

The Effects of Hiring and Firing Regulation on Unemployment and Employment: Evidence Based on Survey Data

Feldmann, Horst

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The Effects of Hiring and Firing Regulation on Unemployment and Employment: Evidence Based on Survey Data

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The Effects of Hiring and Firing Regulation on Unemployment and Employment: Evidence Based on Survey Data

Abstract. We use the results of surveys among senior business executives to measure the strictness of hiring and firing regulations. The survey data are more likely than objective indicators (used in almost all previous studies) to correctly capture the de facto strictness of these regulations and their relevance to the performance of the labor market. Using data from 19 industrial countries for the period 1992 to 2002, we find that more flexible regulations are likely to lower unemployment and to increase employment rates. While the effects on the general population appear to be modest, the effects on female, young and low-skilled workers seem to be substantial.

JEL classification: E24, J23, J63, J64, J68

Keywords: employment, employment protection, hiring and firing regulation, unemployment

1. Introduction

As is well known, the net effects of hiring and firing regulation on unemployment and employment cannot be unambiguously deduced from theory (see, e.g., Bertola 1990). Given the ambiguity of theoretical models, the direction and magnitude of the impact of hiring and firing regulations have to be resolved empirically. Although many empirical studies have analyzed their effects over the

past years, the evidence so far is mixed.¹ In recent surveys of the empirical literature, the OECD (2004a, p. 80), Layard et al. (2005, p. XVII) and Bassanini and Duval (2006, p. 89) conclude that these studies do not settle the matter.

This paper attempts to gain new insights by using a subjective indicator of the strictness of hiring and firing regulation. By contrast, almost all previous studies have used so-called objective indicators. These indicators have their limitations though. Hiring and firing regulations comprise a large number of statute laws, administrative orders and court decisions. It is very hard to develop an objective indicator that correctly reflects the strictness of all of these rules and regulations. Even if it would be possible to correctly measure the de jure strictness of hiring and firing regulations, objective indicators are unable to capture the de facto strictness of these regulations, which also depends on informal norms and the way the formal rules are enforced. The de facto strictness may vary through time, for example because of changes in the manner how courts and public administrations apply a given set of laws and regulations. Furthermore, objective indicators are unable to measure how employers judge the strictness of a given set of hiring and firing regulations. Employers' judgments, and their responses in terms of recruitment and dismissal of workers, may also vary through time, even with de jure strictness remaining unchanged. For example, suppose hiring and firing regulations have recently been liberalized in other economies, or other economies with more flexible regulations have recently become more open to trade and foreign direct investment. As a result, employers may conclude that domestic hiring and firing regulations have become relatively more burdensome. This may induce them to move jobs abroad, lowering employment and increasing unemployment in the domestic economy.

¹ See, e.g., Lazear (1990), Addison and Grosso (1996), Scarpetta (1996), Elmeskov et al. (1998), International Monetary Fund (2003), Heckman and Pagés (2004), OECD (2004a), Baker et al. (2005), Nickell et al. (2005), Bassanini and Duval (2006).

To capture these aspects and thus to shed new light on the unemployment and employment effects of hiring and firing regulations, this paper uses the results of surveys in which high-level managers characterized the strictness of the hiring and firing regulations of their respective economies. Section 2 describes the data set and the empirical strategy, particularly discussing the strengths and weaknesses of the survey data. Section 3 presents and interprets the regression results. Section 4 concludes.

2. Data

To measure the strictness of hiring and firing regulation, this paper uses results from the World Economic Forum's Executive Opinion Surveys (EOS), which are carried out annually in a large number of countries to determine the international competitiveness of the relevant economies. The respondents are a company's CEO or a member of its senior management. In each country approximately 60 to 70 executives are interviewed. The industry structure of the companies questioned corresponds largely to the industry structure of the relevant economy (excluding the agricultural sector). Also, care is taken to question companies of various size categories and types (e.g., private and state-owned, domestically oriented and internationally active enterprises).²

² Over time, there have been some changes to the World Economic Forum's surveys that are of minor importance to our analysis. First, between 1989 and 1995 the surveys were conducted in collaboration with the Institute for Management Development, Lausanne, and between 1996 and 2001 in collaboration with the Center for International Development at Harvard University. Second, the number of countries covered has increased steadily from 36 in 1992 to 80 in 2002. (Due to a lack of data on some of our control variables, our empirical study covers only 19 industrial countries. See text and Appendix A for details.)

The typical EOS question asks participants to indicate on a numerical scale which of the two statements specified in each case they favor. After the questioning, arithmetic means for each question are calculated from the answers for each country. The Box contains the questions on hiring and firing regulation used in the following analysis. The World Economic Forum used different scales in the years before 1997. For the purpose of our analysis, we converted all pre-1997 answers to the 1-to-7 scale used in the more recent surveys. The period covered by our empirical analysis is 1992 to 2002. In the years prior to 1992, the respective questions were phrased very differently. For example, in 1991 the EOS statement read: “Flexibility of management to adjust employment levels during difficult periods: 0 = low, 100 = high” (World Economic Forum and Institute for Management Development 1991). Thus the question did not explicitly refer to hiring and firing regulations. In 1990 the EOS statement read: “Flexibility of enterprises to adjust employment and compensation levels to economic realities: 0 = not at all, to 100 = a great deal” (World Economic Forum and Institute for Management Development 1990). Similarly, in the years 1984 to 1987 and in 1989 (there was no survey in 1988), the EOS statement read: “Flexibility of enterprises to adjust job security and compensation standards to economic realities: 0 = none at all, to 100 = a great deal” (EMF Foundation – The World Economic Forum 1984, 1985, 1986; World Economic Forum 1987; World Economic Forum and Institute for Management Development 1989). Thus before 1991, the questions did not exclusively refer to adjustments in employment or job security (and thus at least implicitly to hiring and firing regulations) but also to wage adjustments. Because of these substantial differences, we excluded the answers to the pre-1992 questions from our data set. The questions from the Executive Opinion Surveys 1992 to 2002 explicitly refer to hiring and firing regulations and are all phrased in a similar way (see Box). There are some slight variations but these are only refinements of style to make the questions more precise. Thus the answers to all 11 questions can be used simultaneously.³

³ As higher marks on the EOS scale indicate more flexible regulation, we label our variable of interest ‘flexible hiring and firing regulation’.

There are a number of reasons to assume that the answers of the Executive Opinion Surveys correctly reflect the strictness of hiring and firing regulations and thus may be superior to objective indicators:

- First, the selection of respondents is largely representative and the respondents have comprehensive knowledge of and practical experience with the hiring and firing regulations of their countries.
- Second, the questions are phrased objectively and, at the same time, permit a better coverage of the various facets of hiring and firing regulations than hard data. For example, a country's dismissal regulations comprise a large number of legal standards, administrative orders and court decisions. If only the duration of the statutory notice period and the amount of the severance payment for a worker with ten years' length of service are used as indicators, as was the case with Lazear (1990), the degree of strictness of hiring and firing regulations is not completely and correctly measured. The OECD's (1999, 2004a) employment protection legislation (EPL) indicator, which has been used in almost all recent studies, is much more sophisticated than Lazear's (1990) indicator. Still, although the OECD's EPL indicator does an excellent job in measuring the *de jure* strictness of hiring and firing regulations, it is unable to capture their *de facto* strictness. As already pointed out, the *de facto* strictness also depends on the degree of enforcement of the law and on informal norms. For instance, in some countries, like France, advance notice before dismissal given orally is more important than the length of the notice period stated in the law. Informal norms and the degree of enforcement of the law cannot be captured at all by hard data. By contrast, the answers to the EOS questions appear to be well suited to capture the *de facto* strictness of hiring and firing regulations.
- Third, as the respondents decide on the recruitment and dismissal of workers, their answers are likely to reflect the relevance of the strictness of hiring and firing regulations to the performance of the labor market. In fact, the answers are likely to reflect this relevance better than objective

data. For instance, when deciding on whether to hire additional workers on a fixed-term basis, the decisive aspect is neither the allowed maximum number of successive fixed-term contracts nor their allowed maximum cumulated duration, as stated by the law (aspects measured by the OECD's EPL indicator). What is decisive is whether the regulations on fixed-term contracts are flexible enough in the opinion of those who decide on recruitment and dismissal. As pointed out in section 1, employer's opinions are not only determined by domestic rules, formal and informal, and the manner the rules are implemented in practice. They are also influenced by (changes to) the international competitiveness of these rules. For example, if other economies have recently relaxed their hiring and firing regulations, employers may conclude that the domestic regulations have become relatively more burdensome, even if these regulations have not changed. They may thus relocate jobs abroad, leading to lower employment and higher unemployment in the domestic economy. Indeed, empirical studies have found that countries with more flexible hiring and firing regulations are able to attract more foreign direct investment (Cooke 1997, Görg 2005).

Of course, potential drawbacks also have to be considered in connection with the use of the Executive Opinion Surveys. One potential drawback is that the answers may be distorted by the state of the business cycle prevailing at the time of the questioning. For example, the managers of a country might judge the dismissal protection regulations favorably during a boom when they do not have to lay off many workers. In a subsequent recession, when they do have to substantially reduce staff, they might feel restricted by those regulations. Thus, they might then judge them less favorably, although the regulations have not been altered in the meantime. However, a closer look at the data suggests that the business cycle does not affect the EOS scores. A first indication is that the correlation coefficient between the variable output gap and the EOS-based variable hiring and firing regulation, at -0.21 , is low and negative, not positive as could be expected if the EOS scores would be affected by the business cycle in the way described previously. Furthermore, Table 1

presents four different regressions with the output gap as an independent variable and flexible hiring and firing regulation as the dependent variable. Regressions (1) and (2) use the fixed effects method to control for unobserved country effects. In regression (1), the coefficient on output gap is statistically significant at the 1% level, but it is negative as well. If we add log income per capita to control for the impact of the level of economic development, the coefficient on output gap becomes statistically insignificant [regression (2)]. It remains statistically insignificant if we apply the random effects instead of the fixed effects method [regression (3)].⁴ If we do not control for unobserved country effects but just for the level of economic development, the coefficient on output gap is statistically significant at the 1% level [regression (4)]. However, once again, it has a negative algebraic sign, contradicting the hypothesis that booms (recessions) lead to higher (lower) EOS scores. All in all, we can safely reject this hypothesis.

A second potential drawback of the EOS data is that each respondent could use his own yardstick when answering the questions. For example, on the 1-to-7 scale, an item marked 7 by one person may only be marked 5 by another. This is a concern particularly because only 60 to 70 managers were interviewed in each country. However, in the planning, implementation and analysis of the surveys, care was taken to ensure the use of a uniform yardstick. For one, the respondents were provided with a written explanation of the answering scale. Also, the answers were examined for robustness and consistency using various methods. In one of these checks, half of the responses in each country were randomly dropped from the sample. As the national EOS scores remained stable in the process, they have obviously not been distorted by individual peculiarities in responding (Cornelius and Warner 2000, p. 94; Cornelius and McArthur 2002, pp. 169-173; Blanke et al. 2003, pp. 372-375).

⁴ The Hausman test indicates that the random effects estimates may be biased (Table 1).

Another concern is that there may be a systematic bias among respondents at the national level. For example, respondents in a country might have a similar biased assessment of the strictness of hiring and firing regulation if this topic has recently been discussed extensively and with a certain flavor in the press. Also, the questions may be interpreted differently in different countries. For these reasons, the survey results may not accurately reflect differences in national hiring and firing regulation. The authors of the Executive Opinion Surveys tried to avoid this problem by providing all respondents with a written explanation of the answering scale and by asking them to think in world terms rather than in national terms.

In order to check whether a “perception bias” exists, we compare the national EOS scores with related hard data. As an objective indicator, we use the OECD’s (2004a) employment protection legislation (EPL) indicator. This indicator measures the strictness of protection against individual dismissals for workers with regular contracts and the strictness of regulation of temporary employment (fixed-term contracts, temporary work agency employment).⁵ As mentioned previously, it solely uses objective data. For example, to measure the strictness of protection against individual dismissal, it takes into account, inter alia, the length of the notice period and the amount of severance pay at different lengths of tenure. To measure the strictness of regulation of temporary employment, it takes into account, inter alia, the maximum number and the maximum cumulated duration of successive fixed-term contracts as well as the maximum cumulated duration of temporary work agency contracts. The OECD converted these measures into cardinal scores that were normalized to range from 0 to 6, with higher scores representing stricter regulation. In

⁵ A second version of the EPL indicator additionally includes specific requirements for collective dismissals. However, data for this broader indicator are only available since the late 1990s. This does not pose a major problem, though, as specific requirements for collective dismissals do not play a major role. Indeed, as the OECD (2004a, p. 72) has demonstrated, taking account of these specific requirements in the overall measure of EPL strictness does not affect cross-country comparisons much.

calculating the summary indicator of EPL strictness, it assigned the same weight to the regulation covering regular and temporary contracts.

As hiring and firing regulations are usually reformed only rarely, most of the variation results from differences across countries rather than from changes through time. Thus we first calculate country averages for the EPL indicator and the EOS scores. Figure 1 plots the EPL indicator on the horizontal axis and the survey results on the vertical axis. The graph shows a strong relationship between the two variables. Indeed, the correlation coefficient for these country averages is -0.84 . For example, the United States and the United Kingdom had both the lowest EPL scores and some of the highest EOS scores on average between 1992 and 2002. At the other end of the spectrum are Italy and Portugal, for example. On average between 1992 and 2002, these countries had both very high EPL scores and some of the lowest EOS scores. Thus in countries with strict (flexible) hiring and firing regulations, as measured by the EPL indicator, few (many) respondents thought that hiring and firing practices were flexibly determined by employers.

Figure 2 presents the corresponding correlation for the annual data. Unsurprisingly, the overall fit is somewhat weaker than for the country averages. Still, Figure 2 also indicates that higher (lower) levels of employment protection strictness, as measured by the OECD's indicator, are strongly associated with lower (higher) EOS scores. The correlation coefficient for the panel data is -0.68 . Furthermore, Figure 2 illustrates that changes in hiring and firing regulation that have occurred in some countries during our period of investigation are reflected not only in the EPL scores but in the EOS scores as well. For example, in 1994 Spain relaxed procedural requirements for dismissals for economic reasons, shortened notice periods, permitted temporary work agencies and tightened rules governing renewals of fixed-term contracts. As a result, not only did its EPL score drop from 3.8 in 1993 to 3.1 in 1994, in addition Spain's EOS score increased from 2.32 in 1993 to 2.56 in 1994. In 1995, its EOS score increased further to 2.76, which is plausible because the Executive Opinion

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Surveys are always conducted in the early months of each year. Obviously, in the early months of 1995 the scope of the reform was more clearly visible than in the early months of 1994.

Belgium is a similar case in point. In 1997 it reduced restrictions on temporary work agencies and made fixed-term contracts renewable. As a result, Belgium’s EPL score fell from 3.2 in 1996 to 2.2 in 1997. Concurrently, its EOS score increased from 2.63 in 1996 to 3.00 in 1997 and 3.26 in 1998. The case of New Zealand also illustrates that substantial changes in the strictness of hiring and firing regulations are reflected in changes in EOS scores. Until 1999, New Zealand’s hiring and firing regulations were relatively flexible. In 2000, the employment relations act tightened legislation on dismissals, fixed-term contracts and temporary work agencies. This reform is not only reflected in an increase in New Zealand’s EPL score from 0.9 in 1999 to 1.5 in 2000 but also in a drop of its EOS score from 4.46 in 1999 to 3.00 in 2000 and 2.80 in 2001. The examples of these three countries illustrate that significant changes in the strictness of hiring and firing regulations are reflected in corresponding changes in EOS scores.

Overall, Figures 1 and 2 indicate a close connection between perceived hiring and firing regulation and employment protection legislation, as measured by the OECD’s indicator. Thus the subjective data from the Executive Opinion Surveys appear to be well suited for analyzing the impact of hiring and firing regulations on labor market performance. To be sure, as pointed out previously, they may have certain limitations. However, objective measures have shortcomings of their own and, on balance, may be less suitable. For instance, they measure only de jure strictness, whereas the EOS scores measure de facto strictness, which certainly is more relevant. Thus the judgments of high-level business executives, as recorded in the Executive Opinion Surveys, provide an alternative characterization that may shed useful new light on the effects of hiring and firing regulations. Therefore, this paper complements previous studies of other researchers who have almost exclusively used objective measures.

To measure the performance of the labor market, we use not only the overall rates of unemployment and employment but also unemployment and employment rates relating to women, youths and the low skilled. Thus we analyze not only whether the strictness of hiring and firing regulation affects the general situation on the labor market but also whether it affects three demographic groups that usually have above-average unemployment rates.

We control for the impact of most other labor market institutions that have been considered in the recent literature. As previous empirical studies have shown, certain labor market institutions appear to have a considerable impact on the performance of the labor market (see footnote 1). By using adequate controls, we try to make sure as far as possible that the coefficients on flexible hiring and firing regulation are not biased due to omitted variables. To date, the OECD has undertaken the most extensive effort to quantify labor market institutions and has developed the best indicators. Therefore, we use these data, although they are available for only 19 industrial countries (see Appendix A). The data cover the following labor market institutions (for variables definitions and sources, see Appendix B):

- trade union density,
- collective bargaining coverage,
- wage bargaining at industry level⁶,
- wage bargaining coordination,
- tax burden on labor ('tax wedge'),
- unemployment benefits replacement rates,
- expenditure on active labor market policies per unemployed person.

⁶ This variable is meant to test Calmfors and Driffill's (1988) hump hypothesis, according to which unemployment (employment) will be comparatively high (low) if wages are negotiated at the industry level.

We use the output gap to control for the state of the business cycle. Additionally, we use log income per capita to account for the effects of differences in the level of economic development, e.g., with respect to the labor force participation of women. In the regressions to explain the youth employment rate, we also employ the tertiary enrollment rate. This variable is meant to account for varying academic education frequencies, which are likely to affect youth employment.

Finally, we control for unobserved country effects by using country-specific fixed effects. The fixed effects regressions, presented in the upper parts of Tables 2 and 3, are the baselines for our empirical estimates.⁷ To check whether other methodologies yield similar results, the lower parts of both tables present the coefficients on our variable of interest from FGLS regressions with country-specific random effects and from pooled OLS regressions, respectively. In both cases, the control variables are the same as the ones used for the fixed effects regressions presented in the upper part of the tables.⁸ We prefer the fixed effects model to the random effects model because in 5 out of 8 regressions, the Hausman test indicates that the random effects estimates may be biased (Tables 2 and 3). We prefer the fixed effects model to the pooled OLS model because, first, the estimates from the latter model are likely to be biased as well in these five cases, and, second, because the

⁷ While controlling for the effects of most other major labor market institutions, the business cycle, the level of economic development and unobserved country effects goes a long way to avoid omitted variables bias, endogeneity still may be a problem for estimation because changes in unemployment and employment rates may lead to changes in the (perceived) strictness of hiring and firing regulation. Unfortunately, due to a lack of instruments we are unable to directly address this reverse causality problem. (This is in line with the previous literature, which does not use instruments either.) However, given the results presented in Table 1, it is unlikely that reverse causality is relevant in our case. (Unemployment and employment rates are strongly correlated with the output gap.)

⁸ To save space, the estimates for the controls from the random effects FGLS and the pooled OLS regressions are not presented in Tables 2 and 3.

OLS model does not control for unobserved country effects. Instead, it treats successive observations for each country as independent.⁹

3. Results

Tables 2 and 3 present our multivariate regressions to explain unemployment and employment rates, respectively. Our results for the control variables largely accord with those obtained in many earlier studies. For example, in line with most previous studies we find that an increase in the tax wedge is likely to both raise unemployment and lower the employment level.¹⁰ Furthermore, we find that generous unemployment benefit schemes appear to increase unemployment. This is also in line with most recent studies.¹¹ Additionally, while some of our estimates corroborate Calmfors and Driffill's (1988) hump hypothesis, overall the evidence in favor of this hypothesis is weak. This, too, accords with the previous literature (Aidt and Tzannatos 2002).

We now turn to the results for our variable of interest. Indeed, the key finding of our empirical investigation is that hiring and firing regulation appears to have a statistically significant and robust effect on labor market performance. The coefficient on flexible hiring and firing regulation is statistically significant in all fixed effects regressions, in seven out of eight random effects regressions and in four out of eight pooled OLS regressions. According to our estimates, more flexible hiring and firing regulation is associated with lower unemployment among the total labor force as well as among female, young and low-skilled workers (Table 2). Similarly, it is associated

⁹ We also checked the robustness of our results by dropping the control variables from our baseline specifications one at a time. In these checks (results not reported here), the coefficient on our variable of interest remained very similar.

¹⁰ Important studies on the effects of labor taxes include, e.g., Daveri and Tabellini (2000) and Prescott (2004).

¹¹ See, e.g., Jenkins and Garcia-Serrano (2004), Lalive and Zweimüller (2004) and Nickell et al. (2005).

with a higher level of employment among the overall working-age population as well as among women, youths and the low-skilled (Table 3).¹²

Our estimates suggest that liberalizing hiring and firing regulation would have a notable, though generally modest, pay-off in terms of lower unemployment and higher employment. For example, according to the Executive Opinion Surveys, France had one of the strictest hiring and firing regulation in our sample of 19 industrial countries. During the period under review, its EOS score averaged 2.84. By contrast, Switzerland had one of the most flexible hiring and firing regulation. Its EOS score averaged 5.31. Switzerland also had substantially lower unemployment rates as well as substantially higher employment rates, both among the total population and among each of the three demographic groups. According to our fixed effects estimates, if hiring and firing regulation in France had been as flexible as in Switzerland, the French unemployment rate would have been 1.1 percentage points lower among the total labor force, 1.6 percentage points lower among women, 2.1 percentage points lower among young people and 1.7 percentage points lower among the low skilled, *ceteris paribus*. Additionally, France's employment rate would have been 1.1 percentage points higher both among the total working-age population and among women, 1.5 percentage points higher among young people and 2.1 percentage points higher among low-skilled workers, *ceteris paribus*. Of course, these figures should be interpreted with some caution. However, they illustrate the magnitude of the effects.

According to our results, flexible hiring and firing regulations are favorable for workers, particularly for female, young and low-skilled workers. If the regulations relating to fixed-term

¹² As mentioned in section 1, the evidence from previous empirical studies, which almost exclusively use objective indicators, so far is mixed. By contrast, our results are less ambiguous. The main reason for this difference may be that our survey-based indicator is more likely than objective indicators to correctly capture the *de facto* strictness of hiring and firing regulations and their relevance to the performance of the labor market (see section 2).

contracts and temporary work agencies are flexible, these workers seem more often to have an opportunity to find a job via temporary employment contracts and thus to establish themselves in working life. If dismissal regulations are not too restrictive, employers seem to be more inclined to hire women, young people and low-skilled workers for an indefinite period, as they are in a position to rapidly dismiss them if the profitability of their employment proves to be inadequate or if the business situation deteriorates. In the end, these workers benefit from this planning scope of employers.

Our results corroborate those theoretical models according to which high costs of hiring and firing impair the employment situation. For example, extending Bertola's (1990) well-know model, Risager and Sørensen (1997) have shown that an increase in hiring and firing costs *ceteris paribus* reduces the return on capital, lowering investment, labor demand and employment. As our results indicate that strict hiring and firing rules are likely to have an especially adverse impact on women, young people and low-skilled workers, they particularly corroborate Lindbeck and Snower's (1988) insider-outsider theory, according to which these kind of rules deteriorate the employment opportunities of these groups in particular.

4. Conclusion

This paper provides new evidence of the effects of hiring and firing regulations on unemployment and employment rates. In contrast to the previous literature, which almost exclusively relies on hard data, we use the results of surveys among senior business executives to measure the strictness of these kind of regulations. The survey data are more likely than objective indicators to correctly capture their *de facto* strictness and their relevance to the performance of the labor market. Controlling for the impact of important labor market institutions, the business cycle, the level of

economic development and unobserved country effects, we find that more flexible hiring and firing regulations are likely to lower unemployment and to increase the employment level. While the effects on the general population appear to be modest, the effects on women, young people and low-skilled workers seem to be substantial.

Appendix A. List of countries

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

Appendix B. Definitions and sources of variables

Active labor market policies: Expenditure on active labor market programs per unemployed person, divided by 1,000. Source: OECD (2004a).

Collective bargaining coverage: Percentage of salaried workers subject to union-negotiated terms and conditions of employment. Source: OECD (2004a).

Employment protection legislation: Indicator for strictness of protection against individual dismissals and for strictness of regulation of temporary employment (fixed-term contracts, temporary work agency employment). The indicator ranges from 0 to 6, with higher values representing stricter regulation. Source: OECD (2004a).

Employment rate: Employed aged 15 to 64 years as a percentage of the population in the same age bracket. Source: International Labour Office (2003), OECD (2005a, 2005b).

Employment rate among low-skilled workers: Employed with less than upper secondary education as a percentage of the population with the same educational attainment. Persons aged 25 to 64 years. Source: OECD (1997, 1998, 1999, 2005a).

Female employment rate: Employed women aged 15 to 64 years as a percentage of the female population in the same age bracket. Source: International Labour Office (2003), OECD (2005a; 2005b).

Female unemployment rate: Unemployed women aged 15 to 64 years as a percentage of the female labor force in the same age bracket. Source: International Labour Office (2003), OECD (2005a).

Flexible hiring & firing regulation: Survey responses from the World Economic Forum's annual Executive Opinion Surveys. In each country approximately 60 to 70 senior business executives were interviewed (see text for a more detailed description of the surveys). The answer scale ranges from 1 to 7, with higher marks on the scale meaning more flexible regulation (see Box for phrasing of questions). Source: World Economic Forum (1996, 1997, 1998, 1999, 2000, 2002, 2003), World Economic Forum, Institute for Management Development (1992, 1993, 1994, 1995).

Log income per capita: The natural logarithm of gross national income divided by midyear population, converted into current international dollars using purchasing power parity rates. Source: World Bank (2005).

Output gap: Deviations of actual GDP from potential GDP as a per cent of potential GDP. Source: OECD (2005c).

Tax wedge: Income tax plus employee's and employer's social security contributions less cash benefits as a percentage of labor costs; one-earner family with two children; average production worker. Source: OECD (2004b).

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3 Tertiary enrollment rate: Students enrolled in tertiary education, regardless of age, as a percentage
4 of the population of the age group that officially corresponds to this level of education.

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6
7 Source: World Bank (2004).

8
9
10 Trade union density: Percentage of employees in trade unions. Source: OECD (2004a).

11
12 Unemployment benefits replacement rates: Gross unemployment benefits as a percentage of
13 previous gross wage earnings. Averages across two earnings levels, three family types, and
14 three unemployment duration categories. Source: OECD (2004c).

15
16
17 Unemployment rate: Unemployed as a percentage of the civilian labor force (standardized rates).
18 Source: OECD (2005c).

19
20 Unemployment rate among low-skilled workers: Unemployed with less than upper secondary
21 education as a percentage of the labor force with the same educational attainment. Persons
22 aged 25 to 64 years. Source: OECD (1997, 1998, 1999, 2005a).

23
24
25 Wage bargaining at industry level: Industry level predominant in wage bargaining, dummy variable.
26 Source: OECD (2004a).

27
28
29 Wage bargaining coordination: Degree of coordination in wage bargaining. The indicator ranges
30 from 1 to 5, with higher values representing a higher degree of coordination. Source: OECD
31 (2004a).

32
33
34 Youth employment rate: Employed aged 15 to 24 years as a percentage of the population in the
35 same age bracket. Source: OECD (2005a, 2005b).

36
37
38 Youth unemployment rate: Unemployed aged 15 to 24 years as a percentage of the labor force in
39 the same age bracket. Source: International Labour Office (2003), OECD (2005a).

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Questions on hiring & firing regulation from the Executive Opinion Surveys (EOS)

- EOS 1992: “Hiring and firing practices are: (0 = too restricted by government, 100 = flexible enough)”
- EOS 1993, 1994 & 1995: “Hiring and firing practices are: (0 = too restricted by government, 10 = flexible enough)”
- EOS 1996: “Hiring and firing practices are flexible enough (1 = strongly disagree; 6 = strongly agree)”
- EOS 1997, 1998 & 1999: “Hiring and firing practices are flexibly determined by employers (1 = strongly disagree; 7 = strongly agree)”
- EOS 2000: “Hiring and firing practices by companies are determined by employers. (1 = strongly disagree; 7 = strongly agree)”
- EOS 2001 & 2002: “Hiring and firing of workers is: (1 = impeded by regulations, 7 = flexibly determined by employers)”

Source: World Economic Forum (1996, 1997, 1998, 1999, 2000, 2002, 2003), World Economic Forum and Institute for Management Development (1992, 1993, 1994, 1995).

Table 1. Correlation between output gap and hiring & firing regulation^{a)}

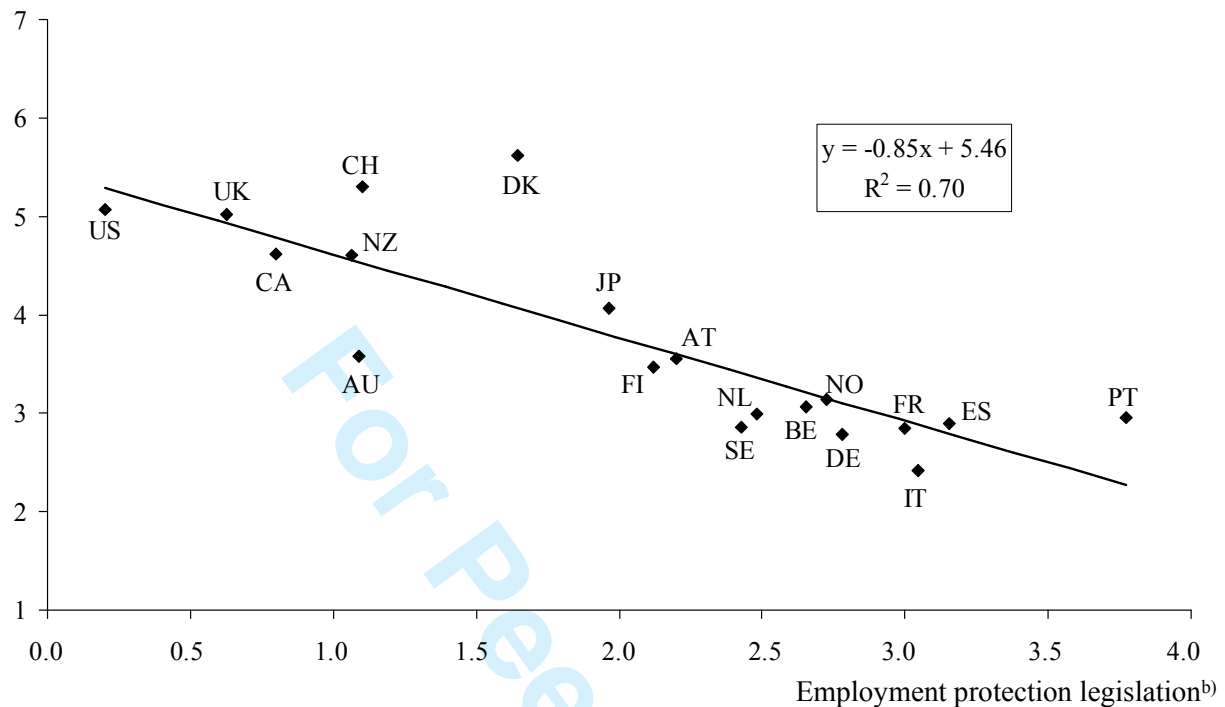
	Dependent variable: Flexible hiring & firing regulation			
	Fixed effects regression	Fixed effects regression	Random effects FGLS regression	Pooled OLS regression
	(1)	(2)	(3)	(4)
Output gap	-0.13*** (-7.74)	0.00 (0.10)	-0.01 (-0.45)	-0.12** (-2.57)
Log income per capita		-3.03*** (-7.89)	-2.74*** (-6.73)	0.61 (0.88)
Country-specific effects	Yes	Yes	Yes ^{b)}	No
Number of observations	209	209	209	209
Adjusted R ²	0.78	0.85	0.41	0.05
Standard error of regression	0.53	0.44	0.45	1.11
F-statistic	40.81***	60.24***	72.88***	6.07***
Hausman test			13.05***	

^{a)}Data for 19 industrial countries from the years 1992 to 2002. Heteroskedasticity-consistent t-statistics in parentheses (White method), except for the pooled OLS regression, where the figures in parentheses are heteroskedasticity- and autocorrelation-consistent t-statistics (Newey-West method). ***(**/*) denotes statistically significant at the 1%(5%/10%) level. All regressions also contain a constant term. See Appendix A for a list of countries. See Appendix B for variables descriptions and sources.

^{b)}Swamy-Arora method.

Figure 1. Hard versus survey data on hiring & firing regulation
– Country averages^{a)}

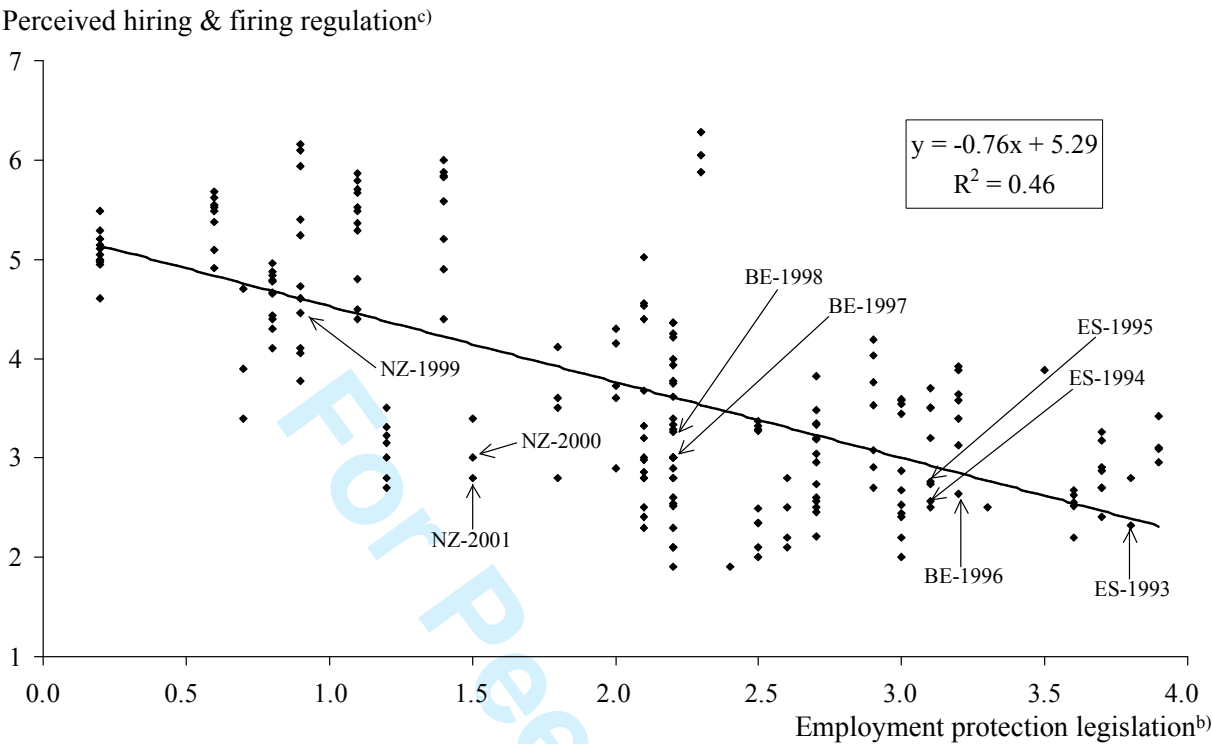
Perceived hiring & firing regulation^{c)}



- a) 19 industrial countries; averages over 1992-2002. See Appendix A for a list of countries.
 b) Indicator for strictness of protection against individual dismissals and for strictness of regulation of temporary employment (fixed-term contracts, temporary work agency employment). The indicator ranges from 0 to 6, with higher values representing stricter regulation. It was developed by the OECD.
 c) Answers from the World Economic Forum's Executive Opinion Surveys. The answer scale ranges from 1 to 7, with higher marks on the scale meaning more flexible regulation. See Box for phrasing of questions.

Source: See Appendix B.

Figure 2. Hard versus survey data on hiring & firing regulation
– Panel data^{a)}



- a) 19 industrial countries; annual data for the years 1992-2002. See Appendix A for a list of countries.
- b) Indicator for strictness of protection against individual dismissals and for strictness of regulation of temporary employment (fixed-term contracts, temporary work agency employment). The indicator ranges from 0 to 6, with higher values representing stricter regulation. It was developed by the OECD.
- c) Answers from the World Economic Forum's Executive Opinion Surveys. The answer scale ranges from 1 to 7, with higher marks on the scale meaning more flexible regulation. See Box for phrasing of questions.

Source: See Appendix B.

Table 2. Fixed effects regressions to explain unemployment rates^{a)}

	Unemployment rate	Female unemployment rate	Youth unemployment rate	Unemployment rate among low- skilled workers
	(1)	(2)	(3)	(4)
Flexible hiring & firing regulation	-0.43*** (-2.78)	-0.66** (-2.60)	-0.85** (-2.11)	-0.68* (-1.91)
Trade union density	0.00 (0.01)	0.03 (0.38)	-0.05 (-0.37)	-0.27*** (-4.57)
Collective bargaining coverage	0.03 (1.49)	0.00 (0.06)	-0.02 (-0.43)	0.09*** (2.84)
Wage bargaining at industry level	3.07*** (5.57)	1.43 (1.27)	2.32 (1.46)	9.31*** (9.70)
Wage bargaining coordination	2.10*** (5.18)	1.00 (1.12)	3.33*** (2.84)	2.55*** (5.61)
Tax wedge	0.20*** (5.36)	0.24*** (5.05)	0.38*** (6.39)	0.17** (2.60)
Unemployment benefits replacement rates	0.06*** (4.07)	0.04*** (2.66)	0.06* (1.65)	0.13*** (5.26)
Active labor market policies	-0.12*** (-4.37)	-0.20*** (-8.07)	-0.19*** (-4.82)	-0.10*** (-3.21)
Output gap	-0.42*** (-24.39)	-0.26*** (-7.90)	-0.86*** (-14.67)	-0.53*** (-8.00)
Log income per capita	-4.46*** (-2.72)	-6.31** (-2.29)	-6.36 (-1.43)	-11.91*** (-5.88)
Adjusted R ²	0.95	0.94	0.94	0.93
Standard error of regression	0.77	1.29	2.01	1.16
F-statistic	140.87***	122.64***	124.06***	78.43***
Memorandum item: Random effects FGLS regressions ^{b)}				
Coefficient on flexible hiring & firing regulation	-0.25** (-1.98)	-0.56*** (-2.79)	-0.89** (-2.54)	-0.40 (-1.37)
Adjusted R ²	0.74	0.58	0.58	0.64
Standard error of regression	0.83	1.28	2.03	1.29
F-statistic	61.05***	29.36***	30.18***	31.53***
Hausman test	39.00***	8.20	13.96	48.80***
Memorandum item: Pooled OLS regressions				
Coefficient on flexible hiring & firing regulation	-0.67** (-2.40)	-0.78 (-1.62)	-2.19*** (-3.34)	-0.23 (-0.58)
Adjusted R ²	0.73	0.62	0.69	0.69
Standard error of regression	1.78	3.29	4.67	2.39
F-statistic	57.66***	35.61***	48.28***	39.09***
Number of observations	208	209	209	170

Table 2. Fixed effects regressions to explain unemployment rates^{a)}
(continued)

^{a)}Pooled least squares estimates with country-specific fixed effects. The lower parts of the table present estimates from FGLS regressions with country-specific random effects and from pooled OLS regressions, respectively. In both cases, the control variables are the same as the ones used for the fixed effects regressions presented in the upper part of the table. Data for 19 industrial countries from the years 1992 to 2002. Heteroskedasticity-consistent t-statistics in parentheses (White method), except for the pooled OLS regressions, where the figures in parentheses are heteroskedasticity- and autocorrelation-consistent t-statistics (Newey-West method). ***(**/*) denotes statistically significant at the 1%(5%/10%) level. All regressions also contain a constant term. See Appendix A for a list of countries. See Appendix B for variables descriptions and sources.

^{b)}Swamy-Arora method.

Table 3. Fixed effects regressions to explain employment rates^{a)}

	Employment rate	Female employment rate	Youth employment rate	Employment rate among low- skilled workers
	(1)	(2)	(3)	(4)
Flexible hiring & firing regulation	0.45*** (3.28)	0.45*** (3.67)	0.59** (2.32)	0.84*** (4.04)
Trade union density	-0.01 (-0.20)	-0.11 (-1.64)	0.06 (0.58)	0.45*** (5.45)
Collective bargaining coverage	-0.01 (-0.62)	0.00 (0.09)	0.06 (1.27)	-0.15*** (-4.74)
Wage bargaining at industry level	1.47 (1.12)	4.74*** (2.88)	-0.44 (-0.21)	-2.62*** (-3.90)
Wage bargaining coordination	-1.10** (-2.05)	-0.20 (-0.44)	-2.53** (-2.02)	-3.14*** (-3.89)
Tax wedge	-0.19*** (-5.46)	-0.18*** (-4.23)	-0.31*** (-4.04)	-0.16** (-2.43)
Unemployment benefits replacement rates	-0.02 (-1.15)	-0.00 (-0.02)	-0.10*** (-3.76)	0.03 (0.95)
Active labor market policies	0.34*** (7.74)	0.44*** (8.21)	0.61*** (8.05)	0.27*** (6.34)
Output gap	0.27*** (6.59)	0.03 (0.43)	0.82*** (11.37)	0.24*** (4.25)
Log income per capita	8.02*** (5.37)	12.24*** (9.68)	-2.37 (-0.75)	9.28*** (5.42)
Tertiary enrollment rate			-0.01 (-0.95)	
Adjusted R ²	0.98	0.99	0.98	0.94
Standard error of regression	1.03	1.14	1.95	1.72
F-statistic	359.68***	561.93***	308.30***	103.15***
Memorandum item: Random effects FGLS regressions ^{b)}				
Coefficient on flexible hiring & firing regulation	0.48*** (3.21)	0.47*** (3.59)	0.98*** (5.48)	0.70*** (3.03)
Adjusted R ²	0.77	0.80	0.58	0.32
Standard error of regression	1.04	1.17	2.01	1.78
F-statistic	68.92***	84.07***	26.54***	8.93***
Hausman test	14.06	19.55**	22.73**	19.76**
Memorandum item: Pooled OLS regressions				
Coefficient on flexible hiring & firing regulation	1.09** (2.03)	0.47 (0.60)	4.74*** (6.64)	-0.56 (-0.64)
Adjusted R ²	0.76	0.69	0.78	0.41
Standard error of regression	3.55	5.54	6.09	5.60
F-statistic	66.40***	47.42***	67.28***	12.85***
Number of observations	209	209	207	170

Table 3. Fixed effects regressions to explain employment rates^{a)}
(continued)

^{a)}Pooled least squares estimates with country-specific fixed effects. The lower parts of the table present estimates from FGLS regressions with country-specific random effects and from pooled OLS regressions, respectively. In both cases, the control variables are the same as the ones used for the fixed effects regressions presented in the upper part of the table. Data for 19 industrial countries from the years 1992 to 2002. Heteroskedasticity-consistent t-statistics in parentheses (White method), except for the pooled OLS regressions, where the figures in parentheses are heteroskedasticity- and autocorrelation-consistent t-statistics (Newey-West method). ***(**/*) denotes statistically significant at the 1%(5%/10%) level. All regressions also contain a constant term. See Appendix A for a list of countries. See Appendix B for variables descriptions and sources.

^{b)}Swamy-Arora method.