Preliminary Version

THE ECONOMIC EFFECTS OF EMPLOYMENT PROTECTION LAWS

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Abstract

This paper examines the economic effects of employment protection legislation in a sample of developed and developing countries. By implementing a differences-in-differences test we lessen the potentially severe endogeneity and omitted variable problems associated with cross-country regressions. This test is based on the hypothesis that job security regulations are more binding in sectors of activity exposed to higher variability in demand or supply shocks. Our analysis indicates that more stringent employment protection legislation slows down job turnover by a significant amount, and that this effect is more pronounced in sectors intrinsically more volatile. We also find that employment and value added in the most affected sectors declines. Such employment effects are entirely driven by a reduction in the entry of new plants in those sectors. In contrast, average employment per plant is not affected.

Keywords: Employment Protection Legislation, Employment Reallocation, Gross Job Flows, Employment and Firm Entry and Exit.

JEL Code: J23, J32, J63

1. Introduction

The effect of labor market regulations, and in particular, the effect of employment protection laws has sparked an ongoing debate among economists on the relative benefits and costs of such regulations.[1] The empirical evidence has not helped to settle the debate. A large body of literature mostly based on cross country analysis for industrial countries has lead to ambiguous results. While some studies find that employment protection regulations have important effects on employment adjustment, turnover, employment or unemployment, others find no evidence of such effects.

The lack of conclusive results may respond to various factors. First, while theoretical models offer clear predictions regarding some of the expected effects, as it is for instance in the case of the expected effects on turnover, they do not offer clear predictions on what are the expected effects of EPL on employment or value added. Employment protection laws reduce firms incentives to adjust labor in the face of supply or demand shocks, but do not necessarily reduce average employment of existing firms (Bertola (1990)). Hopenhayn and Rogerson (1993) however, argue about the importance of firm entry and exit as one important margin affected by the laws. In their model, calibrated to US parameters, an increase in the adjustment costs would significantly reduce employment rates as a result of a decline in (net) entry. The empirical literature however has not paid much attention to the possible differences in effects in the extensive and intensive margins.[2]

Another important issue is that as stated by Freeman (2005), determining the effect of labor institutions is a difficult endeavor. First of all, labor regulations change very infrequently and tend to be applied at the national level for all workers. From the econometrician point of view this situation implies very little variation either over time, across workers or across geographic locations.[3] Most studies resort to cross country differences in institutions and outcomes as the

[1] See for example, Freeman 2005 for a description of the state of this debate.
[2] Klapper et al (2004) is an exception.
[3] An exception to this situation are the studies for the United States or the study of Besley and Burgess (2004) for India.

only existing sources of variation. Such estimates, however, are not sufficiently reliable. First, most studies rely on a limited number of industrial countries to extract inferences. In most studies, the small number of countries combined with insufficient time variation does not allow to control for unobserved country differences, greatly increasing the likehood of omitted variable bias. Second, many studies fail to control for the likely endogeneity of regulations. Let us consider, for example, the relationship between employment protection and job flows. Countries that experience high turnover rates may have a high demand for strict employment protection legislation. This implies that cross-country studies are likely to be upward biased, which in turn, it may explain the lack of relationship that the literature has found between these two variables.[4] Other examples of such endogeneity do easily come to mind. For example, countries with low employment creation may tend to protect existing jobs. Another important problem is that cross-section estimates do not account for the fact that some outcome measures are measured differently across countries, which introduces substantial measurement error into the dependent variable. Thus, for instance, in some countries job reallocation is measured at the firm level, while in others, it is collected from plant-level information. The two measures are not strictly comparable because firm-level data miss the reallocation that occurs within plants.

This paper proposes a new method to estimate the economic effect of employment regulations that surmounts many of the problems faced by existing estimates. Following Rajan and Zingales (1998), this test exploits differences across sectors to implement a differences-in-differences methodology.[5] In the context of a simple model we show that sector differences in the intrinsic variability of demand and supply shocks lead to differential effects of employment protection across sectors. For example, industries with volatile demand require frequent and sizable adjustments in factors, while other industries characterized by stable product markets will only require small adjustments in labor and capital. In this setup regulations are more binding in industries that require more flexibility. This is the inference that we test in our empirical model.

To identify an industry's intrinsic demand for adjustment we first study the correlation of

[4] An exception is Caballero et al. (2004).

[5] Differences-in-differences methodologies exploiting sector differences have been applied in the corporate literature (Claessens and Laeven (2002), Galindo, Micco and Ordoñez (2001), Galindo and Micco (2002), and Raddatz (2002)).

industry job flows across countries and find that this is very large; across countries, some industries tend to exhibit higher levels of job reallocation. This suggests that there are important technological or product market characteristics that determine the volatility of a sector. Of course, observed sector reallocation is itself affected by labor market institutions. Yet, to the extent that institutions only affect the level but not the ranking of sector reallocation within a country, the observed correlation across countries would be a conservative estimate of the true correlation in absence of labor market regulations. Under this assumption, we identify the intrinsic relative employment volatility of an industry by the level of job reallocation of that industry in the United States, which according to many measures has the least restrictive employment protection regulation in our sample. Therefore, U.S. sector volatility constitutes a good proxy of sector volatility in absence of adjustment costs. In fact, our approach only requires the weaker assumption that the U.S. sector ranking is not affected by employment regulations. In addition, our results are robust to other baseline choices. The next step consists in identifying whether industries that require higher levels of reallocation exhibit lower rates of turnover, employment, value added and firm entry relative to more stable sectors in countries with more stringent job regulations.

To implement these tests, we construct two data bases at the industry level. Contrary to most existing literature, which is based solely on industrial countries, our study relies on a larger sample of developed and developing countries. The data bases contain information on turnover (at two digit), employment, value added and number of plants for the manufacturing sector (at two and three digit). We complement this data with some newly available measures of the regulatory environment. Since these are *de jure* measures, which compare labor laws according to what is written in the labor codes, we also control for differences in the level of enforcement of labor laws. The results indicate that employment protection reduces job flows and that this is particularly the case in industries that require a higher level of reallocation. We find that these effects occur both within the sample of developed and developing countries, but the effects are stronger in countries with better law enforcement (proxied by rule of law measures). We also find that employment and value added of the most affected sectors decline in relative term. Such employment effects are entirely driven by a reduction in the entry of new plants in those sectors. In contrast, average employment per plant is not affected. We find our results to be very robust

to changes in specification, sample period, countries in sample, control variables or estimation method.

The rest of this paper is organized as follows. Section 2 motivates and describes the empirical framework using a simple model. Section 3 presents the data used as well as the methodology to identify sectors in which regulations are more binding. Section 4 describes the main results for job reallocation, employment, value added and number of plants. Finally, Section 5 concludes.

2. A Simple Theoretical Framework and Empirical Specification

Our empirical work is based on the notion that some industries require more flexibility than others in adjusting their employment levels. Firms in industries that face high volatility in their product demand or in their technologies are likely to require more flexibility than firms in more stable sectors. In the textile sector, for example, the swings of fashion imply that demand for a certain product or material varies substantially from one year to the next. Therefore, regulations that impede adjustment are expected to be more binding in sectors that require greater flexibility. In this section we develop a simple dynamic labor demand model to illustrate this idea and to provide theoretical support for our empirical specification.

2.A Simple Model

We use a simple adjustment costs model à la Calvo (1983) to describe the effect of labor rigidities on job reallocation, firm expected profits, number of firms in the market and total employment at the industry level. In this model adjustment costs affect more these variables in sectors with high intrinsic volatility (demand and supply shocks). First, we solve the model assuming no adjustment costs and then we introduce such costs.

Consider an environment where firm i faces the following quadratic profit function[6]

$$\Pi(A, L) = A^{Z}_{ijct} L_{ijct} - \tfrac{1}{2} L^{2}_{ijct}$$

where L_{ijct} represents the level of employment of firm i in sector j, country c and period t ,and A_{ijct}, the profit shifter, summarizes the demand and supply shocks. For each firm, A_{ijct} is a

[6] This profit function comes from a linear demand function and constant marginal cost.

random variable with support $[\underline{A}, \overline{A}]$ and cumulative distribution function $F_{jc}(A)$ which is independent of past values.[7]

In each sector there is a large (unbounded) pool of prospective entrants. To enter, firms must first pay a sunk cost ?i, which is distributed among the continuum of potential producers with a continuous cumulative distribution G(). Firms draw their initial profit parameter *A* after they pay the entry sunk cost but before they decide their initial level of employment.[8]

Results without Adjustment Costs

In this setting, with free mobility of labor (lack of adjustment costs), the desired level of employment (the static optimum) is $L^*_{ijct} = A_{ijct}$ and the expected present value of future profits is given by $\frac{1}{1-b}\int \Pi(A, L^*) dF_{jc}(A) = \frac{1}{(1-b)}\frac{1}{2}E(A^2 \mid_{jc})$, where ß is the discount rate and E(|jc) is the expectation operator conditional to be in sector j and country c.[9] Under these assumptions, the free entry condition implies that the fraction of potential producers in the market is G($\frac{1}{(1-b)}\frac{1}{2}E(A^2 \mid_{jc})$).[10] The expected future profits as well as the number of firms in the market are constant time invariant. Finally, in this setup sector job reallocation, defined a la Haltiwanger et al (1999), is equal to $SUM^*_{jc} = \frac{E(\mid A_t - A_{t-1} \parallel_{jc})}{E(A \mid_{jc})}$.[11] We also define an alternative measure of job reallocation than only use the first and second moment of A: $^{a}SUM^*_{jc} = \frac{\sum_{i\in jc}(L_{ijct} - L_{ijct-1})^2}{\sum_{i\in jc} L_{ijct} + \sum_{i\in jc} L_{ijct-1}} = \frac{\mathrm{var}(L_{ijct} - L_{ijct-1} \mid_{jc})}{2E(L \mid_{jc})} = \frac{Var(A \mid_{jc})}{E(A \mid_{jc})}$.

Results with Adjustment Costs

With adjustment costs à la Calvo (1983), in which entrepreneurs face an exogenous constant

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[7] $\underline{A}$ is positive. The profit coefficient A may be correlated within sectors and countries: cov(A_{ijct} , A_{ijct-t})=0 but cov(A_{hjct} , A_{ijct})?0 for i?h.

[8] We do not want to consider entry and exit in steady state, therefore to avoid exit we assume that once a firm exit it cannot enter again.

[9] The expected profits are computed just before enter the market, that is before the entrant draws its initial profit parameter A.

[10] A firm enters in the market if the expected present value of future profit is equal or higher than the entry costs (?).

[11] This result uses the law of large numbers and the fact that the number and the average size are time-invariant.

$SUM_{jct} = \frac{2\sum_{i\in jc}|L_{ijct} - L_{ijct-1}|}{\sum_{i\in jc} L_{ijct} + \sum_{i\in jc} L_{ijct-1}} = \frac{2N_{jc}E(|L_{ijct} - L_{ijct-1}\|_{jc})}{N_{jct}E(L|_{jc}) + N_{jct-1}E(L_{t-1}|_{jc})} = \frac{E(|L_{ijct} - L_{ijct-1}\|_{jc})}{E(L|_{jc})}$

probability ? to adjust employment in a given period, the value function for a firm with profit parameter A_{ijct} and employment level L_{ijct} is equal to:

$$V(A_{ijct}, L_{ijct}) = \Pi(A_{ijct}, L_{ijct}) + l\, b \int V(A_{t+1}, \tilde{L}_{t+1}) dF_{jc}(A_{t+1}) + (1-l)\, b \int V(A_{t+1}, L_{ijct}) dF_{jc}(A_{t+1})$$

where $\tilde{L}_{t+1}$ denotes the dynamic optimal level of employment in t+1 given the profit parameter A_{t+1}. We derive the dynamic optimal level of employment using the FOC:

$$\tilde{L}_{ijct} = A_{ijct}(1 - b(1-l)) + E(A|_{jc})\, b(1-l) \qquad [1]$$

The dynamic optimal level of employment is a weighted average between the current (A_{it}) and expected ($E(A|_{jc})$) optimal level of employment without adjustment costs (or static optimum). Equation [1] implies that labor rigidities do not affect the average firm-size (in term of employment). Using these results we compute sectoral job reallocation a la Davis and Haltiwanger and using our alternative measure:

$$SUM_{jc} = l(1 - b(1-l)) \frac{E(|A_t - A_t\,\|_{jc})}{E(A|_{jc})} = l(1 - b(1-l)) SUM^*_{jc}$$

$$^{a}SUM_{jc} = l(1 - b(1-l))^2 \frac{Var(A|_{jc})}{E(A|_{jc})} = l(1 - b(1-l))^2 \;\; ^{a}SUM^*_{jc}$$

Job reallocation, from firms with low to high profits, falls with adjustment costs (1-?), and this decline is larger in sectors with a high volatility of demand or supply shocks (profit shifters), which we can measure using job reallocation in the absent of adjustment costs ($^{a}SUM^*_{jc}$). This reduction in labor dynamics reduces the expected future profit to enter in the market. Thus, the entry value is equal to:

$$\begin{aligned}\int V(A_{ijc}, \tilde{L}_{ijc}) dF_{jc}(A) &= \tfrac{1}{1-b}\tfrac{1}{2} E(A^2|_{jc}) - \tfrac{1}{2}\tfrac{b^2(1-l)^2}{1-b} Var(A|_{jc}) - \tfrac{1}{2}\tfrac{b(1-l)(1-b(1-l))}{1-b} Var(A|_{jc}) \\ &= \tfrac{1}{1-b}\tfrac{1}{2} E(A^2|_{jc}) - \tfrac{b}{1-b}(1-l)\left(1 - \tfrac{1}{2} b(1-l)\right) Var(A|_{jc})\end{aligned}$$

The Entry Value is smaller than the expected present value of future profits without adjustment costs (first term) because, first, due to the adjustment costs, the static and dynamic optimal level of employment are different (second term in the first line), and second, because firms cannot adjust to the dynamic optimal level of employment in each period (third term in the first line).[12]

[12] $$\int V(A_{ijc}, \tilde{L}_{ijc}) dF_{jc}(A) = \tfrac{1}{1-b} E\left(\Pi(A_{ijc}, L^*_{ijc})\right) - \tfrac{1}{1-b} E\left(\Pi(A_{ijc}, L^*_{ijc}) - \Pi(A_{ijc}, \tilde{L}_{ijc})\,|_{jc}\right) - \tfrac{b(1-l)}{1-b} \iint \Pi(A_h, \tilde{L}_h) - \Pi(A_k, \tilde{L}_k) dF_{jc}(A_h) dF_{jc}(A_i)$$

Summing these two effects we find that the expected Entry Value decreases with the adjustment costs (1- ?) and this reduction increases with the intrinsic sector variance (the variance of the profit shifter). This result plus the free entry condition imply that the number of firms fall with adjustment costs and this fall is increasing with the intrinsic variance. Using a first order Taylor expansion, the fall in the number of firms is $-g\left(\frac{1}{1-b}\frac{1}{2}E(A^2|_{jc})\right)\frac{b(1-l)\left(1-\frac{1}{2}b(1-l)\right)}{1-b}Var(A|_{jc})$.

Summing up this section, we have that this simple model has several empirical implications:

- Job reallocation falls with adjustment costs and this fall is increasing with the intrinsic volatility of the market (volatility of demand and supply shocks which is summarized in the volatility of the desired level of employment without any adjustment costs).
- The reduction in turnover due to adjustment costs reduces the expected entry value (that is, the expected net present value of future profits before entering the market). This decline is higher in sectors with high intrinsic volatility. The free entry condition implies that the number of firms in the market declines with increasing adjustment costs and this decline is larger in sector with high intrinsic volatility.
- The expected size of firms (in term of employment) is independent of the level of adjustment costs (1-?). In this simple setup, there is no substitute for labor and therefore the increase in adjustment costs does not imply a substitution between labor and other factors.
- The two previous results imply that the sector level of employment (and therefore output) is decreasing with adjustment costs and this negative effect is increasing with the intrinsic variance of sectors (demand shifters).

Thus our model implies that effects of employment protection legislation on turnover, employment, value added, and numbers of plants are relatively larger in sectors with higher intrinsic volatility. This is the inference that we test in our empirical analysis.

2.B. Empirical Specification

The previous section suggests that employment protection legislation affects relatively more those sectors with high intrinsic volatility. Taking for example job reallocation, our simple

model implies:

$$SUM_{jc} - SUM_{.c} = \lambda(1-\beta(1-\lambda))(SUM^{*}_{jc} - SUM^{*}_{.c})$$

that is, for a given size of the adjustment cost $(1-\lambda)$, the decline in turnover is larger, the higher is the relative intrinsic volatility of sector j relative to the country average.

Our empirical approach follows the literature on difference-in-differences to test for a differential effect of employment protection legislation in sectors that are inherently more volatile. This approach allows us to use country fixed effects to control for all observable and unobservable country characteristics. In particular, it allows us to control for differences in country and sector output volatility as well as for differences in the coverage and methodology of data collection across countries. This approach also alleviates the potential problem of endogeneity of regulations present in cross-country analysis. Thus, by using sector level data and controlling for country-wide volatility with country fixed effects we account for the feedback from employment outcomes to regulations.

We estimate the following expression:

$$Y_{jc} = \alpha_j t_j + \alpha_c t_c + \delta_0 R_c X_j + \delta_1 Z_{jc} + \varepsilon_{jc} \qquad (*)$$

where Y_{jc} denotes an economic indicator in sector j, country c, t_j and t_c are sector and country fixed-effects, $Z_{jc.}$ is a vector of controls that vary at the country-sector level, R_c is a measure of (de jure) employment protection legislation in country c, and X_j is a variable that measures the flexibility requirements of sector j,

Under the assumption that sector intrinsic employment volatility is equal across countries up to a constant term, and making use of the fact that regulatory costs are low in the United States, we can take the adjustment costs in this country as the numeraire—or $\tilde{\lambda}_{USA} = 1$ and use U.S. sector job reallocation as a proxy for intrinsic variance of employment across sectors in the absence of adjustment costs. Obviously, for these assumptions to be appropriate, the correlation between sector job flows between the US and in other countries should be high. That is, more stringent

regulation should reduce the difference in job reallocation across sectors but not affect the sector ranking. In the next section, we describe our data and show that this is indeed the case.

3. Data and Correlations

3.A. Data

The analysis is based on two different sets of sector data at the two and three digit level, respectively. The first data set collects information on average gross job flows at the two-digit level on manufacturing industries for 18 countries, 11 developed and 7 in the developing world, during the 1980s and 1990s (see Table 1 for summary statistics and Tables A.1 and A.2 in the Appendix for a full description of the periods and sources of this data, and for job reallocation rates by country and sector, respectively). Following Davis and Haltiwanger (1999), job reallocation is defined as the sum of job creation and job destruction. Plant-level data have been used for most countries, except for Argentina, Italy and United Kingdom, where only firm-level information was available. Entry and exit data were available for all countries but Argentina, Uruguay and Venezuela. For the few countries in which is available, we also collect excess reallocation data.. Excess reallocation is defined as the difference between job reallocation and net job creation.[13]

The second dataset is obtained from the UNIDO data base and covers three digit sector level (ISIC rev2) data for 31 developing and 22 industrialized countries on employment, value added and number of plants in each sector. For each variable, we construct five-year averages covering the periods, 1985-1989 and 1990-1995.

[13] See Davis and Haltiwanger (1999). In the absence of heterogeneous job creation and destruction patterns across firms within sectors, excess job reallocation is zero. Instead, excess reallocation measures tend to be quite large, indicating that a large share of job reallocation is not driven by aggregate shocks (more than 70% of job reallocation in our sample is driven by idiosyncratic shocks). There is a high correlation between sector job reallocation and sector excess job reallocation (0.99).

To characterize job security across countries we use two measures of the stringency of employment protection regulations obtained from Botero et al (2004) . The first measures, denominated *cost of firing* . measures the cost of firing 20 percent of the workers (10% percent hired for redundancy and 10 percent without just cause. This costs is calculated as the sum of advance notice, severance pay and other mandatory penalties. If dismissals are not allowed by law, the measure sets the costs of dismissal to the annual wage

The second measure, denominated *administrative costs of dismissal*, measures employment protection in terms of the extent of the administrative procedures involved in dismissals. It is computed as the average of the following seven dummy variables which equal one: (1) if the employer must notify a third party before dismissing more than one worker; (2) if the employer needs the approval of a third party prior to dismissing more than one worker; (3) if the employer must notify a third party before dismissing one redundant worker; (4) if the employer needs the approval of a third party to dismiss one redundant worker; (5) if the employer must provide relocation or retraining alternatives for redundant employees prior to dismissal; (6) if there are priority rules applying to dismissal or lay-offs; and (7) if there are priority rules applying to reemployment. For the purposes of our work we standardize both measures between zero and one. In some specifications we use the sum of both measures as a summary measure of employment protection legislation.

For robustness, we also use a measure of employment regulation, the EPL index constructed by OECD (1999). Although this measure is only available for OECD countries, earlier versions of the EPL index have been widely used in the employment protection literature (see, for instance, Blanchard and Wolfers (2000); Nickell (1997); Nickell and Layard (1999); Garibaldi and Mauro (2002) and Gómez-Salvador et al. (2003)). This index is computed as a unweighted average of two indices that reflect the level of employment protection for permanent workers and the stringency of the regulation of temporary work, both in the early and in the late 1990s (OECD (1999), Annex 2.B). The higher the EPL index, the more restrictive are the regulations.

It can be argued, however, that the stringency of the regulatory environment depends on the level of enforcement of the law. While direct measures of the degree of enforceability of labor laws do not exist, it is expected that countries with better overall rule of law are more likely to enforce labor laws. We use the simple time average of the rule of law measure constructed by Kauffman et al. (2003) to account for law enforceability differences across countries. This indicator reflects the responses given by a large number of enterprise, citizens and expert survey respondents across the world. Higher values reflect better rule of law and higher government effectiveness.

Table 1 reports country averages for gross job flows and excess reallocation, as well as for job security variables, rule of law and entry costs. Job reallocation is 19.55 percent in the overall sample. On average, job reallocation is very similar in the sub-samples of industrial and developing countries. However, this is partly due to the lack of entry and exit data for some Latin American countries. The average reallocation for all Latin American countries with entry and exit data is 26.37, higher than the average for industrial countries. Cross-country comparisons, however, should be treated cautiously. Besides the treatment of entry and exit, differences in the collection and nature of the data, in the definition and treatment of firm mergers, in firm size and in the size of shocks imply that data are not strictly comparable. This is a standard problem in cross-country exercises, which we will avoid using a differences-in-differences methodology.

Job security measures indicate that firing costs tend to be higher in the sub-sample of Latin American countries. The lower prevalence and lower level of coverage of unemployment insurance may explain such differences. Instead, it is noticeable that on average, the administrative costs of dismissal are higher in the sub-sample of industrial countries. Finally, rule of law measures suggest that compliance is higher in industrial countries. Table 2 shows a high correlation among the different job security measures. In general, countries that face high administrative restrictions to fire workers are also countries where the (monetary) costs of firing workers are high. In addition, for the sample of industrial countries, both measures are highly correlated with the widely used index of employment protection legislation (EPL) produced by the OECD.

Table 3 provides summary statistics for the UNIDO data base for the averages of the period 1990-1995. In addition to such sector level variables, we gather information on sector specific characteristics obtained from existing sources in the literature to be used as controls in our specifications. We gather information on job reallocation and excess job reallocation for the US industries at the 3 digit level from John Haltiwanger's job flows database.[14] We also gather data on the external financial dependence of US industries and on the ratio to intangible to fixed assets from Rajan and Zingales (1998) and Claessens, Stijn and Laeven (2003). In addition, we obtain information on the importance of entry for each sector from two alternative measures: Entry rate (% of firms with 2 years or less in the market) and rate of job creation by entering firms from Dunne et al (1988) and from the John Haltiwanger job flows dataset, respectively. Table A.3 in the Appendix provides the values of such variables per sector.

Finally, we collect information on country specific characteristics. Information on Accounting standards by country is obtained from Rajan and Zingales (1998). Data on property rights is obtained from Claessens et al (2003). Finally information on Cost of Entry (as a percentage of GDP is obtained from Djankov et al (2002).

3.B. Ranking Sectors according to Flexibility Requirements

In this subsection we provide evidence that there are important differences across sectors in the volatility of employment and that these differences are highly correlated across the countries in our sample.

Table 4 shows the correlation across pairs of countries in two-digit ISIC sector job reallocation. It also shows the correlation in job reallocation between each country and the simple average of job reallocation in Anglo-Saxon countries (row 19) as well as with the simple average in our sample (row 20). Remarkably, the correlation across countries is very high. For instance, the correlation in sector reallocation between Argentina and Brazil is 0.87 and is significant at the 1 percent level (second row, first column). This high correlation indicates that the relative intensity of job reallocation across sectors is very similar in the two countries. Moreover, the correlation

[14] Available at http://www.econ.umd.edu/~haltiwan/download.htm

between the sector reallocation in Argentina and all the other countries of the sample, with the exception of Finland, Sweden and Venezuela, is also very high and statistically significant at conventional levels. As Table 5 shows, this is the case for most pairs of countries in our sample, even between countries that are far from one another in terms of either economic development or geographic distance. Focusing on the correlations with the U.S. (row 17), the pair-wise correlations with developing and developed countries are positive in 15 out of 16 cases, and statistically significant at the 10 percent level in 12. The correlations between the U.S. and the other three English speaking countries in our sample (Canada, U.K. and New Zealand), all highly deregulated countries, are 0.85 or higher. The two countries with the lowest pair-wise correlation with the U.S., and in general with most countries, are France and Sweden.

The large correlation among countries in sector job reallocation is not exclusively the product of common sector shocks. In fact, the correlation in sector excess job reallocation across countries is positive, large, and in most cases statistically significant. This implies that some sectors experience a higher variance of firm or plant-specific shocks than others and that these sector characteristics are correlated across countries.

It can be argued that observed correlations are themselves affected by labor market institutions. Yet, to the extent that regulations do not alter the within-country sector reallocation ranking, the observed correlations would be similar, in particular the rank-correlation, to the ones in absence of job security.

In sum, our previous results show that some industries are more volatile than others, and that these sectors tend to be the same across countries. The sectors that exhibit the lowest levels of job reallocation are (in increasing order) manufacturing of paper and paper products, publishing and printing (34) , basic metal industries (37) and manufacturing of chemical goods (35). Instead, the sectors with the highest volatility (in decreasing order) are: other manufacturing (39), manufacture of woods and wood products (33), textiles, wearing apparel and leather products (34) and non-metallic mineral products (36). This high correlation suggests common sector shocks and also important commonalities in the distribution of plant or firm-idiosyncratic shocks. From these results, we conclude that some industries require greater input flexibility. In

the next sections, we make use of these sector characteristics to implement a differences-in-differences estimation.

4. Results

4.A. Job Flows and Employment Protection

The main advantage of this procedure is that by focusing on the differential effect across sectors within countries, we can control for all observable and unobservable country characteristics, greatly reducing the scope for omitted variables. We can also account for endogeneity, since we control for a country's propensity to implement more restrictive regulations with country fixed effects and focus on differences across sectors using U.S. sector employment reallocation as a proxy for a sector intrinsic sector flexibility requirements. The second advantage is that this procedure relies on the differences across sectors in countries with different levels of regulation, thus multiplying the sources of variation used to estimate this equation.

Table 5 shows the results of estimating specification (*). The main result for job flows is presented in column (1). After controlling for country and sector fixed effects, we find that more intrinsically volatile industries present lower levels of job turnover, relative to less volatile sectors, in countries with more stringent employment protection laws. The sign of the coefficient on the interaction terms is negative and statistically significant at conventional levels. The row labeled *differential in job reallocation* at the bottom of the table shows the magnitude of the impact of job security on job turnover differentials across sectors and countries, according to our estimation. For example, in column (1) this differential is -6.31. This number should be interpreted as follows: job reallocation in an industry in the 90^{th} percentile of flexibility requirement relative to an industry in the 10^{th} percentile is 6.31 percentage points lower in a country with strict employment protection (that is, in the 90^{th} percentile of job security) than in a country with low employment protection (in the 10^{th} percentile). These are large numbers if we consider that the average level of job turnover in our sample is 20 percent.

It could be argued that these results are driven by differences in sector volatility across countries with different levels of income per capita, which in turn are correlated with differences in

regulatory levels.[15] To control for such possible income effects, we add to the regression the interaction between income per capita and U.S. job reallocation. Controlling for such effects does not change the magnitude of the coefficient (Column 2).

These results are robust to alternative classifications of sector flexibility requirements. In column (3) we measure sector flexibility requirements according to average sector job reallocation in the sample of Anglo-Saxon countries. While the coefficient in the interaction term is smaller, it is still statistically significant at 1 percent. In column (4) we measure sector-specific flexibility requirements with U.S. excess reallocation. Using excess reallocation allows us to focus only on plant or firm-idiosyncratic shocks. The results are qualitatively unchanged. Results also hold if instead of using the described measures of employment protection, the OECD EPL measure is used for the sub-sample of developing countries (column 5).

It is well known that the entry and exit of firms explains a large share of total labor reallocation (Davis, Haltiwanger and Schuh, 1996). Therefore, regulations that increase the cost of entry and can also dampen labor reallocation. Since it is quite plausible that across countries the political economy that leads to the enactment of job security regulations also leads to the enactment of regulations on entry our formerly estimated coefficients may be capturing the effects of other regulations. To assess whether this is the case, we control for a measure of the cost of entry (as a percentage of GDP per capita) multiplied by the importance of firm entry in a given industry (measured by percentage of firms less than two years old). Column (6) shows that our main results for job flows are unchanged if such regulations are controlled for.

In some countries of our sample, regulations may be poorly enforced. To account for differences in law enforcement, we add a new control variable interacting our main regulatory variable with rule of law, while allowing for another interaction between reallocation by sector and rule of law, which captures, differences in reallocation associated with differences in rule of law (but unrelated to job security regulations). We find a negative and statistically significant coefficient on the interaction between the regulatory term and rule of law. Such negative coefficient

[15] Heckman and Pagés (2003) and Botero et al. (2003) show that, across countries, the stringency of job security regulations decreases with income levels.

indicates that the effect of employment protection laws on flows increases the better the rule of law. In fact, the effect of EPL on job flows is not statistically significant in countries with very poor rule of law.

Column (8) shows that the previous results do not depend on whether we use the manufacturing census data or the social security registry data for Brazil and Mexico. However, the coefficient on job security and the estimated magnitude of the effect on turnover is larger if manufacturing census data are used. The results also hold if job reallocation differences across sectors are computed in percentage rates (*ln SUM*) rather than in percentage points.

We next assess whether these results hold within the samples of developed and developing countries. Columns (10) - (12) examine our main difference in difference estimation in the Latin American (LAC) and the developed country (DEV) samples. Accounting for rule of law is important in the developing country sample. We find that in this sample the effect is maintained in countries with higher values in the rule of law measure, while the effect is not statistically significant for low values. Instead, rule of law does not play a large role in the developed country sample. Instead, the dumping effects of employment protection laws are felt in all countries. An F test of whether the coefficients on the regulatory variable and the regulatory interacted by the rule of low, indicates that they are both statistically significant at the 15 percent in the LAC sample and at the percent or lower in the developed countries sample. [16]

In sum, the results in Table 5 suggest that using a differences-in-differences methodology that controls for country, sector and income effects allows us to identify negative and sizeable effects of job security on turnover. Such effects hold in industrial countries, as well as developing countries with an effective rule of law.

[16] It is well known that cross-country regressions suffer from lack of robustness. To test for this possibility we re-run our baseline estimates (columns (2) and column (10) in Table 5) excluding one country and one sector at a time. The results, available upon request, indicate that the coefficients presented in table 4 remain stable and statistically significant at conventional levels in all cases.

4b. Results for Employment and Value Added

We now turn to examine the effect of employment protection legislation on other economic outcomes. In this section we study sector outcomes at the 3 digit SITC level in 53 countries. We start our analysis examining whether the employment level in relatively more volatile sectors is disproportionally affected by strict job security legislation. We report the results in Table 6.

Column (1) suggests that employment regulations reduce employment of the most affected sectors. Thus, controlling for country and sector dummies, as well as possible income related patterns in the structure of employment, we find a negative and statistically significant coefficient on the regulatory variable. It may well be however, that such relative lower employment in volatile sectors is related to other factors that affect the distribution of employment across sectors within countries. To account for such possibility, we re-run our baseline specification with a number of controls that in the literature have been found to affect the activity levels across sectors. To that end, we control for external finance dependence à la Rajan and Zingales (1995). In particular, we include the interaction of country accounting standards (proxy for financial development) and sector external finance dependence.[17] Rajan and Zingales (1995) show that low financial development slows down the relative growth of industries that require more external funds. In addition, as pointed by Claessens and Laeven (2003), it may be efficient for a firm that operates in a market with weaker property rights to invest more in fixed assets relative to intangible assets that is optimal because the returns for the latter assets are less protected against competitors' actions. To control for this effect we include the interaction of sector requirement of intangible assets and a measure of property right at the country level.[18]

Finally as in the gross job flows specifications we control for a measure that accounts for the difficulties of firm entry in a given country multiplied by how important is firm entry in each industry.

[17] External Fina External Finance Dependance at 3-digit SITC code comes from Raddatz (2004) nce Dependance at 3-digit SITC code comes from Raddatz (2004).

[18] The importance of intangible assets relative to fixed assets at the sector level is taken from Claessens and Laeven (2003). Property Rights comes from Kaufmann et al. (2003)

Column (2) shows the result of this exercise. Even when accounting for all these factors, we find a negative and statistically significant coefficient on the regulatory variable. We also find the expected results for the controls. Thus, quite interestingly, better capital markets increase employment levels in sectors that depend more from external fund, while better property rights expand employment in intangible-asset dependent industries. In addition, we also find that higher cost of entry reduce employment growth in industries where entry is more important. The results also hold if rather than expressing the dependent variable in log levels, we express it as a share of employment. This is not surprising given that the inclusion of country dummies implies that all results for log levels are relative to the country average.

We find both measures of employment protection (administrative costs and monetary costs) to affect employment. When both measures are included in the specification the results indicate a stronger effect for administrative costs than for monetary costs. In addition, while the coefficient for administrative costs is statistically significant at the 1 percent level, the coefficient for monetary costs is only significant at the 20 percent. On one hand, these results may give some support to the idea that if for social protection reasons some form of employment protection is socially desirable, monetary costs provide better protection for workers and generate lower employment distortions than administrative costs of dismissal. On the other, workers and employers may undo monetary protection through posteriors transfers.

We find stronger adverse effects of employment protection in the sample of industrial countries. Thus, the size and significance of the coefficient on the regulatory variable is much larger for the sub-sample of industrial countries relative to developing ones. It is noticeable that in industrial countries, employment protection regulations and entry costs play a more significant role in explaining the distribution of employment across sectors than capital market development. Instead, low capital market development plays a more important role in the distribution of employment of developing countries.

Lower enforcement levels are an important reason for why labor regulations play a less significant role in explaining the distribution of employment in developing countries. Once enforcement rates are accounted for with measures of rule of law, we find that the higher the

enforcement capabilities (the better the rule of law) the higher the costs in terms of foregone job creation of employment protection regulations. Thus, interestingly, the effect of enforcement becomes statistically significant only in the sample of developing countries.

(

We find the results to be very robust to changes in the level of aggregation of the data, measures of sector reallocation, control variables, sample period and method of estimation. Table A.X in appendix reports the results. For example, performing the estimation with the data aggregated at the two digit level does not alter our main results. (see columns (1) and (2)). Our results are also maintained if we measure intrinsic reallocation with excess reallocation rather than gross flows. (see column 3). The results also held if we control for systematic differences in the distribution of employment across industries in countries with different levels of income. To do so, we add to our baseline employment regression (column 2, table 6) sector dummies for both developing and developed countries; we also include sector dummies multiply with income per capita.

Results also hold if instead of using as dependent variable the average of log employment in the period 1991-1995, we use the average log employment in the period 1986-1990 (log Emp 86) or in the period 1996-2000 (log Emp 96) (see columns 8 and 9 table A.X). Finally, the results also hold if rather than using accounting standards (the variable used by Rajan and Zingales (1995) we measure capital market development by the ratio of credit to GDP (see columns 10-12).

Employment protection legislation also has a bearing on other economic outcomes. Table 6 reports the results of running the same baseline specification as in column 2 table 6 for value added, labor productivity, number of plants, and workers per plant (all in log average). We find that more stringent employment protection regulation is associated with lower value added in industries with higher intrinsic volatility. Since more strict regulation is associated with a larger decline in employment than in output (as a result of a substitution of labor for physical and human capital), affected industries in very regulated countries produce with higher levels of labor productivity. Our results also suggest that strict employment protection legislation is associated with substantial decline in the number of plants in the affected sectors. As suggested by our simple model, the impossibility to adjust employment to frequent shocks results in lower

expected profits and lower (net) entry of firms in such industries. Quite importantly, such reduction in the number of plants, fully explains the decline in employment. As implied by our simple model, the average level of employment of firms that operate in this market does not change with regulations, that is, regulations only alter the pattern of adjustment but not its average level. This implies that a researcher measuring the impact of labor regulations in continuing plants would most likely miss their effects.

5. Conclusions

This paper has shown that some sectors exhibit greater volatility than others and that these differences are strongly correlated across countries. We develop a simple empirical framework to show how intrinsic differences in variance of demand or supply shocks lead to sector differences in response to employment protection legislation. Using two different sector level data for a large sample of industrial and developing countries we implement an econometric test of this hypothesis using a differences-in-differences estimation. Our results suggest that strict job security regulations slow down job reallocation and that these effects are larger in sectors with a high intrinsic volatility.

We also find important effects on employment, value added and the number of plants in a sector. Thus, employment, value added and the number of plants decline relatively more in the more affected sectors of highly regulated countries. We find the decline in employment to be larger than in value added, which implies that the affected sectors operate at higher labor productivity as a result of a process of substitution from labor to human and/or physical capita. We also find a that strict employment protection regulations are associated with a decline in the number of plants in the most inherently volatile sectors. This decline in the number of plants accounts for all the decline in employment. Instead, employment per plant is not affected by such regulations. Another noteworthy finding is that low compliance seems to reduce the effect of regulations in developing countries, while the effect becomes more binding in developed countries and countries with better rule of law.

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Table A.1: Job Reallocation Data Sources

Country	Country	Period	Sectors	Unit	Entry/Exit	Source
Argentina	ARG	1991-2001	9	Firms	No	Butler and Sanchez (Forthcoming)
Brazil	BRA	1992-2000	8	Plants	Yes	Menezes-Filho coordinator (2003)
Brazil	BRA (IS)	1997-2000	9	Firms	No	Authors Construction [1]
Canada	CAN	1979-1988	9	Plants	Yes	Baldwin, Dunne and Haltiwanger (1998)
Chile	CHL	1991-1999	8	Plants	Yes	Bergoeing, Hernando & Repetto (2003)
Colombia	COL [2]	1993-1999	9	Plants	Yes	Medina, Meléndez & Seim (2003)
Germany	DEU	1986-1989	9	Plants	Yes	Grey (1995)
Finland	FIN	1985-1988	9	Plants	Yes	Grey (1995)
France	FRA	1984-1988	9	Plants	Yes	Gourinchas (1999)
United Kingdom	U.K.	1987-1989	9	Firms	Yes	Barnes & Haskel (2002)
Italy	ITA	1987-1989	9	Firms	Yes	Grey (1995)
Mexico	MEX	1994-2000	9	Plants	Yes	Kaplan, Martínez & Robertson (2003)
Mexico	MEX (IS)	1994-2000	9	Firms	No	Authors Construction [3]
Norway	NOR	1984-1986	9	Plants	Yes	Grey (1995)
New Zealand	NZL	1986-1989	9	Plants	Yes	Grey (1995)
Portugal	PRT	1992-1996	9	Plants	Yes	Blanchard and Portugal (2001)
Sweden	SWE	1980-1991	9	Plants	Yes	Grey (1995)
Uruguay	URY	1988-1995	6	Plants	No	Casacuberta, Fachola & Gandelman (2003)
United States	U.S.	1973-1993	9	Plants	Yes	Baldwin, Dunne and Haltiwanger (1998)
Venezuela	VEN	1996-1999	9	Plants	No	Authors Construction [4]

Notes: All information is restricted to the manufacturing sector. Industries are defined using 2 dig. ISIC rev2 classification.
For BRA (IS), CAN, FRA, MEX(IS) and U.K. we use correspondences between national classifications and ISIC rev2.

We do not include sectors that on average have less than 40 plants.

1/ BRA uses data from the social security agency (*Relação Anual de Informações Sociais*),and BRA (IS) from the Manuf. Annual Survey (*Pesquisa Industric*

2/ Due to methodology changes in 1992, we restrict the data to the period 1993-1999.

3/ MEX uses data from the social security agency (*Instituto Mexicano del Seguro Social*). MEX (IS) uses data from the Manuf. Annual Survey (*Encuesta In INEGI*.).

4/ VEN uses data from the Industrial Survey (*Encuesta Industrial de Venezuela – Instituto de Estadísticas de Venezuela*).

Table A.w2: Job Reallocation by Sector and Country

Country \ Sector	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
ARG	15.3	15.5	17.4	12.7	12.9	12.0	12.3	15.4	17.3
BRA	34.4	36.4	36.5	27.7	30.3	29.9	30.3	31.7	
BRA (IS)	13.8	9.8	10.7	8.6	8.6	8.4	8.6	9.8	7.3
CAN	17.6	26.0	27.7	16.6	18.6	23.0	13.3	25.1	28.1
CHL91	28.4	22.8	32.7	21.3	21.8	23.5	9.8	25.4	
COL93	24.9	23.4	29.6	22.7	20.5	19.8	16.0	23.4	22.4
DEU	15.9	15.0	17.5	11.6	8.6	13.0	10.1	12.5	14.6
FIN	14.6	18.9	18.2	19.2	14.7	13.8	10.7	19.6	16.7
FRA	31.2	21.5	28.8	17.3	18.4	14.0	27.4	20.2	28.4
GBR	23.0	26.2	29.8	22.2	20.0	22.3	20.9	23.9	35.6
ITA	22.4	25.4	23.1	17.4	15.8	17.7	19.1	19.4	38.9
MEX	23.5	35.5	39.6	26.3	22.5	24.9	21.4	26.7	30.8
MEX (IS)	5.9	7.9	9.0	5.5	6.0	6.5	6.1	8.1	6.3
NOR	14.8	17.4	15.7	11.8	12.0	14.3	7.3	18.9	16.3
NZL	27.3	34.3	32.7	23.8	27.4	30.9	25.1	32.3	38.3
PRT	27.1	24.4	27.1	23.3	22.0	22.2	18.1	24.4	26.0
SWE	24.6	21.7	24.6	20.7	20.2	26.1	32.6	22.3	19.0
URY	11.9	17.6		10.5	10.9	12.2		15.3	
USA	17.6	21.8	22.6	15.3	17.3	20.1	15.6	19.2	24.0
VEN	9.4	7.6	11.4	7.4	8.7	10.2	4.5	10.1	9.3
Average	20.2	21.4	23.9	17.1	16.9	18.2	16.3	20.2	22.3

Table A.3: Sector Variables

Appendix

Sector	Job Reallocation	Excess Job Reallocation	External Financial Dependence	Intangible to fixed assets	Entry Rate	Job Creation by Entry
311	0.18	16.30	0.14	0.75	0.39	1.13
313	0.17	14.32	0.08	0.75	0.39	1.13
314	0.14	9.17	-0.45	0.49	0.21	0.02
321	0.18	13.77	0.11	0.21	0.37	1.18
322	0.25	19.74	0.03	0.53	0.40	2.21
323	0.24	18.33	-0.14	0.33	0.29	1.10
324	0.22	15.86	-0.08	0.33	0.29	1.10
331	0.23	17.68	0.28	1.20	0.50	2.18
332	0.22	16.84	0.24	0.49	0.47	1.69
341	0.12	9.82	0.11	0.20	0.31	0.77
342	0.17	14.71	0.20	4.54	0.49	1.71
351	0.12	9.30	0.33	0.96	0.33	0.98
352	0.18	14.49	0.75	0.96	0.33	1.11
353	0.08	5.33	0.04	0.02	0.34	0.72
355	0.15	10.21	0.23	0.46	0.43	1.45
356	0.23	17.31	1.14	0.46	0.43	1.52
361	0.18	12.62	-0.15	0.05	0.34	1.48
362	0.15	10.81	0.53	0.05	0.34	1.50
369	0.22	18.02	0.06	0.05	0.34	1.53
371	0.15	7.99	0.09	0.11	0.32	0.82
372	0.17	11.65	0.01	0.11	0.32	0.81
381	0.21	16.10	0.24	0.31	0.43	1.25
382	0.20	14.68	0.68	0.25	0.47	1.36
383	0.19	14.27	0.86	0.77	0.46	1.20
384	0.18	13.29	0.29	0.24	0.47	0.83
385	0.17	13.83	0.96	0.90	0.60	1.29
390	0.24	19.50	0.47	2.29	0.40	1.91
Dif. P90-p10	0.12	9.16	1.00	1.15	0.20	1.14
Dif. P75-p25	0.07	6.03	0.43	0.57	0.14	0.54

Note: Sector variables for the USA. Job reallocation and excess job reallocation are the time average for the period (1973-1993). These job flows at 4-digit SIC code come from John Haltiwanger webpage. External Finance Dependance at 3-digit SITC code comes from Raddatz (2004). Intangible to Fixed Assets at 2-digit SIC code comes from Claessens and Leaven (2003).Entry Rate at 2-digit SIC code comes from Dunne et al (1988). Job Creation from Entry is the time average for the period (1973-1993) and the data at 2-digit SIC code comes from John Haltiwanger webpage.

Table 1 : Job Reallocation in Manufacturing and Institutional Variables

Country	Period	Entry / Exit	Job Realloc.	Exc. Realloc.	Reg_CF	Reg_AdmC	EPL_90	Rule of Law	Entry C
Argentina	1991-2001								
(F)		No	14.54	9.61	0.27	0.29		-1.04	0.10
Brazil (IS)	1992-2000	Yes	32.14	27.9	0.61	0.57		-1.23	0.20
Brazil (IS)	1997-2000								
(F)		No	9.49	6.46	0.61	0.57		-1.23	0.20
Canada	1979-1988	Yes	21.78		0.05	0.29	0.60	0.86	0.01
Chile	1991-1999	Yes	23.22	17.87	0.81	0.29		0.24	0.13
Colombia	1993-1999	Yes	22.52	17.25	0.55	0.29		-1.66	0.15
Germany	1986-1989	Yes	13.2		0.48	0.57	2.50	0.81	0.16
Finland	1985-1988	Yes	16.27		0.53	0.57	2.00	1.01	0.01
France	1984-1988	Yes	23.02		0.43	0.86	3.00	0.43	0.14
United Kingdom	1987-1989								
(F)		Yes	24.86	19.14	0.49	0.14	0.50	0.88	0.01
Italy	1987-1989								
(F)		Yes	22.13		0.45	0.43	3.30	-0.11	0.20
	1994-2000								
Mexico		Yes	27.92	20.13	0.43	0.86		-1.30	0.57
Mexico (IS)	1994-2000								
(F)		No	6.82	4.95	0.43	0.86		-1.30	0.05
Norway	1984-1986	Yes	14.28		0.53	0.71	2.60	1.01	0.05
New Zealand	1986-1989	Yes	30.23		0.00	0.14	1.00	0.98	0.01
Portugal	1992-1996	Yes	23.83		0.61	0.71	3.70	0.23	0.18
Sweden	1980-1991	Yes	23.53		0.53	0.71	2.20	0.91	0.03
Uruguay	1988-1995	No	13.06	8.59	0.24	0.00		-0.48	0.49
United States	1973-1993	Yes	19.42	13.77	0.07	0.14	0.20	0.74	0.00
Venezuela	1996-1999	No	8.73	5.11	0.67	0.00		-1.81	0.11
Dif. P90-p10			19.965	15.02	0.58	0.79	2.80	2.66	0.48
Dif. P75-p25			11.9	12.68	0.23	0.50	2.40	2.14	0.19

Job Reallocation is the sum of Job Creation and Job Destruction. Excess Reallocation is Job Reallocation minus the absolute value of the net employment change. Rule of Law and is an institutional variables from Kaufmann et al. (2003). RegCF and RegAC are the employment protec measures developed by Botero et al. (2004). Brazil (IS) is computed with data from the Manufacturing Annual Survey (Pesquisa Industrial Anu conducted by the Instituto Brasileiro de Geografia e Estatística. Mexico (IS) is obtained from Mexico's industrial survey: Encuesta Industrial INEGI.(F) data at the firm level, for the other countries the data is at the plant level.All countries have 9 sectors but Brazil (IS) and Chile with Uruguay with 7., Brazil (IS) is computed with data from the Manufacturing Annual Survey (Pesquisa Industrial Anual) conducted by the Instit Brasileiro de Geografia e Estatística. Mexico (IS) is obtained from Mexico's industrial survey: Encuesta Industrial INEGI. Dif PY-PX denotes difference between the percentile Y and the percentile X.

.

Table:2 Correlation Between Job Security Indexes

	OECD	Botero et al (2003)		
	EPL_90	**Reg_FC**	**Reg_AdmC**	**FC+AdmC**
EPL_90	1.00			
Reg_FC	0.72	1.00		
Reg_AdmC	0.83	0.71	1.00	
FC+AdmC	0.84	0.91	0.94	1.00

Note: EPL is the Index for Employment Protection Legislation from OECD 1999.

Table 3

Pairwise Correlation for sectoral job reallocation between countries.

Job reallocation as the sum of job creation and job destruction

	ARG	BRA	CAN	CHL	COL	DEU	FIN	FRA	GBR	ITA	MEX	NOR	NZL	PRT	SWE	URY	USA	VEN
ARG	1																	
BRA	0.8722*	1																
	0.0047																	
CAN	0.7536*	0.6357*	1															
	0.019	0.0902																
CHL	0.7445*	0.5654	0.7015*	1														
	0.0341	0.1441	0.0525															
COL	0.7624*	0.6674*	0.5948*	0.9198*	1													
	0.0169	0.0705	0.0912	0.0012														
DEU	0.7763*	0.8015*	0.6313*	0.7469*	0.7919*	1												
	0.0139	0.0167	0.0683	0.0332	0.011													
FIN	0.5219	0.2718	0.5937*	0.58	0.6862*	0.3941	1											
	0.1495	0.515	0.0919	0.1318	0.0412	0.294												
FRA	0.6388*	0.6126	0.0569	0.1713	0.3335	0.5258	-0.1739	1										
	0.064	0.1064	0.8845	0.685	0.3805	0.146	0.6546											
GBR	0.8458*	0.7980*	0.7781*	0.6752*	0.4851	0.6493*	0.3811	0.474	1									
	0.0041	0.0176	0.0135	0.0662	0.1856	0.0584	0.3116	0.1973										
ITA	0.7405*	0.9141*	0.5988*	0.3987	0.2416	0.5217	0.1896	0.5404	0.9242*	1								
	0.0225	0.0015	0.0885	0.3279	0.5312	0.1497	0.625	0.1331	0.0004									
MEX	0.7512*	0.7418*	0.7924*	0.592	0.7514*	0.7466*	0.6319*	0.2406	0.6997*	0.4684	1							
	0.0196	0.0351	0.0109	0.1221	0.0196	0.0208	0.0679	0.5328	0.0359	0.2034								
NOR	0.6867*	0.5594	0.8446*	0.7494*	0.6478*	0.6138*	0.7292*	-0.0034	0.5221	0.4104	0.5796	1						
	0.041	0.1494	0.0042	0.0323	0.0592	0.0787	0.0258	0.9931	0.1494	0.2725	0.1019							
NZL	0.7406*	0.7095*	0.9325*	0.5384	0.3666	0.5507	0.381	0.1883	0.8385*	0.7810*	0.6487*	0.7522*	1					
	0.0225	0.0487	0.0002	0.1686	0.3319	0.1244	0.3116	0.6276	0.0047	0.013	0.0587	0.0194						
PRT	0.8199*	0.6480*	0.6388*	0.9464*	0.8976*	0.8252*	0.6106*	0.3994	0.6195*	0.4972	0.6074*	0.7553*	0.5234	1				
	0.0068	0.0823	0.0641	0.0004	0.001	0.0062	0.0807	0.287	0.0752	0.1733	0.0828	0.0186	0.1481					
SWE	-0.3965	-0.0402	-0.4902	-0.5221	-0.4272	-0.1074	-0.7092*	0.2275	-0.3983	-0.3543	-0.3031	-0.5835*	-0.4148	-0.5632	1			
	0.2907	0.9247	0.1804	0.1844	0.2515	0.7833	0.0324	0.5561	0.2883	0.3495	0.4278	0.099	0.267	0.1143				
URY	0.7016	0.7416*	0.8984*	0.1322	0.3454	0.4883	0.5087	0.1164	0.8908*	0.7575*	0.8471*	0.8882*	0.9065*	0.25	0.0069	1		
	0.1203	0.0915	0.015	0.8028	0.5025	0.3257	0.3028	0.8261	0.0172	0.0811	0.0333	0.0181	0.0127	0.6328	0.9896			
USA	0.7676*	0.7661*	0.9482*	0.6487*	0.5017	0.6746*	0.3706	0.2312	0.8622*	0.7446*	0.7703*	0.7052*	0.9619*	0.5987*	-0.3724	0.8412*	1	
	0.0157	0.0266	0.0001	0.0819	0.1688	0.0463	0.3261	0.5494	0.0028	0.0214	0.0152	0.0338	0	0.0885	0.3237	0.0358		
VEN	0.5296	0.3722	0.7044*	0.9202*	0.7273*	0.5721	0.449	-0.0185	0.4039	0.1661	0.4535	0.7265*	0.5162	0.7543*	-0.4427	-0.0208	0.6012*	1
	0.1426	0.3639	0.0341	0.0012	0.0264	0.1075	0.2254	0.9624	0.281	0.6693	0.2202	0.0266	0.1548	0.0189	0.2327	0.9688	0.0868	
Anglo-Saxon	0.8160*	0.7505*	0.9573*	0.6781*	0.5137	0.6531*	0.464	0.2467	0.9115*	0.7973*	0.7615*	0.7430*	0.9745*	0.6260*	-0.4462	0.9401*	0.9826*	0.5827*
	0.0073	0.0319	0.0001	0.0646	0.1572	0.0565	0.2084	0.5223	0.0006	0.0101	0.0171	0.0218	0	0.0713	0.2286	0.0053	0	0.0996
All	0.9533*	0.8905*	0.8604*	0.7709*	0.7664*	0.8702*	0.5094	0.5189	0.8765*	0.7307*	0.8593*	0.7231*	0.8212*	0.8053*	-0.3333	0.8787*	0.8875*	0.6039*
	0.0001	0.003	0.0029	0.0251	0.016	0.0023	0.1613	0.1523	0.0019	0.0253	0.003	0.0277	0.0066	0.0088	0.3808	0.0212	0.0014	0.0851

Note: The first line indicates the correlation coefficient and the second the significance level (p-value), * significant at the 10 per cent level.

All pairwise correlation are estimated with either 8 or 9 observation (depending whether we have information for sector 39 ISIC Rev2)

Anglo Saxon is the simple average of sectoral job reallocation for Canada, Great Britain, New Zealand and USA.

All is the simple average of sectoral job reallocation for all countries.

Table 4: Summary Statistics UNIDO data base ISIC 3 digit.

All Countries	Country - Sector (Average 1990-1995)				
Variable	Obs	Mean	Std.Dev.	Min.	Max.
Emp. (ln)	1317	9.40	1.89	1.95	14.33
VA (ln)	1317	19.35	2.40	9.78	25.76
VA / Emp.(ln)	1317	9.96	1.27	4.78	14.00
Firm Size. (ln)	1262	4.28	1.18	0.25	8.91
Sector Share (Emp)	1317	0.04	0.06	0.00	0.70
US-SUM * elS_04	1317	0.16	0.08	0.01	0.38
	Country (Time invariant)				
Industrial (Dummy)	53	0.42	0.50	0.00	1.00
CF+AdmC	53	0.82	0.40	0.08	1.49
Reg_CF	53	0.44	0.19	0.00	0.81
Reg_AdmC	53	0.38	0.29	0.00	0.86
Acc. Standard	34	0.62	0.14	0.24	0.83
Property Right	45	3.99	0.86	3.00	5.00
Entry Cost (%GDPpc)	53	0.36	0.59	0.01	3.35
Rule of Law	53	0.65	0.98	-0.95	2.04
GDPpc (ln) Avg.85-89	53	8.26	1.56	4.97	10.50

Industrial Countries	Country - Sector (Average 1990-1995)				
Variable	Obs	Mean	Std.Dev.	Min.	Max.
Emp. (ln)	561	9.89	1.75	5.27	14.33
VA (ln)	561	20.80	1.90	14.60	25.76
VA / Emp.(ln)	561	10.91	0.62	9.30	14.00
Firm Size. (ln)	535	3.90	1.02	1.13	6.95
Sector Share (Emp)	561	0.04	0.05	0.00	0.51
US-SUM * elS_04	561	0.15	0.08	0.01	0.35
	Country (Time invariant)				
CF+AdmC	22	0.76	0.39	0.08	1.40
Reg_CF	22	0.40	0.20	0.00	0.69
Reg_AdmC	22	0.36	0.26	0.00	0.86
Acc. Standard	21	0.68	0.08	0.54	0.83
Property Right	21	4.71	0.46	4.00	5.00
Entry Cost (%GDPpc)	22	0.13	0.13	0.01	0.59
Rule of Law	22	1.64	0.43	0.74	2.04
GDPpc (ln) Avg.85-89	22	9.86	0.39	8.88	10.50

Developing Countries	Country - Sector (Average 1990-1995)				
Variable	Obs	Mean	Std.Dev.	Min.	Max.
Emp. (ln)	756	9.03	1.91	1.95	14.16
VA (ln)	756	18.28	2.15	9.78	22.35
VA / Emp.(ln)	756	9.25	1.16	4.78	13.71
Firm Size. (ln)	727	4.57	1.21	0.25	8.91
Sector Share (Emp)	756	0.04	0.06	0.00	0.70
US-SUM * elS_04	756	0.17	0.08	0.01	0.38
	Country (Time invariant)				
CF+AdmC	31	0.87	0.41	0.15	1.49
Reg_CF	31	0.47	0.19	0.08	0.81
Reg_AdmC	31	0.40	0.30	0.00	0.86
Acc. Standard	13	0.52	0.15	0.24	0.76
Property Right	24	3.35	0.56	3.00	5.00
Entry Cost (%GDPpc)	31	0.53	0.73	0.03	3.35
Rule of Law	31	-0.06	0.53	-0.95	1.27
GDPpc (ln) Avg.85-89	31	7.13	0.96	4.97	8.53

Table 5: Effects of employment Protection on Job Flows

	(1) Sum	(2) Sum	(3) Sum	(4) Sum	(5) Sum	(6) Sum	(7) Sum	(8) Sum	(9) Log(Sum)	(10) Sum	(11) Sum	(12) Sum
sum_USA_FC+AdmC	-0.689	-0.673				-0.690	-0.292	-1.037	-0.032	-0.983	-2.561	-1.507
	(0.244)a	(0.241)a				(0.243)a	(0.242)	(0.217)a	(0.012)b	(0.739)	(2.119)	(0.364)a
sum_AS_FC+AdmC			-0.447									
			(0.158)a									
exc_USA_FC+AdmC				-0.574								
				(0.307)c								
sum_USA_E190					-0.265							
					(0.129)b							
ENTRYrand_ecG						-2.209						
						(2.386)						
sum_USA_FC+AdmC_RL							-1.098			-1.512	1.389	
							(0.339)a			(0.772)c	(2.657)	
sum_USA_RL							1.006			1.852	-2.142	-0.908
							(0.244)a			(0.569)a	(2.522)	(0.658)
sum_USA_inc		-0.086			-0.807	-0.080	-0.085	0.118	-0.002	-0.323	-0.121	0.209
		(0.131)			(0.392)b	(0.133)	(0.412)	(0.117)	(0.007)	(0.337)	(0.764)	(0.454)
sum_AS_inc			-0.066									
			(0.092)									
exc_USA_inc				-0.181								
				(0.160)								
Observations	148	148	157	148	90	148	148	149	148	58	90	90
R-squared	0.83	0.83	0.84	0.83	0.77	0.84	0.85	0.86	0.86	0.94	0.80	0.80
Sample	All - USA	All - USA	All	All - USA	All - USA	All - USA	All - USA	All - USA 1	All - USA	LAC	DEV	DEV
F							0.00			0.14	0.00	
Diff. In Job.Real. P90-p10	-6.31	-6.16	-6.06	-6.26	-6.41	-6.32		-9.50	-0.27			

Sum_USA denotes gross job flows in the United States, FC+AdmC is the sum of the cost of firing and the administrative cost of dismissal from Botero el al (2004), exc_USA measures excess reallocation I the US at the sector level, El190, is the OECD EPL index, ENTRYrand denotes the percentage of less than 2 years old firms in the US per sector, while ecG is the cost of entry as a % of GDP per capita. RLdenotes rule of law, inc denotes Income per capita. SUM_USA_RL and SUM_USA_inc denotes the interaction terms of US job flows and rule of law and income per capita respectively. Finally, Sum_AS are the average sector gross job flows for all the Anglo Saxon countries of our sample. Robust standard errors in parentheses. c significant at 10%; b significant at 5%; a significant at 1%

1: For Brazil and Mexico we use the manufacturing census data (only continuous plants) instead of the registry information.

Table 6: Effects of Employment Protection on Employment

	(1) Avg.Log.Emp. 91-95	(2) Avg.Log.Emp. 91-95	(3) Avg.Log.Emp. 91-95	(4) Avg.Log.Emp. 91-95	(5) Avg.Log.Emp. 91-95	(6) Avg.Share.Emp. 91-95	(7) Avg.Log.Emp. 91-95	(8) Avg.Log.Emp. 91-95	(9) Avg.Log.Emp. 91-95	(10) Avg.Log.Emp. 91-95
SUM_CF+AdmC	-5.637	-7.021				-0.214	-7.431	-2.732	-3.870	-0.199
	(1.570)***	(1.510)***				(0.064)***	(1.937)***	(2.791)	(2.433)	(2.747)
SUM_RegCF			-8.620		-3.919					
			(3.260)***		(3.079)					
SUM_RegAdmC				-9.379	-8.549					
				(2.009)***	(1.986)***					
SUM_CF+AdmC_RL									-2.571	-8.374
									(1.721)	(4.403)*
RZ_AS		2.343	2.284	2.374	2.361	0.075	1.500	1.323	2.390	1.249
		(0.502)***	(0.506)***	(0.503)***	(0.502)***	(0.024)***	(0.873)*	(0.716)*	(0.493)***	(0.721)*
IA_PR		0.078	0.078	0.079	0.0784	0.002	0.065	-0.003	0.080	-0.005
		(0.024)***	(0.024)***	(0.024)***	(0.024)***	(0.001)	(0.049)	(0.046)	(0.024)***	(0.045)
ENTRYrand_ecG		-8.076	-8.335	-7.876	-7.971	-0.173	-14.069	-3.175	-7.996	-3.458
		(1.884)***	(1.911)***	(1.868)***	(1.883)***	(0.056)***	(2.800)***	(1.964)	(1.860)***	(1.982)*
SUM_inc	-0.202	-0.653	-0.563	-0.366	-0.538	-0.020	-6.152	2.670	0.798	2.735
	(0.409)	(0.505)	(0.535)	(0.499)	-0.529	(0.016)	(1.479)***	(1.723)	(0.909)	(1.714)
SUM_RL									0.136	8.856
									(1.811)	(4.016)**
Observations	1317	870	870	870	870	870	537	333	870	333
R-squared	0.8378	0.8673	0.8646	0.8673	0.8675	0.5641	0.9064	0.8391	0.8682	0.8412
Countries	53	33	33	33	33	33	21	12	33	12
	ALL	ALL	ALL	ALL	ALL	ALL	Industrial	Developing	ALL	Developing
F									0.0000	0.1538

Robust standard errors in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%

SUM denotes job flows in the US. CF+AdmC is the sum of the two measures of EPL from Botero et al (2004), RL denotes rule of law, RZ denotes the measure of external financial dependency for sector j, AS denotes accounting standards, IA denotes the ratio of Intangible to fixed assets in sector j, while PR is a measure of Respect for Property Rights. ENTRYrand denotes percentage of young firms in sector j, while ecG denote cost of entry measured as proportion of GDP per capita while inc stands for income per capita.

Table 7: The effects of Employment Legislation on Value Added, Labor Productivity, Number of Plants and Employment per Plant

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log Value Added 91-95	Log Labor Productivity 91-95	Log Number of Plants 91-95	Log Plant Size 91-95	Log Value Added 91-95	Log Labor Productivity 91-95	Log Number of Plants 91-95	Log Plant Size 91-95
SUM_CF+AdmC	-5.263	1.757	-4.883	-2.124	-2.199	1.671	-1.739	-0.708
	(1.716)***	(1.023)*	(1.762)***	(1.417)	(3.286)	(2.092)	(2.798)	(1.878)
SUM_CF+AdmC_RL					-2.612	-0.040	-2.304	-1.286
					(2.285)	(1.399)	(1.942)	(1.390)
RZ_AS	2.824	0.481	1.577	0.749	2.837	0.447	1.665	0.719
	(0.543)***	(0.290)*	(0.550)***	(0.399)*	(0.539)***	(0.285)	(0.545)***	(0.403)*
IA_PR	0.095	0.017	0.070	0.024	0.096	0.016	0.073	0.022
	(0.027)***	(0.012)	(0.025)***	(0.018)	(0.026)***	(0.012)	(0.024)***	(0.018)
ENTRYrand_ecG	-6.241	1.835	-12.070	3.991	-6.221	1.775	-11.959	3.917
	(1.661)***	(1.282)	(1.868)***	(1.115)***	(1.659)***	(1.250)	(1.846)***	(1.115)***
SUM_MAgdppc	1.134	1.787	0.018	-0.734	1.804	1.005	2.002	-1.254
	(0.542)**	(0.383)***	(0.547)	(0.409)*	(1.026)*	(0.756)	(0.974)**	(0.669)*
SUM_RL					1.447	1.311	-0.926	2.096
					(2.201)	(1.435)	(1.980)	(1.401)
Observations	870	870	817	817	870	870	817	817
R-squared	0.8767	0.8894	0.8969	0.8065	0.8770	0.8900	0.8979	0.8071
Countries	33	33	31	31	33	33	31	31
F					0.0039	0.2509	0.0226	0.2561

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%