# Job Flow Dynamics and Firing Restrictions: Evidence from Europe

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VERY PRELIMINARY

**Abstract**

This paper characterizes job flow dynamics for a panel of 16 European countries using a unique homogeneous firm-level data set that covers both manufacturing and service firms. Consistent sectoral patterns across countries emerge, with job flows responding more rapidly to net employment changes in services than in manufacturing sectors. Differences across countries confirm the prevailing view in the literature, where job reallocation in the manufacturing sector presents a higher correlation with net employment changes in Continental Europe than in the UK. Garibaldi (1998) shows that these differences might be explained by differences across countries in firing restrictions. This paper provides the first empirical test of Garibaldi's (1998) hypothesis, which is strongly supported by the data. Countries with more stringent employment protection legislation present a higher correlation between job reallocation and net employment changes. When the role of other labour market institutions in job flow dynamics is considered, the panel analysis suggests that more generous unemployment benefits, a higher tax wedge and a more extensive use of temporary employment counter-balance the effects of employment protection, reducing the correlation between job turnover and net employment changes.

**Keywords***: Gross Job Flows, Europe, Business Cycle, Firing Costs*

**JEL Classification***: J23, J63, J68.*

*This paper reflects the views of the authors, and not necessarily those of the European Central Bank.

# 1 Introduction

Following Davis and Haltiwanger's (1990, 1992) seminal papers, a large empirical literature has looked at the stylized facts of job creation and job destruction using firm or establishment level data for different OECD countries. A branch of this literature has focused on the relationship between job turnover and the business cycle. A pro-cyclical movement of job creation and counter-cyclical movement of job destruction is observed in all studies, but the volatility of these two flows along the business cycle differs across countries. Estimates for the US, Canada and the UK show that the increase in job destruction during economic downturns tends to be stronger than the increase in job creation during upturns, resulting in counter-cyclical movements of job reallocation (the sum of job creation and job destruction). By contrast, estimates for continental European countries present a less clear-cut picture, job reallocation tending to be a-cyclical or slightly pro-cyclical. However, different sources of data heterogeneity across these studies difficult cross-country comparisons.

Garibaldi (1998) shows that differences in employment protection legislation between countries may explain the dichotomy in the cyclical behavior of job flows between the Anglo-Saxon and European countries. When costs associated with dismissals are negligible within a matching model with endogenous job destruction, job creation takes time while job destruction is instantaneous. As a consequence, job destruction varies more than job creation within the cycle and job reallocation moves counter-cyclically. This prediction is in line with the counter-cyclical pattern of job reallocation observed in Anglo-Saxon countries, which are characterized by relatively low dismissals restrictions. However, when firing is costly and time consuming as in Continental Europe, the asymmetry in the job flows' cyclical behavior disappears or might even be reversed for stringent enough dismissal restrictions.

This paper overcomes previous problems of comparability of job flows statistics by using a unique homogenous firm level data set that covers the whole spectrum of productive sectors, and provides the first empirical assessment of the relationship between the cyclical behaviour of job flows and . labour market institutions. Thus, the contribution of this paper is twofold. First, it provides a set of homogeneous estimates of the

cyclicality of job flows based on an homogenous sectoral database for sixteen European countries in the nineties, and examines differences and regularities across sectors. Second, it proposes the first formal empirical test of Garibaldi's (1998) main hypothesis and extends the institutional analysis of the behavior of job turnover within the business cycle considering other labour market institutions commonly used in the macroeconomic literature.

Our findings suggest important differences across sectors in the cyclical behaviour of job turnover. Typically, service industries present a pro-cyclical pattern while manufacturing industries always react more slowly to the business cycle. At the aggregate level, job turnover presents either an a-cyclical or pro-cyclical pattern in European countries, but important cross-country disparities emerge in job flow dynamics. These disparities are partially explained by labour market institutions. Consistent across a variety of specifications, job destruction is less volatile the tighter are firing restrictions, resulting in a higher correlation between job reallocation and net employment changes in countries with more stringent employment protection legislation. This finding is in line with the theoretical predictions of the matching model described by Garibaldi (1998). When the role of other labour market institutions in job flow dynamics is considered, we find that more generous unemployment benefits, a higher tax wedge and a larger use of temporary employment at the sectoral level counter-balance the effects of employment protection, reducing the correlation between job turnover and net employment changes.

The rest of the paper is organized as follows. Next section critically reviews the cross-country evidence on the relationship between job flows and the business cycle and presents summary statistics of this relationship for our panel of European countries. Section 3 spells out the empirical strategy and Section 4 presents the main characteristics of the data. The main results of the paper are presented in Section 5. Section 6 draws some concluding remarks.

## 2 Job flows and the business cycle

The prevailing view in the business cycle literature predicts an unambiguous pro-cyclical behavior of job creation and counter-cyclical behavior of job destruction. As a consequence, the effect of the cycle on job reallocation (the sum of job creation and job destruction) remains undetermined. Previous evidence regarding the cyclical patterns of JR is far from conclusive. Davis and Haltiwanger (1992) and Davis et al. (1996) find a negative relationship between job reallocation and the cycle in the US manufacturing sector. The same cyclical pattern in JR has been observed for Canada (Baldwin at al, 1994) and the UK (Konings, 1995). For the countries of Continental Europe the evidence is mixed and in general job reallocation has been found to follow an a-cyclical pattern. In particular, an a-cyclical pattern in job reallocation has been found in Austria (Stiglbauer et al., 2002), Italy (Contini et al., 1995), Spain (Dolado and Gomez, 1995) and Germany (Boeri and Cramer, 1992) and a slightly pro-cyclical pattern has been found in France (Lagarde et al., 1994) and Sweden (OECD, 1994). Hence, as suggested by Garibaldi (1998) the empirical evidence suggests a clear dichotomy in the cyclical behavior of job flows between the Anglo-Saxon countries and Continental Europe.

However, whether the dichotomy in the cyclical behavhiour of JR should be regarded as a stylized fact is still an open question. In fact the main limitation of the existing empirical studies is the lack of internationally comparable job flows statistics (OECD 1994). For example, differences in the sectoral coverage and sampling frame may lead to misleading interpretations of the cross-country differences in the cyclical behavior of job flows. While some of the country studies previously mentioned focus on establishment data for the manufacturing sector, other studies rely on firm level data for the whole economy. Table 1 shows our own calculation of the correlation between job reallocation and net employment growth for the countries in our sample.[1] The correlations are calculated for each country across a total of 28 sectors.[2] We present the results for

[1] The main advantage of our analysis comes from the fact that our data are comparable across countries and are available for both the service and manufacturing sectors. See section 4 for a detailed description of the dataset used in the analysis.

[2] The sectors are: Agriculture, forestry and fishing; Mining and quarrying; Food, Beverages and Tobacco; Textiles; Wood Products; Paper products, Publishing and Printing; Refined petroleum, nuclear

Table 1: Correlations between job reallocation and net employment change

| | Whole economy | Services | Manufacturing |
|---|---|---|---|
| Austria | 0.17 | 0.18 | -0.26 |
| Belgium | 0.45* | 0.40* | -0.11 |
| Denmark | 0.05 | 0.27 | -0.12 |
| Finland | 0.48* | 0.47* | 0.65* |
| France | 0.68* | 0.79* | 0.22 |
| Germany | 0.51* | 0.53* | -0.06 |
| Greece | 0.75* | 0.84* | 0.55* |
| Ireland | 0.53* | 0.84* | 0.33* |
| Italy | 0.26* | 0.39* | 0.19 |
| Luxemburg | 0.41* | -0.15 | 0.34* |
| Netherlands | 0.32* | 0.29* | -0.06 |
| Norway | 0.64* | 0.82* | 0.21 |
| Portugal | 0.90* | 0.94* | 0.58* |
| Spain | 0.70* | 0.70* | 0.60* |
| Sweden | 0.51* | 0.43* | 0.65* |
| Switzerland | 0.25* | 0.57* | 0.04 |
| United Kingdom | 0.37* | 0.56* | -0.41* |

Note:* 5 percent significance. Yearly data for a total of 28 sectors, of which 11 are manufactures and 12 service industries. For a definition of the sectors see Footnote 2.

the economy as a whole, and then for the service and manufacturing sectors separately. From Table 1 it follows that job reallocation is strongly positively correlated with net growth in all countries. The correlation is still positive and significant in services. In manufacturing job reallocation follows an a-cyclical or pro-cyclical pattern in Continental Europe whereas in the UK job reallocation and net employment change are significantly negatively associated. The later is in line with previous empirical evidence and with Garibaldi's theoretical insights.

fuel and chemical products; Rubber and plastic products; Other non-metallic products; Basic metals and fabricated metal products; Machinery and equipment; Electrical and optical equipment; Transport Equipment; Other manufacturing sectors; Electricity, gas and water supply; Construction; Sale, maintenance and repair of motor vehicles; Wholesale trade, except for motor vehicles; Retail trade, except for motor vehicles; Hotels and Restaurants; Transport and communications; Financial intermediation and insurance; Real estate and renting; Computer and related activities; Research and Development; Public Administration, Defense and Education; Health and Social Work; Other community, social and personal services

## 3 Empirical Methodology

Davis and Haltiwanger (1996) show the importance of firm and sectoral characteristics in the determination of job flows in the US. In Europe, firms operating in service industries consistently present a higher degree of job turnover (Gomez-Salvador et al. 2004). Thus, failing to control for compositional effects might seriously blur cross-country comparisons. The proposed methodology takes this fact into account. We calculate yearly job creation ($JC_{ijt}$), job destruction ($JD_{ijt}$) and job reallocation ($JR_{ijt}$) rates at the sectoral level for a total of 28 sectors. We follow the standard definitions of job flow measures as described in Davis and Haltiwanger (1990). $JC_{ijt}$ in period $t$, country $j$ and sector $i$ equals the weighted sum of employment gains over all growing firms in sector $i$ and country $j$ between $t-1$ and $t$. Similarly, $JD_{it}$ equals the sum of employment losses (in absolute value) over all contracting firms between $t-1$ and $t$. It follows that net employment change $NET_{it} = JC_{it} - JD_{it}$ and the job reallocation rate $JR_{it} = JC_{it} + JD_{it}$. Our basic empirical strategy responds to the following reduced-form specification

$$JF_{ijt} = \alpha + N_{jt}\gamma + D\beta + I_{jt}\eta + (N_{jt} * I_{jt})\,\phi + \mu_j + \varepsilon_{ijt} \qquad \text{for } i = 1, ..., 28 \text{ and } j = 1, ..., 16$$

where $JF_{ijt}$ denotes the different measures of job flows ($JC_{ijt}$, $JD_{ijt}$ or $JD_{ijt}$), $N_{jt}$ is a business cycle indicator (which will be defined below), $D$ is a set of sectoral and year dummies, $I_{jt}$ denotes a vector of institutional indicators and $\mu_j$ is country unobserved heterogeneity. The coefficients of interest are captured by the vector $\phi$, which corresponds to an interaction term between the different institutional indicators and the business cycle indicator. We consider two different indicators of the cycle, depending on the level of aggregation: the aggregate net employment change, which is measured per country and year; and the sectoral employment change, which is measured per country and year for the 7 macro-sectors of activity for which information on the use of temporary contracts is available.

Two different assumptions will be made about the nature of the country unobserved heterogeneity. Our basic specification will assume that the country effects are fixed and therefore can be estimated. The main limitation of the fixed effect specification

is that it disregards the cross-country information in the data. This might severely affect the efficiency of the estimates of institutional variables given the slow moving nature of institutions and the short sample period of our panel. Thus, as Heckman and Pages (2000) point out, the reduced time-series variation in the institutional data may result in imprecise estimates (high standard errors) when country-specific fixed effects are included in the regressions. A second set of regressions overcomes this problem treating country unobserved heterogeneity as random. Differently from the fixed effect, the random effect methodology allows to exploit both the cross-country and time-series variation of the data, implying more precise estimates. The advantage of this approach in terms of efficiency comes with the cost of imposing the assumption of orthogonality between the individual effects and the covariates.

It is well known that in the presence of measurement error the bias incurred in a standard OLS regression might actually be exacerbated by the inclusion of fixed effects. Painful efforts have been taken to clean the data from errors, as described in Gomez-Salvador et al (2004). However, the presence of measurement error cannot be ruled out with this type of firm level data. One advantage of our synthetic panel is that we know the number of firms from which we draw the summary measures of job flows in each country, sector and year. This allow us to construct weights as the share of the number of firms in each sector in the total number of firms. The weights are country specific, such that each country has an equal weight in the final regression. Weighting the fixed effects regressions is expected to mitigate the impact of measurement error.

# 4 The data

Annual firm-level observations over the period 1992-2001 are available from Amadeus produced by Bureau van Dijk (BvD). Amadeus contains comparable firm-level data for European countries and covers all sectors with the exception of the financial sector. Information on balance sheets, sector of operation and number of employees is collected by the national Chambers of Commerce and homogenized by BvD applying uniform formats to allow accurate cross-country comparisons.

The data has several advantages, which make it especially well suited for international comparisons. First, the data . collection method is reasonably homogeneous across countries. This overcomes the problem of previous studies where available country data differed on the sources (administrative vs. survey) and unit of study (firm vs. establishments). Second, information is provided on narrowly defined sectors (2-digit NACE classification) and data on both manufacturing and non-manufacturing sectors are reasonably representative. The availability of data for firms in the service sector is an important advantage with respect to previous studies, where cross-country comparisons relied on information obtained from the whole economy in some countries and the manufacturing sector in others. Previous results (Gomez-Salvador, Messina and Vallanti, 2004) showed that the sectoral distribution of employment in Amadeus is very close to the actual distribution of employment.

There are some limitations in our data. First, it is not possible to distinguish between newly created firms and firms that simply enter the sample at a given period t but were already operating in the period before. Similarly, it is not possible to identify firms' closures from firms that exit the sample for other reasons. Therefore, we restrict our analysis to continuing firms, e.g. firms that are in the sample for at least two consecutive periods. Although this is quite standard in the literature, it introduces a downward bias in the estimates of job flows. Moreover, differences across countries in job turnover rates implied by entry and exit have been found to be quantitatively relevant (Bartelsman et al., 2003) and this may further hamper the cross-country comparability of estimated job flows. However, the exclusion of entry and exit should be less of a problem because it is precisely job turnover of continuing firms the component of total job turnover that is more likely to be affected by firing restrictions (OECD, 1999).

Second, the data are available at the firm rather than the establishment level. Measuring job flows at firm level understates the actual magnitude of total gross flows among plants and may lead to longitudinal linkage problems if ownership and organizational changes (i.e. mergers, acquisitions, etc.) are not accounted for. This may be less of a problem with plant-level data, plant being defined in terms of physical location of production. However, cross-country comparisons of establishment data pose serious dif-

ficulties since there is important heterogeneity in the definition of establishment across data sets (OECD, 1994). This is less of a problem with firm data. Moreover, firing restrictions will typically not be binding when worker reallocation takes place between establishments within the same firm

Finally, the inclusion criteria in Amadeus introduces a bias against very small firms. Gomez-Salvador et al. (2004b) assesses the representativeness of the data in Amadeus comparing the growth in the number of employees in the sample with official statistics. The results show that, with the exception of some outliers, the sample of firms in Amadeus tracks pretty closely the aggregate growth in the number of employees, suggesting that the data is reasonably representative. We have extended the data to include three countries originally excluded from the sample. These are Greece, Norway and Switzerland. Thus, the final sample comprises 16 European countries. The yearly coverage varies depending on the country, but in most cases information is available for the period 1995-2000.

The institutional variables considered in the analysis are the following:

- Restrictions to hiring and firing: we consider an updated version of the time-varying index of EPL reported in Nickell et al. (2001) and a time-invariant index as described by OECD (1999). Both increase with the relative stringency of EPL.

- The availability of temporary contracts has been constructed from the National Labour Force Surveys. It is defined as the share of workers holding temporary contracts in the total number of employees measured for the 7 sectors of operation used for the definitions of the cells.

- Tax and benefits systems: including an index of the duration of unemployment benefits and the tax wedge between the real (monetary) labour cost faced by the firms and the consumption wage received by the employees. The latter is normalized by GDP, while the former ranges from 0 (if benefit provision stops before 1 year) to 1 (for a constant benefit after 5 years). Both series have been updated from Nickell et al. (2001) using OECD information.

# 5 Empirical Results

## 5.1 Job Dynamics and Firing Restrictions

We concentrate first on the effects of employment protection in the relationship between job flows and the business cycle. Table 2 presents the results of the fixed effects regressions for JR, JC and JD on the aggregate NET employment change and its interaction with the index of employment protection. The specification also includes country, sector and year dummies. First note that according to the goodness of fit of the regressions, the proposed models do a much better job in explaining the patterns of JR and JC than in explaining the sources of JD, suggesting a more important role of idiosyncratic factors in the determination of the latter. We find consistent regularities in the sectoral patterns of job flows across countries. Typically, service industries present higher JR rates than manufacturing sectors, the difference lying especially on a higher JC rate. The sector with the highest turnover rate is Computer and related activities, while Electricity, gas and water supply presents the lowest JR rate in the sample. Note also that most of the sectoral dummies are clearly significant, suggesting the importance of controlling for compositional effects before drawing cross-country comparisons.

Regarding employment protection legislation, we find a negative effect on both JC and JD which translates into a lower JR rate in countries with more stringent EPL. When evaluated at the average level of NET, the effect is statistically significant at all confidence levels in the cases of JC and JR. This finding supports the prediction of dynamic models of labour demand as discussed by Bertola (1990) and is in line with previous empirical studies (Gomez-Salvador et al, 2004). JC (JD) presents a clear pro-cyclical pattern (counter-cyclical) when evaluated at the average level of EPL. Also for the average level of EPL, the response of JC to a cyclical upturn is stronger than the response of JD to a cyclical downturn, resulting in a pro-cyclical response of JR to movements in NET. Most importantly, the interaction term NET*EPL suggests that the counter-cyclical movements of JD are hampered in countries with more stringent EPL. This finding supports Garibaldi's (1998) main theoretical prediction. In the limit, our empirical results suggest that JD becomes even pro-cyclical in the countries with

Table 2: Job Flows. Sectoral Effects

| | (1) JR | (2) JC | (3) JD | | (1) JR | (2) JC | (3) JD |
|---|---|---|---|---|---|---|---|
| $NET$ | -0.399 | 0.290 | -0.689 | (continued) | | | |
| | (1.73) | (1.36) | (7.18) | Sector 15 | -4.305 | -3.844 | -0.461 |
| $NET * EPL$ | 0.487 | 0.257 | 0.230 | | (5.62) | (8.72) | (0.75) |
| | (5.21) | (3.03) | (6.65) | Sector 16 | 0.692 | 1.328 | -0.636 |
| $EPL$ | -1.824 | -0.837 | -0.987 | | (1.01) | (2.66) | (1.50) |
| | (3.11) | (1.60) | (3.34) | Sector 17 | -2.378 | -0.373 | -2.004 |
| Sector 2 | -2.147 | -1.630 | -0.517 | | (3.83) | (0.87) | (4.90) |
| | (2.82) | (2.34) | (0.84) | Sector 18 | -0.408 | 0.750 | -1.158 |
| Sector 3 | -3.155 | -2.130 | -1.025 | | (0.64) | (1.68) | (2.88) |
| | (4.81) | (4.96) | (2.31) | Sector 19 | -1.094 | 1.024 | -2.118 |
| Sector 4 | -3.333 | -2.569 | -0.764 | | (1.59) | (2.08) | (5.09) |
| | (5.11) | (6.13) | (1.69) | Sector 20 | -0.482 | 0.601 | -1.083 |
| Sector 5 | -3.069 | -1.253 | -1.816 | | (0.60) | (1.07) | (2.23) |
| | (4.62) | (2.76) | (4.09) | Sector 21 | -2.902 | -1.220 | -1.682 |
| Sector 6 | -3.861 | -2.428 | -1.432 | | (4.59) | (2.73) | (4.01) |
| | (6.31) | (5.74) | (3.40) | Sector 22 | 4.238 | 3.341 | 0.896 |
| Sector 7 | -3.907 | -2.384 | -1.523 | | (4.91) | (4.32) | (1.64) |
| | (6.05) | (4.33) | (3.45) | Sector 23 | 2.557 | 1.997 | 0.560 |
| Sector 8 | -3.092 | -1.178 | -1.914 | | (3.43) | (3.65) | (1.16) |
| | (4.95) | (2.55) | (4.58) | Sector 24 | 8.316 | 9.670 | -1.354 |
| Sector 9 | -3.649 | -2.277 | -1.372 | | (10.20) | (13.18) | (2.86) |
| | (5.79) | (5.28) | (3.09) | Sector 25 | 1.436 | 2.387 | -0.951 |
| Sector 10 | -2.638 | -1.524 | -1.114 | | (2.22) | (5.32) | (2.25) |
| | (4.27) | (3.71) | (2.44) | Sector 26 | -0.125 | 1.469 | -1.594 |
| Sector 11 | -2.608 | -1.424 | -1.184 | | (0.15) | (2.35) | (2.85) |
| | (4.35) | (3.50) | (2.81) | Sector 27 | -1.348 | 1.207 | -2.555 |
| Sector 12 | -0.712 | -0.138 | -0.574 | | (2.02) | (2.38) | (6.16) |
| | (1.03) | (0.29) | (1.25) | Sector 28 | -0.648 | 1.102 | -1.750 |
| Sector 13 | -2.809 | -1.997 | -0.812 | | (1.07) | (2.58) | (4.35) |
| | (3.86) | (4.01) | (1.52) | Country Du | Yes | Yes | Yes |
| Sector 14 | -1.828 | -0.733 | -1.095 | Sectoral Du | No | No | No |
| | (2.95) | (1.75) | (2.44) | Countries | 16 | 16 | 16 |
| Sector 15 | -4.305 | -3.844 | -0.461 | Obs. | 2727 | 2727 | 2727 |
| | (5.62) | (8.72) | (0.75) | R-squared | 0.52 | 0.57 | 0.23 |

Note: Reference Sector: Agriculture, Forestry and Fishing. Sectoral Definitions: Sector Definitions. 2: Mining and quarrying; 3: Food, Beverages and Tobacco; 4: Textiles; 5: Wood Prod.; 6: Paper Prod.; 7: Refined Petroleum and Chemical Prod.; 8: Rubber and Plastic Prod.; 9: Other Non-metallic Prod.; 10: Basic metals; 11: Machinery and Equipment.; 12: Electrical and Optical Equip.; 13: Transport Equip.; 14: Other manufacturing sectors; 15: Electricity, Gas and Water Supply; 16: Construction; 17: Sale, Maintenance and Repair of Motor Vehicles; 18: Wholesale Trade; 19: Retail Trade; 20: Hotels and Restaurants; 21: Transport and Communications; 22: Financial Intermediation and Insurance; 23: Real Estate and Renting; 24: Computer and Related Activities; 25: Research and Development; 26: Public Administration, Defense and Education; 27: Health and Social Work; 28: Other Community, Social and Personal Services. Robust standard errors. t-statistics in parenthesis

Table 3: Employment protection and the cyclical behavior of job flows

| | (1) FE | (2) FE | (3) RE | (4) RE | (5) FE | (6) FE | (7) RE | (8) RE |
|---|---|---|---|---|---|---|---|---|
| | Aggregate NET | | | | Sectoral NET | | | |
| *Job reallocation* | | | | | | | | |
| NET | -0.399 | 0.004 | -0.278 | -0.063 | 0.145 | 0.199 | 0.049 | 0.088 |
| | (1.73) | (0.01) | (2.54) | (0.51) | (0.74) | (1.06) | (0.89) | (1.58) |
| NET*EPL | 0.487 | 0.384 | 0.335 | 0.285 | 0.199 | 0.184 | 0.165 | 0.153 |
| | (5.21) | (4.04) | (8.57) | (6.83) | (2.99) | (2.91) | (8.19) | (7.54) |
| EPL | -1.824 | -3.496 | -0.954 | -0.932 | -1.628 | -2.847 | -0.678 | -0.667 |
| | (3.11) | (5.05) | (3.34) | (3.02) | (3.06) | (4.87) | (2.50) | (2.24) |
| Overall NET[1] | 0.789 | 0.940 | 0.539 | 0.632 | 0.631 | 0.648 | 0.451 | 0.462 |
| | (8.79) | (9.22) | (13.25) | (12.71) | (8.28) | (8.65) | (5.17) | (18.13) |
| R-squared | 0.51 | 0.52 | - | - | 0.54 | 0.56 | - | - |
| *Job Creation* | | | | | | | | |
| NET | 0.290 | 0.528 | 0.356 | 0.531 | 0.503 | 0.528 | 0.437 | 0.495 |
| | (1.36) | (2.23) | (3.94) | (5.18) | (3.83) | (4.12) | (10.42) | (10.67) |
| NET*EPL | 0.257 | 0.196 | 0.163 | 0.118 | 0.113 | 0.105 | 0.090 | 0.080 |
| | (3.03) | (2.22) | (5.08) | (3.45) | (2.41) | (2.34) | (5.82) | (5.16) |
| EPL | -0.837 | -1.848 | -0.256 | -0.176 | -1.005 | -1.392 | -0.288 | -0.233 |
| | (1.60) | (3.17) | (1.32) | (0.89) | (2.82) | (3.51) | (1.63) | (1.27) |
| Overall NET[1] | 0.917 | 1.010 | 0.754 | 0.820 | 0.778 | 0.786 | 0.656 | 0.656 |
| | (11.91) | (11.55) | (22.68) | (20.19) | (15.07) | (15.33) | (35.34) | (33.48) |
| R-squared | 0.56 | 0.57 | - | - | 0.69 | 0.70 | - | - |
| *Job Destruction* | | | | | | | | |
| NET | -0.689 | -0.524 | -0.597 | -0.547 | -0.318 | -0.329 | -0.383 | -0.366 |
| | (7.18) | (4.79) | (9.32) | (7.53) | (5.40) | (4.63) | (4.67) | (10.98) |
| NET*EPL | 0.230 | 0.188 | 0.163 | 0.156 | 0.081 | 0.078 | 0.075 | 0.073 |
| | (6.65) | (5.10) | (7.12) | (6.35) | (3.84) | (3.23) | (6.31) | (6.04) |
| EPL | -0.987 | -1.647 | -0.578 | -0.548 | -0.247 | -1.454 | 0.281 | -0.287 |
| | (3.34) | (4.64) | (4.22) | (4.09) | (2.78) | (4.50) | (2.38) | (2.41) |
| Overall NET[1] | -0.127 | -0.067 | -0.199 | -0.168 | -0.119 | -0.138 | 0.199 | -0.188 |
| | (3.55) | (1.58) | (8.41) | (5.86) | (5.17) | (4.49) | (13.93) | (12.45) |
| R-squared | 0.21 | 0.23 | - | - | 0.24 | 0.26 | - | - |
| Time dummies | *No* | *Yes* | *No* | *Yes* | *No* | *Yes* | *No* | *Yes* |
| Sectoral du. | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Countries | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| Obs. | 2727 | 2727 | 2727 | 2727 | 2727 | 2727 | 2727 | 2727 |

Note: Robust standard errors. t-statistics in parenthesis. [1]The overall cyclical effect is evaluated at the sample mean of the EPL indicator.

the strongest restrictions to firing. We also find that more stringent EPL increases the responsiveness of JC to the business cycle. Thus, while JR is clearly pro-cyclical for the average levels of EPL, we find an a-cyclical movement of JR in the UK, the country with the less stringent firing restrictions.[3]

Table 3 shows that these results are fairly robust to a variety of specifications. For completeness, Column 1 repeats the results reported in Table 2. Column 2 shows that these results do not change when year dummies are included in the analysis. The interaction term NET*EPL is signed as expected and statistically significant at all confidence levels. Random effect estimates, reported in columns 3 and 4, do not change the main results presented so far. Columns 5 to 8 repeat the specifications presented in Columns 1 to 4 using the sectoral NET instead of the aggregate NET as an indicator of the business cycle. Again, the main message of the regressions is not altered.

### 5.2 Temporary Employment and Other Labour Market Institutions

The previous section shows the importance of firing restrictions in the determination of the cyclical movements of job turnover. In this section, we extend the empirical analysis to consider the effects of other labour market institutions which are likely to play a role in the responses of JC and JD to business cycle movements. We consider in turn the effects of temporary employment, unemployment benefits and the tax wedge.

Temporary employment might facilitate employment adjustment in countries with stringent employment protection legislation (see for instance Dolado et al., 2002). In most cases, fixed-term contracts have lower firing restrictions, with shorter advance notice periods and less generous severance payments. Even if fixed-term and open-ended contracts imposed the same restrictions to firing, repeated fixed-term contracts for a short period of time might be used as a way-out of stringent employment protection legislation. Hence, we expect that temporary employment counter-balance the effects of EPL in the job flow dynamics. Other things being equal, JD should react more rapidly to an economic downturn in sectors with a larger share of temporary workers, resulting

[3] The implied response of JR to NET in the UK is actually negative, but not statistically significant different from zero.

in more counter-cyclical movements of JR in those countries where fixed-term contracts are more extended.

Many empirical studies have confirmed the theoretical prediction that longer-term unemployment insurance entitlements lead to longer unemployment duration.[4]. In a search and matching framework, Pissarides (2000) shows that more generous unemployment insurance increase labour costs, resulting in a raise of equilibrium unemployment due to a lower JC rate and higher JD rate. Thus, along the business cycle more generous unemployment benefits are likely to slowdown the creation of vacancies during a cyclical upswing but also to increase the firing of workers during economic downturns. Thus, unlike EPL, unemployment benefits are expected to reduce the co-movement of JR and NET. The expected effects of the tax wedge on job flow dynamics go in the same direction. A higher tax wedge should increase labour costs (Pissarides, 2000) and consequently induce slower responses of JC to a cyclical upswing and stronger responses of JD to a cyclical downturn. As a result, JR is expected to behave less pro-cyclically (or more counter-cyclically) in countries with a higher tax wedge.

Table 4 presents the results of the extended institutional analysis on the dynamics of job turnover. Since the indicator of temporary employment is available at the sectoral level, we restrict the analysis to the sectoral NET. Columns 1 to 4 present the basic results including the share of workers holding temporary contracts. The results suggest a clear positive direct impact of temporary contracts on JR. Moreover, the interaction term TEMP*NET presents a negative sign, suggesting that job turnover is more counter-cyclical in sectors that make a more important use of fixed-term contracts. Note that this effect is only statistically significant in the random effect specifications. Columns 5 to 8 include in the regressions the tax wedge and duration of unemployment benefits indicators. As expected, both institutional variables present a negative and statistically significant sign when interacted with sectoral NET. Thus, the evidence suggests that in countries with more generous unemployment benefits and a higher tax wedge JR responds less rapidly to business cycle movements. Moreover, the interaction term TEMP*NET becomes statistically significant even in the fixed effect specifications when these two

[4]See for instance Bover et al, 2002 and the references therein.

Table 4: Institutions and the cyclical behavior of job reallocation

| | (1) FE | (2) FE | (3) RE | (4) RE | (5) FE | (6) FE | (7) RE | (8) RE |
|---|---|---|---|---|---|---|---|---|
| *Job reallocation* | | | | | | | | |
| NET | 0.161 | 0.222 | 0.063 | 0.114 | 1.279 | 1.335 | 1.096 | 1.204 |
| | (0.81) | (1.18) | (1.14) | (2.01) | (3.93) | (4.33) | (8.07) | (8.74) |
| NET*EPL | 0.207 | 0.193 | 0.181 | 0.173 | 0.216 | 0.197 | 0.153 | 0.142 |
| | (2.98) | (2.96) | (8.33) | (7.91) | (3.44) | (3.18) | (5.12) | (4.72) |
| EPL | -1.485 | -2.815 | -0.756 | -0.824 | -2.342 | -3.328 | -1.064 | -1.403 |
| | (2.81) | (4.80) | (2.81) | (2.71) | (4.68) | (5.41) | (3.39) | (3.62) |
| NET*Temp. Empl. | -0.288 | -0.361 | -0.425 | -0.532 | -0.965 | -1.054 | -0.850 | -1.012 |
| | (0.89) | (1.09) | (2.09) | (2.61) | (2.84) | (3.13) | (4.10) | (4.86) |
| Temporary Empl. | 7.055 | 7.985 | 4.930 | 5.730 | 11.287 | 12.331 | 7.336 | 8.380 |
| | (2.25) | (3.13) | (2.65) | (3.04) | (3.71) | (4.07) | (3.89) | (4.38) |
| NET*U Benefits | – | – | – | – | -0.602 | -0.612 | -0.622 | -0.637 |
| | | | | | (3.00) | (3.01) | (6.35) | (6.53) |
| U Benefits Duration | – | – | – | – | -1.263 | -3.046 | 0.066 | -1.446 |
| | | | | | (0.74) | (1.80) | (0.07) | (1.26) |
| NET*Tax Wedge | – | – | – | – | -2.108 | -2.047 | -1.605 | -1.680 |
| | | | | | (3.19) | (3.21) | (3.39) | (5.71) |
| Tax Wedge | – | – | – | – | 2.623 | 3.325 | 5.106 | 7.058 |
| | | | | | (0.57) | (0.46) | (1.97) | (2.41) |
| Overall NET[1] | 0.632 | 0.652 | 0.455 | 0.474 | 0.547 | 0.566 | 0.413 | 0.438 |
| | (8.09) | (8.47) | (18.29) | (18.08) | (9.30) | (9.44) | (16.07) | (16.28) |
| Time dummies | *No* | *Yes* | *No* | *Yes* | *No* | *Yes* | *Yes* | *No* |
| Countries | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| Obs. | 2727 | 2727 | 2727 | 2727 | 2727 | 2727 | 2727 | 2727 |
| R-squared | 0.55 | 0.56 | - | - | 0.56 | 0.58 | | |

Note: Robust standard errors. t-statistics in parenthesis. [1]The cyclical overall effect is evaluated at the sample mean of the institutional indicators.

institutional variables are included in the analysis. Finally, note that the coefficient of EPL*NET is in line with the previous regressions, presenting a positive and statistically significant sign in all the specifications.

# 6 Conclusions

This paper provides a first set of comparable cross-country estimates of job flows dynamics using a unique homogenous firm level data set that covers the whole spectrum of productive sectors for 16 European countries. Relying on data for 28 sectors, this paper characterizes the dynamics of job flows during the 1990s, examining differences and regularities across sectors and countries. We find consistent sectoral patterns across countries, with job flows responding more rapidly to net employment changes in services than in manufacturing sectors. Differences across countries confirm the prevailing view, where job reallocation in the manufacturing sector presents a higher correlation with net employment changes in Continental Europe than in the UK. However, differences across countries in the volatility of job creation and job destruction of the service sector present less clear patterns.

Garibaldi (1998) shows that differences in employment protection legislation may explain differences in the cyclical behavior of job flows across countries. The tighter the firing restrictions, the less volatile is job destruction in a matching model with endogenous job destruction and the higher the correlation between job reallocation and net employment changes. Using standard panel techniques this paper provides the first empirical test of Garibaldi's (1998) main hypothesis, which is strongly supported by the data. Consistent across a variety of specifications, we find a higher correlation between job reallocation and net employment changes in countries with more stringent employment protection legislation. When the role of other labour market institutions in job flow dynamics is considered, we find that more generous unemployment benefits, a higher tax wedge and a larger use of temporary employment at the sectoral level counter-balance the effects of employment protection, reducing the correlation between job turnover and net employment changes.

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