Gwartney and Lawson [2004] that the original regulatory variables consider the enforcement of regulations in addition to the statutes.

[15] The estimated value is obtained as follows:

$$\beta\left[\left(USJflow_{90^{th}} - USJflow_{10^{th}}\right)\left(HF_{max} - HF_{min}\right)\right]$$

where β is the estimated coefficient, and $USJflow$ and HF are the job reallocation in the United States and the indicator of hiring and firing regulations corrected for the degree of enforcement, respectively. Micco and Pages [2004], using a similar approach, estimated an impact of 5.7 percentage point. Their country sample and period of observation were different from ours but the results are close.

Table 12: Job Flows - A Baseline Difference-in-Difference Analysis

	1990s			**1990s, transition late 1990s**		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.0348***	0.0004	0.0524***	0.1153***	0.1376***	0.1810***
	[0.0100]	[0.0118]	[0.0118]	[0.0095]	[0.0109]	[0.0107]
USA SUM	0.7097***			0.6621***		
	[0.0183]			[0.0173]		
USA SUM *EU		0.5860***			0.5746***	
		[0.0288]			[0.0274]	
USA SUM *Transition		0.8282***			0.6878***	
		[0.0325]			[0.0308]	
USA SUM *LAC		0.7493***			0.7493***	
		[0.0329]			[0.0312]	
USA SUM *<20 Workers			0.5628***			0.5385***
			[0.0227]			[0.0215]
USA SUM *20-49 Workers			0.3975***			0.3875***
			[0.0317]			[0.0301]
USA SUM *50-99 Workers			0.3157***			0.3169***
			[0.0351]			[0.0333]
USA SUM *100+ Workers			0.1764***			0.2090***
			[0.0566]			[0.0537]
Observations	935	935	935	940	940	940
Adjusted R-squared	0.69	0.70	0.74	0.69	0.69	0.73

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. All regressions include country dummies. USA SUM: industry/size job reallocation in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America.

Source: Own calculations based on harmonized firm-level database.

Table 13: Job Flows and the Role of Labor Regulations (Difference-in-Difference Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.1815***	0.2062***	0.0930***	0.0360***	0.0016	0.0513***
	[0.0341]	[0.0354]	[0.0290]	[0.0138]	[0.0100]	[0.0140]
USA SUM	0.6588***		0.8417***	0.7047***	0.8602***	0.8541***
	[0.0426]		[0.2010]	[0.0835]	[0.1016]	[0.0490]
USA SUM *EU		0.5660***				
		[0.0390]				
USA SUM *Transition		0.6876***				
		[0.0466]				
USA SUM *LAC		0.7501***				
		[0.1050]				
EPL	-0.0191***	-0.0190***				
	[0.0042]	[0.0042]				
USA SUM *EPL			-0.032			
			[0.0311]			
USA SUM *EPL (Adj)					-0.0452**	
					[0.0182]	
USA SUM *EPL *EU				-0.0211		
				[0.0138]		
USA SUM *EPL (Adj) *EU						-0.0484***
						[0.0097]
USA SUM *EPL *Transition				-0.0057		
				[0.0146]		
USA SUM *EPL (Adj) *Transition						-0.0361***
						[0.0113]
USA SUM *EPL *LAC				0.0127		
				[0.0182]		
USA SUM *EPL (Adj) *LAC						-0.0450**

Continued on next page.

Table 13: Job Flows and the Role of Labor Regulations (Difference-in-Difference Analysis) (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
						[0.0183]
Observations	940	940	940	940	940	940
Adjusted R-squared	0.55	0.56	0.69	0.69	0.69	0.69

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. Columns (1) and (2) include region dummies. Columns (3)-(6) include country dummies. USA SUM: industry/size job reallocation in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America. EPL is the index of stringency of hiring and firing regulations. EPL (Adj) is the indicator of hiring and firing adjusted to take into account different degrees of enforcement of regulations (see main text).

Source: Own calculations based on harmonized firm-level database.

5.6 The Differential Effects of Regulations on Small and Large Firms

The next step in our analysis is to look at the possibly different effect of labor regulations on job flows of firms of different sizes. Table 14 presents regressions in which we estimate the coefficient on the interaction between the benchmark U.S. job flow and the hiring and firing regulatory indicator for firms of different sizes. Column (1) considers the hiring and firing indicator without controlling for the different degree of enforcement of laws and regulations. Interestingly, once the interaction effect is allowed to vary across firm size classes, the estimated effect is negatively signed and statistically significant at the conventional level for all size classes. Moreover, the estimated impact of stringent regulations on the variance of job flows across industries increases with firm size. As hypothesized above, smaller firms are often either exempt from certain regulations or can more easily stay below the radar screen of regulators and law enforcement authorities. The estimated negative impact of labor regulations on job flows is almost twice as strong in large firms (more than 100 employees) compared to micro units (fewer than 20 employees).

Column (2) of Table 14 presents a similar specification in which we control for the different degree of enforcement of regulations. Controlling for such effects yields larger coefficients and a larger magnitude of the impact of labor regulations on job flows. As in the previous case, the estimated effect of labor regulations increases with the size of firms.[16]

Appropriate care and caution is required to interpret the interaction effects estimated in Table 14 with respect to employer size. Recall that small businesses systematically have higher job reallocation rates than larger businesses in all countries including the U.S. benchmark. As such, the results in Table 13 imply that industry/size cells with a higher U.S. benchmark will have the flow reduced by labor market regulations that are enforced. For Table 14, this implies that in comparing coefficients across size class interactions, the magnitudes are comparable for a given U.S. benchmark rate. That is, the absolute effect is larger for large businesses than small businesses for a given U.S. benchmark rate. But given that small businesses have a higher U.S. benchmark rate this variation tends to work in the opposite direction.

Another step in our analysis is aimed at assessing the robustness of our results to the inclusion of regulations in the goods and services markets in our specification. As discussed above, 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

[16] Also in this case, the results are robust to the use of the excess labor reallocation. See Appendix B for more details.

Table 14: Job Flows by Firm Size - the Role of Labor and Product Market Regulations (Difference-in-Difference Analysis)

	(1)	(2)	(3)	(4)
Constant	0.1225***	0.0753***	0.1150***	0.0660***
	[0.0126]	[0.0131]	[0.0109]	[0.0147]
USA SUM	0.8379***	0.8579***	0.8401***	0.8371***
	[0.0700]	[0.0409]	[0.0988]	[0.0435]
USA SUM *EPL (Adj)			-0.0546**	
			[0.0203]	
USA SUM *EPL *<20 workers	-0.0499***			
	[0.0124]			
USA SUM *EPL (Adj) *<20 workers		-0.0632***		-0.0540***
		[0.0090]		[0.0139]
USA SUM *EPL *20-49 Workers	-0.0739***			
	[0.0129]			
USA SUM *EPL (Adj) *20-49 Workers		-0.0895***		-0.0649***
		[0.0100]		[0.0188]
USA SUM *EPL *50-99 Workers	-0.0853***			
	[0.0131]			
USA SUM *EPL (Adj) *50-99 Workers		-0.1012***		-0.0793***
		[0.0104]		[0.0206]
USA SUM *EPL *100+ Workers	-0.0997***			
	[0.0148]			
USA SUM *EPL (Adj) *100+ Workers		-0.1140***		-0.0537*
		[0.0133]		[0.0319]
USA SUM *Bus. Reg. (Adj)			0.0235	
			[0.0255]	
USA SUM *Bus. Reg. (Adj) *<20 Workers				-0.0096
				[0.0225]
USA SUM *Bus. Reg. (Adj) *20-49 Workers				-0.037
				[0.0309]
USA SUM *Bus. Reg. (Adj) *50-99 Workers				-0.0321
				[0.0338]
USA SUM *Bus. Reg. (Adj) *100+Workers				-0.1003*
				[0.0530]
Observations	940	940	940	940
Adjusted R-squared	0.73	0.73	0.69	0.73

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. All regressions include country dummies. USA SUM: industry/size job reallocation in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America. EPL is the index of stringency of hiring and firing regulations. EPL (Adj) is the indicator of hiring and firing adjusted to take into account different degrees of enforcement of regulations (see main text). Bus. Reg. is the indicator of the stringency of business regulations. Bus. Reg. (Adj) is the same indicator adjusted to take into account different degrees of enforcement of regulations.

Source: Own calculations based on harmonized firm-level database.

on the goods and services markets. 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. Likewise, 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.

Columns (3) and (4) of Table 14 show the results of estimating the job flow regressions controlling for our synthetic indicator of business regulations. We correct both labor and product market regulations by the degree of enforcement proxied by the law and order indicator. In column (3), we do not differentiate the interactions between U.S. reallocation and regulations by firm size, while we do so in the last column of the table. Including the interaction between product market regulations and U.S. job flows does not dramatically alter our results. Whether we differentiate the impact of regulations by firm size or not, the estimated effects of the interaction between U.S. job reallocation and labor regulations remain negatively signed and highly statistically significant, while the coefficients on the product market regulations are generally not statistically significant. However, once we differentiate effects by firm size, we notice that the only statistically significant effect of product market regulations is among large businesses (greater than 100 employees). Moreover, controlling for product market regulations reduces the estimated impact of labor regulations for those firms. In other words, for large firms product market regulations play an important role in curbing labor reallocation over and above labor regulations. Intermediate firms (those in between 20 and 99 employees) seem to be the most adversely affected by stringent labor regulations that raise labor adjustment costs. In terms of magnitude, note that stringent labor market regulation is associated with a 4.4 percentage points drop in job reallocation for micro firms, 3.7 percentage points drop for small firms, 4.1 percentage points drop for medium firms, and a 1.6 percentage points drop in job reallocation for large firms. Stringent product market regulation, on the other hand, has the largest impact on job reallocation by large firms: it is associated with a 1.9 percentage points drop.[17]

[17]We obtain these magnitudes by multiplying the coefficient by the standard deviation of enforcement adjusted regulatory variables and average U.S. job reallocation in the corresponding cell.

5.7 Do regulations influence the various margins of labor reallocation differently?

So far we have focused on the effects of regulations in labor and product markets on overall job reallocation. In this section we want to explore 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 15).[18] Column (1) shows that cross-cell variation in job reallocation by entering and exiting firms in the Latin American countries is very similar to the variation observed in the United States, which is the reason for the close link between cross industry/size variation in job reallocation between the United States and the Latin American countries (see Table 14), given that the coefficient on U.S. job reallocation for continuing firms in Latin America is much lower in magnitude (see column (2) of Table 15). The link between cross industry/size differences in job reallocation is not as close between the United States and the EU and transition countries, and there is not much difference in the strength of the link for entering/exiting businesses and for continuing businesses.

Column (3) of Table 15 shows the results of estimating the job flow regressions for entering and exiting firms, controlling for labor and product market regulations corrected by the degree of enforcement and differentiating the impact of both by firm size. Column (4) does the same for continuing firms. The results suggest a negative and statistically significant effect of labor market regulation (interacted with U.S. job reallocation) on labor mobility generated by entering and exiting firms for all but large firms. The coefficients are also more than twice as large in magnitude as the corresponding coefficients in column (4) of Table 14, and they are about the same magnitude for micro, small and medium entering and exiting firms. However, in order to correctly assess the magnitude of the impact, we need to remember that the magnitude of job reallocation varies significantly by size class. Taking that into account, note that stringent labor market regulation has the biggest impact on job reallocation by micro entering and exiting firms: it is associated with a 4.6 percentage points drop in job reallocation by such firms. The impact on small, medium and large firms is lower: stringent labor market regulation is associated with a 2.5, 2.2 and 0.5 percentage points drop in job reallocation, respectively.

The estimated effects of product market regulation (interacted with U.S. job reallo-

[18] 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 entries and exits are largely part of a creative destruction process in which entry and exit reflect within sector reallocation reflecting idiosyncratic differences across firms within sectors (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]).

Table 15: Job Flows by Firm Size, Entering, Exiting and Continuing Firms - the Role of Labor and Product Market Regulations (Difference-in-Difference Analysis))

	Entry & Exit	Continuers	Entry & Exit	Continuers
	(1)	(2)	(3)	(4)
Constant	-0.0074	0.0241**	0.0232***	0.0610***
	[0.0054]	[0.0094]	[0.0058]	[0.0116]
USA SUM			1.0809***	0.4742***
			[0.0454]	[0.0615]
USA SUM *EU	0.5730***	0.5118***		
	[0.0307]	[0.0372]		
USA SUM *Transition	0.6835***	0.6133***		
	[0.0345]	[0.0418]		
USA SUM *LAC	0.9982***	0.4942***		
	[0.0341]	[0.0427]		
USA SUM *			-0.1542***	-0.0018
EPL (Adj) *<20 workers			[0.0137]	[0.0179]
USA SUM *			-0.1483***	-0.0418*
EPL (Adj) *20-49 Workers			[0.0212]	[0.0219]
USA SUM *			-0.1636***	-0.0557**
EPL (Adj) *50-99 Workers			[0.0277]	[0.0226]
USA SUM *			-0.1148	-0.0722**
EPL (Adj) *100+ Workers			[0.0738]	[0.0304]
USA SUM *			0.1010***	0.0007
Bus. Reg. (Adj) *<20 Workers			[0.0220]	[0.0288]
USA SUM *			0.0034	0.0404
Bus. Reg. (Adj) *20-49 Workers			[0.0347]	[0.0357]
USA SUM *			-0.0208	0.0546
Bus. Reg. (Adj) *50-99 Workers			[0.0450]	[0.0368]
USA SUM *			-0.2452**	0.0599
Bus. Reg. (Adj) *100+Workers			[0.1205]	[0.0504]
Observations	946	934	946	934
Adjusted R-squared	0.69	0.55	0.75	0.58

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. All regressions include country dummies. USA SUM (Entry & Exit): industry/size job reallocation due to entering and exiting firms in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America. EPL is the index of stringency of hiring and firing regulations. EPL (Adj) is the indicator of hiring and firing adjusted to take into account different degrees of enforcement of regulations (see main text). Bus. Reg. is the indicator of the stringency of business regulations. Bus. Reg. (Adj) is the same indicator adjusted to take into account different degrees of enforcement of regulations.

Source: Own calculations based on harmonized firm-level database.

cation) on job flows by entering and exiting firms is not significant for small and medium firms, and is negative and significant for large firms, while it is surprisingly positive for micro firms. Given all the controls and interactions in this setting, care needs to be applied in intepreting the coefficients. However, the results suggest that labor market regulations have a relatively larger adverse impact on entry and exit for micro firms while product mar-

ket regulations have a relatively larger adverse impact on the entry and exit of larger firms. For continuing firms, labor market regulation is more important than product market regulation, as the results in column (4) demonstrate. The coefficients are smaller in magnitude than the ones in column (4) of Table 14, but the basic result holds: the estimated impact of stringent regulations on the variance of job flows across industries increases with firm size. Stringent labor market regulation is associated with a 1.9, 2.1 and 1.7 percentage points drop in job reallocation by continuing large, medium and small firms, respectively. However, we can now see that the impact on larger firms is through the impact on larger continuing firms.

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. However, controlling for other regulations influencing firm behavior also influences job flows. In addition, labor market regulations are especially important for entering and exiting firms, especially for micro, small and medium firms, which presumably face more hardship in adjusting to changing market conditions (for example, demand) than large firms and find labor market regulations (such as firing costs) too restrictive. Even though small firms are often either exempt from certain regulations or can more easily stay below the radar of regulators, this appears to be easier for continuing small firms than for entering or exiting small firms. The impact of labor market regulations on larger firms is primarily on the adjustment of labor for continuing firms.

5.8 Sensitivity Analysis

In the empirical analysis, we control for country, industry and 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. However, the use of quasi panel data may still run the risk that results are driven 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.

To test for the robustness of results to changes in the sample, we re-estimate our two preferred specifications - columns (2) and (4) in Table 14 - removing one country or one industry at a time from the sample. Figures 4 and 5 present the estimated coefficients on enforcement-adjusted hiring and firing regulations interacted with job reallocation in the United States, differentiated by size classes, in the specification without and with control

for business regulations.

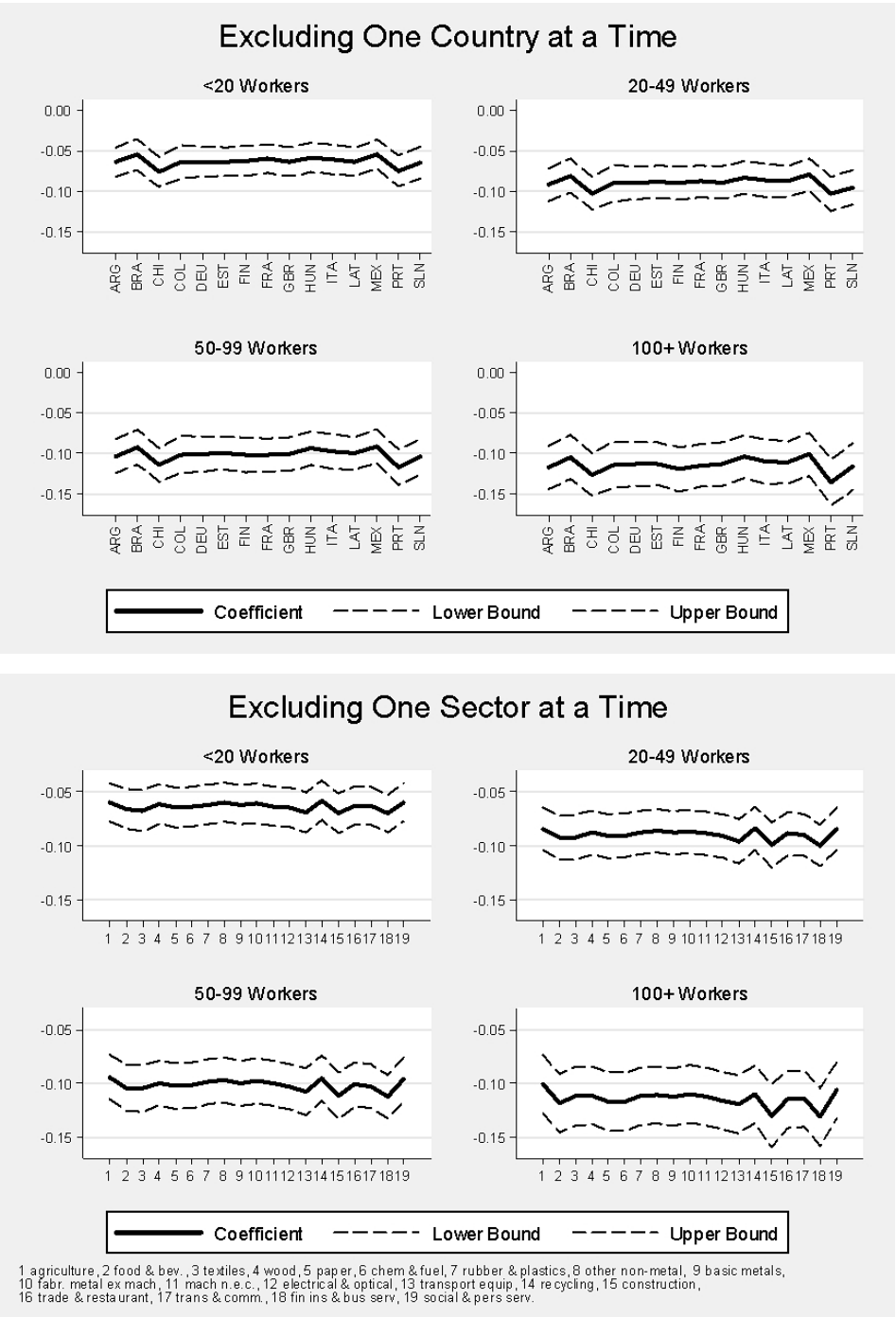
The results show a remarkable stability of the estimated coefficient for the interaction term to changes in the sample along the country or the industry dimension. The point coefficient estimates for the interaction term are always negative and statistically significant. The most sensitive coefficients are those for the largest size class - 100 or more employees - where the exclusion of Chile or Portugal leads to a stronger estimated effect of regulations. Not surprisingly given the unbalanced nature of the sample, the exclusion of finance and business activities as well as construction tend to strengthen the estimated negative effects of regulations on job reallocation.

6 Conclusion

This paper exploits a rich new database with harmonized 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 sizeable 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 (e.g., over 50 percent of the variation in the summary measure of job reallocation is accounted for by industry and size effects interacted together). Interestingly, the most important factor here is employer size. Small businesses exhibit a substantially higher pace of job creation and destruction and this pattern is pervasive across industries and countries. Moreover, industry effects play a large role as well. Taken together, it is clear that some form of 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.

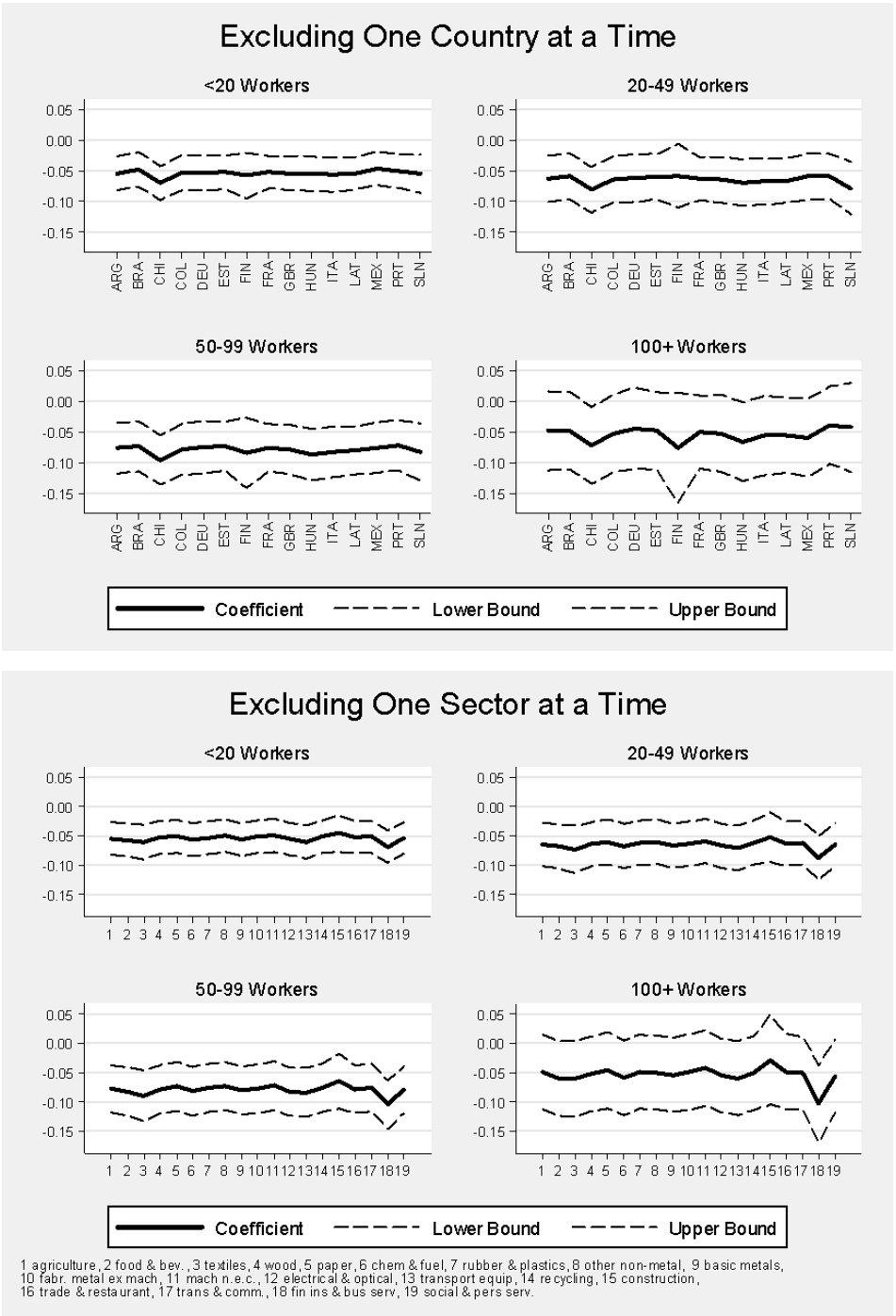
Our harmonized firm-level dataset allows us to look at two factors shaping the business environment - regulations on the hiring and firing of workers and business regulations. To minimize the possible endogeneity and omitted variable problems associated with cross-country regressions, we use a difference-in-difference 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 United States patterns as a benchmark to identify and quantify industry/size class cells with inherently higher job turnover. Labor regulations also distort the patterns of flows across industry and size classes within a coun-

Figure 4: Sensitivity Analysis: Estimated Coefficient on Enforcement Adjusted Hiring and Firing Regulations Interacted with U.S. Job Reallocation and 95% Confidence Intervals, Excluding One Country or One Sector at a Time, Labor Market Regulations (Column (2) from Table 14)



Source: Own calculations based on harmonized firm-level database.

Figure 5: Sensitivity Analysis: Estimated Coefficient on Enforcement Adjusted Hiring and Firing Regulations Interacted with U.S. Job Reallocation and 95% Confidence Intervals, Excluding One Country or One Sector at a Time, Labor and Product Market Regulations (Column (4) from Table 14)



Source: Own calculations based on harmonized firm-level database.

try. Interestingly, even though medium and large firms have lower average flows, holding the magnitude of the U.S. benchmark rates constant, medium and large firms are more severely affected by stringent labor regulations within a country. Labor reallocation by existing small firms is less affected (for a given pace of reallocation in the U.S. benchmark), probably because they are in some cases exempt from such regulations or can more easily circumvent them. However, stringent labor regulations disproportionally affect the entry and exit of small firms and their associated job creation and destruction. Overall, business regulations have a smaller impact than labor regulations on job flows. Business regulations seem to affect mainly the entry and exit of larger businesses and the associated job reallocation.

Much work remains to be done to understand the implications of our findings. They 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 across time, industries and countries in the level and growth of productivity (see, e.g., Foster et al. [2001] and Bartelsman et al. [2005]). 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.

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A Definitions of Institutional Variables

Variable	Definition
Hiring and Firing Practices	Flexibility in hiring and firing (5B(ii)) from Fraser Institute, hiring and firing practices 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 Fraser Institute (World Economic Forum: Global Competitiveness Report); scale [0,10], 10 being the worst.
Law and Order	Integrity of Legal System (2e) from Fraser Institute, which is based on Political Risk Component I (Law and Order) from the International Country Risk Guide; scale [0,10], 10 being the worst.

B Results for Excess Job Flows

Table B.1: *Job Flows - A Baseline Difference-in-Difference Analysis*

	1990s			**1990s, transition late 1990s**		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.1048***	0.1351***	0.1513***	-0.0279***	0.0022	0.0256**
	[0.0094]	[0.0106]	[0.0119]	[0.0090]	[0.0106]	[0.0118]
USA EXC	0.6900***			0.6795***		
	[0.0186]			[0.0181]		
USA EXC *EU		0.5602***			0.5624***	
		[0.0292]			[0.0287]	
USA EXC *Transition		0.7596***			0.7223***	
		[0.0335]			[0.0322]	
USA EXC *LAC		0.7878***			0.7854***	
		[0.0329]			[0.0323]	
USA EXC *<20 Workers			0.5973***			0.5867***
			[0.0270]			[0.0259]
USA EXC *20-49 Workers			0.4793***			0.4501***
			[0.0376]			[0.0360]
USA EXC *50-99 Workers			0.4102***			0.3829***
			[0.0429]			[0.0410]
USA EXC *100+ Workers			0.3491***			0.3311***
			[0.0741]			[0.0712]
Observations	933	933	933	937	937	937
Adjusted R-squared	0.66	0.68	0.69	0.68	0.68	0.71

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. All regressions include country dummies. USA EXC: industry/size job reallocation in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America.

Table B.2: *Job Flows and the Role of Labor Regulations (Difference-in-Difference Analysis)*

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.1649***	0.1946***	-0.0217*	-0.0104	-0.006	0.0056
	[0.0278]	[0.0292]	[0.0113]	[0.0130]	[0.0113]	[0.0131]
USA EXC	0.6769***		0.8363***	0.6473***	0.8892***	0.8457***
	[0.0516]		[0.2100]	[0.0888]	[0.1267]	[0.0507]
USA EXC *EU		0.5542***				
		[0.0449]				
USA EXC *Transition		0.7208***				
		[0.0566]				
USA EXC *LAC		0.7893***				
		[0.1196]				
EPL	-0.0193***	-0.0192***				
	[0.0035]	[0.0035]				
USA EXC *EPL			-0.0279			
			[0.0322]			
USA EXC *EPL (Adj)					-0.0479*	
					[0.0225]	
USA EXC *EPL *EU				-0.0137		
				[0.0147]		
USA EXC *EPL (Adj) *EU						-0.0496***
						[0.0100]
USA EXC *EPL *Transition				0.0101		
				[0.0156]		
USA EXC *EPL (Adj) *Transition						-0.0270**
						[0.0119]
USA EXC *EPL *LAC				0.0319*		
				[0.0190]		
USA EXC *EPL (Adj) *LAC						-0.0248
						[0.0185]
Observations	937	937	937	937	937	937
Adjusted R-squared	0.58	0.59	0.68	0.69	0.68	0.69

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. Columns (1) and (2) include region dummies. Columns (3)-(6) include country dummies. USA EXC: industry/size job reallocation in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America. EPL is the index of stringency of hiring and firing regulations. EPL (Adj) is the indicator of hiring and firing adjusted to take into account different degrees of enforcement of regulations (see main text).

Table B.3: *Job Flows and the Role of Labor and Product Market Regulations (Difference-in-Difference Analysis)*

	(1)	(2)	(3)	(4)
Constant	0.0332***	0.0456***	0.0004	0.0490***
	[0.0128]	[0.0140]	[0.0081]	[0.0161]
USA EXC	0.8424***	0.8897***	0.8605***	0.8604***
	[0.0769]	[0.0436]	[0.1181]	[0.0464]
USA EXC *EPL (Adj)			-0.0619**	
			[0.0254]	
USA EXC *EPL *<20 workers	-0.0432***			
	[0.0137]			
USA EXC *EPL (Adj) *<20 workers		-0.0612***		-0.0696***
		[0.0100]		[0.0167]
USA EXC *EPL *20-49 Workers	-0.0653***			
	[0.0144]			
USA EXC *EPL (Adj) *20-49 Workers		-0.0846***		-0.0876***
		[0.0112]		[0.0226]
USA EXC *EPL *50-99 Workers	-0.0772***			
	[0.0148]			
USA EXC *EPL (Adj) *50-99 Workers		-0.0977***		-0.1140***
		[0.0119]		[0.0255]
USA EXC *EPL *100+ Workers	-0.0823***			
	[0.0178]			
USA EXC *EPL (Adj) *100+ Workers		-0.0980***		-0.0881**
		[0.0167]		[0.0433]
USA EXC *Bus. Reg. (Adj)			0.0342	
			[0.0320]	
USA EXC *Bus. Reg. (Adj) *<20 Workers				0.0245
				[0.0270]
USA EXC *Bus. Reg. (Adj) *20-49 Workers				0.0151
				[0.0369]
USA EXC *Bus. Reg. (Adj) *50-99 Workers				0.0385
				[0.0417]
USA EXC *Bus. Reg. (Adj) *100+Workers				-0.0074
				[0.0711]
Observations	937	937	937	937
Adjusted R-squared	0.71	0.71	0.68	0.71

Standard errors in brackets. *significant at 10%, **significant at 5%, ***significant at 1%. All regressions include country dummies. USA EXC: industry/size excess job reallocation in the United States. EU denotes the OECD European countries. Transition denotes the countries in Central and Eastern Europe. LAC denotes the countries in Latin America. EPL is the index of stringency of hiring and firing regulations. EPL (Adj) is the indicator of hiring and firing adjusted to take into account different degrees of enforcement of regulations (see main text). Bus. Reg. is the indicator of the stringency of business regulations; Bus. Reg. (Adj) is the same indicator adjusted to take into account different degrees of enforcement of regulations.