

The Labor Market Effects of Financial Crises

The Role of Temporary Contracts in Central and Western Europe

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Abstract

This paper examines how the 2008–09 financial crisis affected labor markets in Central and Western Europe, and how this impact depended on employment protections laws. Using a differences-in-differences approach that compares industries with varying degrees of inherent dependence on external financing, the analysis finds that the crisis had significant negative impacts on employment, particularly on temporary, less skilled, and younger workers. These impacts on the level

and composition of employment were significantly stronger in countries with stronger legal protection of permanent workers from dismissal. This finding suggests that, given regulatory inflexibility in adjusting the permanent workforce, firms responded to tightening financial constraints by disproportionately laying off temporary workers (who tend to be younger and less skilled than permanent workers).

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**The Labor Market Effects of Financial Crises:
The Role of Temporary Contracts in Central and Western Europe¹**

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1. Introduction

Twenty-one European countries faced a systemic wave of banking crises between 2007 and 2011. The crises were accompanied by a significant slowdown in economic activity, with some of the crisis-affected countries losing 25% or more of their GDP relative to pre-crisis levels (Laeven and Valencia 2012).² Labor markets in the region were also severely affected, with large declines in earnings and employment (see Figure 1). Even by 2014, several European countries had still not returned to the levels of employment rates and earnings they had achieved before the crisis wave hit the region.

A number of studies document that recessions originating in financial markets are associated with relatively deep and long-lasting declines in aggregate output and employment.³ As a result, there is growing interest in gaining a better understanding of the labor market impacts of such crises. Job losses in firms that become financially constrained as a result of the crisis appears to be a major channel of impact (Chodorow-Reich, 2014). Two key aspects of this channel, with significant implications for productivity and welfare, are not well understood. The first is whether certain types of workers are particularly vulnerable to job loss when firms become financially constrained, and the second is whether this heterogeneity in labor market impact depends on labor market regulation. The latter is of particular interest in light of the long-standing literature on the economic impacts of Europe's relatively stringent employment protection laws.⁴

² This number includes both the systemic and the "borderline"-systemic cases of banking crisis identified by Laeven and Valencia (2012). They define systemic banking crises as cases in which at least three of the following government interventions took place: extensive liquidity support, significant direct bank restructuring costs, significant guarantees on liabilities, significant asset purchases, and significant nationalization of financial institutions. Borderline cases are those that come close to meeting this definition of a systemic crisis. Output losses from the crises are computed as the cumulative sum of the differences between actual and trend real GDP over the three-year period starting with the first crisis year, expressed as a percentage of trend real GDP.

³ See, for example, Boeri et al. (2013); Buera et al. (2015); Claessens et al. (2013); Calvo et al. (2012); OECD (2010), Reinhart and Rogoff (2014); Knotek and Terry (2009).

⁴ See, for example, Bentolila, S. and G. Saint-Paul (1992), Bentolila and Dolado (1994); Blanchard and Wolfers (2000); Cahuc and Postel-Vinay (2002); Bentolila et al. (2012).

This paper aims to empirically examine how the 2008-09 financial crisis affected the level and composition of employment in Central and Western Europe, and how this effect depended on employment protection laws. We focus on European countries because they exhibited substantial heterogeneity in labor market performance during the crisis years (see Table 1), because the availability of harmonized labor market surveys for the region facilitates cross-country comparisons, and as mentioned, because of the continued academic and policy debate on their labor laws.

Using sector (industry) level panel data from 26 countries, our identification strategy adapts the approach in Rajan and Zingales (1998)—hereafter referred to as RZ1998—which is based on the insight that changes in the supply of finance are more likely to affect industries “inherently” more dependent on external financing. The impact of the financial crisis is identified by measuring how the association between aggregate credit and employment during the crisis years varied across industries with high and low inherent financial dependence. Exploiting country and time level variation in the decline in aggregate credit during the crisis years, and industry-level variation in the sensitivity to external finance, this “differences-in-differences” method disentangles the effects of the credit crunch from those of other macroeconomic shocks.⁵ It is important to do so because the banking crises in Europe occurred during a global economic slowdown which could have affected labor demand through other channels, such as a decline in export demand.

Our estimates confirm that industries with high financial dependence reduced employment significantly more than their low financial dependence counterparts when aggregate credit conditions worsened. Our baseline estimate suggests that industries in the top quartile of financial dependence

⁵ Specifically, with country, sector and year fixed effect included, our specification is equivalent to a differences-in-differences estimation with a continuous treatment variable (the level of credit decline).

experience an additional 1.4 percentage points decline in total employment from the credit crunch, when compared to industries with lower financial dependence.⁶ As this estimate is based on data from representative labor force surveys, it captures employment in the entire universe of firms.

We then analyze the heterogeneity in the impacts of the financial crisis, and find that temporary, unskilled, young and migrant workers, as well as those in smaller firms, experienced disproportionately larger declines in employment during the credit crunch. The disproportionate impact on those employed in smaller firms is consistent with prior evidence from firm-level studies (Fort et al., 2013; Greenstone et al., 2014; Chodorow-Reich, 2014). The greater vulnerability of unskilled workers could be because firms “hoard” skilled workers, since the costs of training and finding skilled workers are likely to be higher (Halac and Schmukler, 2003; Anderton et al., 2012). At the same time, the larger impact on temporary workers suggests that labor market regulation too could have mattered.

In theory, stronger Employment Protection Law (EPL) is expected to reduce the extent to which firms are able to adjust employment in response to economic shocks.⁷ But there is a duality in European EPL, with high mandated dismissal costs for permanent workers coexisting with relatively lax regulations on temporary contracts (Boeri and Garibaldi, 2007). The stronger the protection for permanent workers relative to that of temporary workers, the higher the incentive for firms to adjust employment on the other margin; that is, through increased use of temporary workers (Bentolia et al., 2012; Chaurey, 2015; Kahn, 2007). This increased reliance on temporary workers could actually make employment more responsive to shocks. Indeed, it has been argued that the deeper fall in employment after the Great Recession in Spain as compared to France is due to the bigger gap in the stringency of EPL for permanent and temporary workers in the former (Bentolila et al., 2012).

⁶ This estimate is based on a 20 percentage points decline in the credit to GDP ratio, the average level of decline in our sample.

⁷ See, for example, Oi (1962); Nickell (1986) and Hamermesh (1993).

In order to shed light on this mechanism, we exploit cross-country variation in EPL for permanent workers in our sample of countries. Employing a triple difference methodology, we estimate how the effects of the credit crunch depended on EPL by interacting the main explanatory variable with the EPL measures. We find that the labor market impacts of the drop in finance were significantly larger in countries with stronger EPL for permanent workers. This suggests that in Europe, the net effect of the dual EPL system has been to *increase* the response of total employment to the financial shock.

In keeping with the hypothesis about the effect of dual EPL systems, we also find that the negative impact of the credit crunch on the share of temporary workers was more pronounced in countries with stronger EPL. This is also the case with the share of young, less skilled and migrant workers, perhaps reflecting the fact that temporary workers tend to be less skilled, younger and more likely to be migrants than those on permanent contracts (Kahn, 2007). Thus, while we cannot reject that labor hoarding or similar explanations for heterogeneous impacts also played a role, our results suggest that a stronger EPL for permanent workers accentuated labor market inequalities during the financial crisis.

In summary, this paper makes three important contributions to the literature. First, while there is substantial evidence on the labor market effects of the crisis in European economies, our methodology helps to better isolate the impact of the lack of credit from that of the general decline in aggregate economic activity. Second, while there is evidence that temporary, young and unskilled workers experienced worse labor market outcomes during this period than permanent, prime age and skilled ones (European commission, 2014), our results confirm the important and direct role of credit constraints, beyond the general impact of the overall decline in aggregate demand on firms. Third, we contribute to the large body of literature on the effects of strong EPL for permanent contracts and the existence of

temporary contracts in Europe, and show that the negative employment effects of a credit crunch tend to be larger in countries with stronger EPL for permanent workers.⁸

The rest of the paper is organized as follows. Section 2 explains the empirical methodology, and Section 3 presents the data sets used. Section 4 discusses the main results, while Section 5 investigates the role of EPL during a credit crunch. Section 6 concludes.

2. Methodology

The methodology proposed in this paper is an adaptation of that used in RZ1998, a seminal study that tests the hypothesis that financial development facilitates economic growth. RZ1998 first identify an industry's need for external finance (the difference between investments and cash generated from operations) using data for publicly listed US firms. They claim that this is an indicator of an industry's inherent demand for external finance, which is driven purely by technological factors. The prediction tested is that sectors more dependent on external finance expand relatively faster than others in more financially developed countries.

The hypothesis of this paper is similar to that of RZ1998, but instead of focusing on the economic effects of long-term financial development, it focuses on the short-term effects of a credit shortage. More specifically, the hypothesis is that sectors more heavily dependent on external finance would be more sensitive to a tightening of credit conditions. This method could be applied to different settings to study the impact of a credit crunch on firms and individuals.

The hypothesis is tested using the following empirical specification:

$$y_{s,c,t} = \alpha + \beta \text{credit decline}_{c,t} \times FD_s + \mu_{s,t} + \mu_{s,c} + \mu_{c,t} + \varepsilon_{s,c,t} \quad (1)$$

⁸ See, for example, Bentolila and Dolado (1994); Cahuc and Postel-Vinay (2002); Bentolila et al. (2012).

where s is the sector (industry) of economic activity, c is the country of residence, and t is the year. The variable y is the outcome of interest. The variable *credit decline* is a measure of overall credit shortage in the economy (which varies across countries and years in our sample), FD is the degree of finance-dependence of sector s , $\mu_{s,t}$ are sector-year pair fixed effects, $\mu_{s,c}$ are sector-country pair fixed effects and $\mu_{c,t}$ are country-year pair fixed effects. The fixed effects $\mu_{s,t}$ control for sector-specific trends. The fixed effects $\mu_{s,c}$ allow to control for sector-specific characteristics that do not vary over time within a country. The fixed effects $\mu_{c,t}$ absorb the effect of other macroeconomic factors that vary at the same time as the overall access to credit and may also affect the dependent variable y , such as economic growth.

One empirical concern is that beside the credit supply shock, sectors could have been affected differentially by other shocks such as a decline in global demand. However, the sector-year fixed effects allow us to control for global changes that affect sectors differently over time. For instance, there could have been a secular decline in manufacturing in this period, or it could have been the case that certain sectors were more likely to face a decline in global demand during the crisis years. Such sector-level shocks are not a concern for our strategy, provided that they did not differ systematically across the countries in our sample. Similarly, our identification strategy also controls for different country shocks assuming they did not affect sectors differentially according to their level of dependence on external finance.

The coefficient β represents the effect of the credit crunch on y . Equation (1) describes a differences-in-differences-in-differences estimator, in which the continuous “treatment” is the change in the access to credit, the treated sectors are those that depend more heavily on credit (high level of FD), and the sectors in the control group are those that depend less heavily on credit (low level of FD). In other words, the coefficient β is the time change in the average labor market outcome y for high FD sectors in a country that has experienced a credit crunch, minus the time change in the mean of y for high FD sectors in a country that has not experienced a credit crunch, minus the time change in the mean of y for low FD

sectors in a country that has experienced a credit crunch. We expect the coefficient β to be negative, implying that high financially dependent industries (hereafter, *high FD*) experience larger declines in employment outcomes as credit conditions worsen.

It is important to mention some key caveats of this method. We are only able to measure the relative effect of the credit crunch on the labor market, and not the total effect of the initial shock on the economy (i.e., savings, wealth effects, etc.). Effects of the crisis that were independent of the firm-financing channel (such as effects operating through exchange rates, government transfers or consumer credit) are not reflected in our estimates. Further, if governments responded to the crisis with policies targeted to sectors highly exposed to the credit crunch, then our estimates would provide a lower bound for the actual impacts.

3. Data

Following RZ1998, we assume that there is a technological reason why some industries depend more on finance than others. We define the variable *FD* as the share of desired investment that cannot be financed by internal cash flows. It is calculated as the difference between a firm's capital expenditures minus cash flows, divided by capital expenditures. We then use the median of this variable at the two-digit NACE code. We estimate this variable using data from "Compustat" data for publicly listed firms in the United States from 1995 to 2005. This sample choice is motivated by the assumption that these firms are more likely to operate in a frictionless environment and are thereby able to meet their demand for external finance. We also assume that this technological dependence carries over across countries.⁹ Unlike RZ1998, we extend the sample to include not only manufacturing firms, but also those in the

⁹ Specifically, the identification strategy requires that the ordering of industries according to inherent dependence on external financing is the same in the US and the study sample.

services industry, as they are the major source of jobs. In addition to using the *FD* variable, to facilitate the interpretation of the results we also create the dummy variable *FDq4* equal to 1 for sectors in the highest quartile of financial dependence.

Figure 2 illustrates the identification strategy of this paper. It shows that total employment in high and low FD sectors exhibited a very similar trend up to the year 2008, but diverged significantly since then until the year 2010. After that year, both high and low FD sectors started to converge again albeit to a lower level, possibly reflecting the fact that the initial financial shock spread out to the real economy.

We estimate the dependent variables related to the labor market using the EU Labor Force Survey (EU-LFS) for the reference years 2004–2013. The EU-LFS is the largest European household survey, with 1.8 million interviews conducted each quarter throughout the participating countries. The survey collects labor and demographic information for residents living in private households in the 28 member states of the European Union, as well as in two candidate countries and in three countries of the European Free Trade Association (Iceland, Norway, and Switzerland). The survey draws on nationally representative samples; the sampling rates vary between 0.2 and 3.3 percent across countries.

To assure comparability, the EU-LFS uses output harmonization. This means that the European Union issues standards for the output of the LFS, including a list of variables and categories, minimum sampling precision, observation period, and periodicity, while the national statistical institutes across Europe are responsible for designing and conducting the survey. They must follow the standards and forward the results to Eurostat, which processes the information centrally. While some factors may make the survey less than perfectly comparable, this process of harmonization nonetheless makes it attractive

for studying labor market dynamics. The list of countries and years that are covered is shown in Table 1.¹⁰ All of the information is aggregated by sector of activity using the standardized NACE classification Rev. 1.1 at 1 digit.¹¹

Table 2 shows the labor market characteristics of low and high FD sectors in 2007, one year before the financial crisis. High FD sectors are larger in terms of total employment, and have a higher share of middle and high-skill occupations (82% versus 77%). 46% of employment in high FD sectors is rural, versus 42% in low FD sectors. Their differences on other dimensions are not striking. The share of workers on temporary contracts is 11% in high FD sectors and 12% in low FD sectors. The share of employment accounted for by small firms (10 employees or less) is about 23-24% in both types of sectors. They have roughly similar distributions of workforce by age, education and gender.

Our proxy variable for the availability of credit is private sector credit flow, consolidated as a share of GDP (from Eurostat). The private sector credit flow represents the net amount of liabilities that firms and households have incurred throughout the year. As seen in Figure 3, which shows the average of this variable for the two country groups, this variable displays significant variation throughout the period. During the financial crisis, the net amount of liabilities as a share of GDP declined from around 20 percent or more to around zero. In order to facilitate the interpretation of the results, we create the variable *credit decline*, which is equal to private sector credit flow (as a share of GDP) multiplied by -1. Alternatively, we also use a dummy variable equal to one if private sector credit flow (as a share of GDP) is negative or falls below half of the previous year's level.

¹⁰ Data for Germany and the two candidate countries (Macedonia and Turkey) were not included in the 2014 release of the EU-LFS microdata. Malta was excluded because data for this country are only available from 2009 on.

¹¹ Unfortunately, the public version of this survey does not include a more disaggregated version by sector of economic activity.

4. Results

Table 3 shows the estimates of β using alternative specifications. The first column confirms the prediction that high FD sectors experienced a higher decline in total employment during the credit crunch. To facilitate interpretation, the second column uses the dummy variable FDq4 for sectors in the highest quartile of financial dependence. If we assume that the private sector credit flow (as a share of GDP) falls by 20 percentage points - the average value of the decline during 2007-09 in our sample of countries – then the estimate in the second column shows that high FD sectors experience an additional 1.4 percent decline in total employment, when compared to low FD sectors. The third column, which uses the dummy variable for credit decline shows that high FD sectors experience an additional 2.4 percent decline in total employment when private sector credit flow (as a share of GDP) is negative or declines by half, when compared to low FD sectors. In the rest of the paper, we show the results using the specification in column 2, as the continuous measure of credit decline better captures the variation in access to credit across years and countries, and not just when it reaches extreme values.

Table 4 shows alternative specifications of equation (1) as a robustness check of the main results. To address the concern that the results may be driven by a decline in banking or in the real estate sector, columns (2) and (3) exclude these sectors from the sample. In an influential paper, Bertrand et al. (2004) argue that differences-in-differences estimators that use several years of data result in standard errors that are inconsistent, and propose solutions to deal with this issue. One proposal is to collapse the data in two groups, one period before and one after the treatment. We follow this approach by splitting the sample in two periods: 2004-2007 and 2008-2013. Column (4) shows the estimated coefficient, which is still negative and statistically significant. Finally, the authors also propose to use bootstrap to estimate the standard errors. Column (5) shows that the coefficients are still statistically significant when using this estimation strategy with 200 repetitions.

Next, we examine the heterogeneity in the impact of the crisis. This builds on the literature on the distributional impacts of financial crises.¹² This literature, which largely relies on household survey data, has mixed findings on whether such crises have affected the poor more severely than the middle class, or rural households more than urban households. Our study can add to this literature in two ways. The first contribution is methodological: most existing studies are based on a before-after comparison which, unlike our differences-in-differences approach, does not account for other aggregate shocks. The second contribution is to highlight specific channels of distributional impacts, namely heterogeneity in job losses by worker attributes.¹³

Table 5 investigates which type of workers were more severely affected by firms' credit tightening conditions. The dependent variables are the share of workers in different job categories; hence the β 's in these regressions capture the impact of the credit crunch on the composition of employment. Overall, the results suggest that unskilled workers with precarious working conditions suffered greater employment losses.

Column (1) shows that the share of employees in temporary contracts decreased an additional 0.6 percentage point in financially dependent sectors when access to credit declined by about 20 percentage points, a sizable impact given that the baseline share of temporary workers in high FD sectors is around 11%. This heterogeneity is to be expected, given that the costs of laying off temporary workers when their contracts end is lower than that of laying off permanent workers.

Column (3) shows that the share of workers with a second job increased slightly more among workers whose main occupation is in sectors highly dependent on finance. This is consistent with second-

¹² See Fallon and Lucas (2002), Brown (2013), Lustig (2000), McKenzie (2006), McKenzie (2004), Cunningham and Maloney (2000), Goh et al. (2005), Robilliard et al. (2001), Friedman and Levinsohn (2002), Lokshin and Ravallion (2000) and Lopez-Acevedo and Salinas (2000).

¹³ It is important to note that the overall distributional impact of such crisis depends on other factors as well, such as changes in non-labor income and other ways in which households are able to respond to a job loss.

job holding being typically associated with higher job insecurity and volatility in Europe, as it provides a hedging strategy against labor market risk (Zangelidis, 2014).

Columns (4) and (5) show that the share of workers in small firms decreased disproportionately more among high FD sectors when access to credit fell. This could be because small firms are more dependent on external finance than their larger peers (Beck et al. 2005; Beck and Demirguc-Kunt, 2016; Chodorow-Reich, 2014).

Columns (6) to (11) investigate the impact of the credit crunch on the share of workers of different skills levels. We use two different measures of skills. The first one is educational attainment, displayed in columns (6) through (8). The second one follows Autor (2014), and classifies occupations using the ISCO codes in terms of their task content. According to this classification, high-skill occupations include legislators, senior officials and managers, professionals, technicians, and associate professionals. Middle-skill occupations comprise clerks, craft and related trades workers, plant and machine operators, and assemblers. Finally, low-skill occupations refer to service and sales workers, skilled agricultural, forestry, and fishery workers, and elementary occupations. The results are very similar using either set of skills definition: less skilled workers were more vulnerable. The share of workers who did not complete a secondary education or were in low-skill occupations dropped an additional 1.1 and 1.4 percentage points in high FD sectors when credit declined by 20 percentage points. Consistent with this decline in the share of low-skill workers, the share of middle and high-skill workers experienced a disproportionate increase in high FD sectors during the credit crunch.

This result could in part reflect the fact that low-skill workers are more likely to be in temporary contracts and thereby they are less costly to lay off (Kahn, 2007). It could also reflect the fact that within industries, companies with a larger fraction of skilled workers were less likely to experience a decrease in demand and credit during this period (Fabiani et al., 2015). Finally, it may also indicate the existence of

labor hoarding, that is, the fact that firms may be more likely to keep workers with higher qualifications or firm-specific skills if they expect the initial credit shock to be transitory (Anderton et al., 2012).

Columns (12) through (14) show the results for different age groups. Consistent with aggregate patterns (European Commission, 2014), they show that high FD sectors experienced disproportionately higher declines in the share of young workers, mirrored by an increase in the share of prime-age workers. The share of workers older than 50 years was not affected differentially across sectors with different levels of dependence on finance. Since temporary contract workers tend to be younger (Kahn, 2007), these results are also consistent with our finding that temporary workers suffered to a greater extent the employment effects of the credit crunch.

Finally, column (16) shows the result for the share of migrant workers, where we define migrants as those individuals with a foreign nationality. It shows that the share of migrant workers was reduced disproportionately among high FD sectors as credit declined. This could reflect the fact that migrant workers are more likely to have temporary contracts.

In summary, the empirical evidence suggests that a decline in access to finance leads firms to lay off employees, especially those in temporary contracts, unskilled and with shorter job tenures. While the disproportionately higher layoffs of these types of workers may be explained because they are less costly for the firm than layoffs of other types of workers, such differential costs could be driven by several factors. On the one hand, the least affected workers might be of higher value to the firm due to their specific human capital. On the other hand, labor market policies may allow for the existence of two-tier labor markets, where skilled workers are better able to obtain contracts with higher levels of employment protection, while their unskilled counterparts are pushed toward more flexible work arrangements. The next section examines the latter mechanism.

5. The role of EPL of permanent contracts in shaping the impact of the credit crunch on the labor market

There is a large body of literature on the impacts of EPL and temporary contracts on the labor market (see Boeri (2010) for a thorough literature review). Stringent employment protection is expected to reduce the response of employment to economic fluctuations. But this prediction becomes more nuanced when there is a “dual” labor market where firms have both “permanent workers” (who are covered under an EPL with high dismissal costs) as well as workers on fixed-term contracts with lower dismissal costs. Stricter EPL of permanent jobs gives firms a greater incentive to offer temporary jobs and preserve some ability to adjust labor in the face of shocks. The existence of this segmented labor market implies that new entrants to the labor market (which tend to disproportionately include the young, women and immigrants) are more likely to be offered temporary contracts than more experienced workers (Kahn, 2007). Empirical evidence suggests that unemployment during a recession would increase more when the EPL of permanent jobs is more stringent and the regulation of temporary jobs is less stringent (Bentolila et al., 2012).¹⁴

To investigate the impacts of the credit crunch across countries with different levels of employment protection, we use the Employment Protection Index (EPLex) from the International Labour Organization (ILO).¹⁵ The EPLex provides a comparative overview of regulations governing permanent

¹⁴ There is also evidence to this effect from India, where EPL does not cover temporary (“contractual”) workers. As EPL becomes stronger, the extent to which to which firms adjust permanent workers in response to shocks falls (Adhvaryu et al., 2013), while the extent to which to which firms adjust contractual workers in response to shocks increases (Chaurey, 2015).

¹⁵ We do not use the OECD’s Overall Strictness of ELP index because it covers fewer countries in our sample than that of ILO.

contracts of employment, and of employment protection legislation. We use the aggregate indicator which combines information on (1) valid grounds for dismissals, (2) prohibited grounds for dismissals, (3) probationary period, (4) procedural notification requirements for dismissals, (5) notice periods, (6) severance pay, (7) redundancy pay and (8) avenues for redress.¹⁶ The EPLex aggregate indicator has a scale from 0 (lowest level of employment protection) to 1 (highest level of employment protection). To facilitate the interpretation of the results, we use a dummy variable equal to one if the EPLex is above the median value for this sample. The actual values of the EPLex for our sample are displayed in Table 1. Unfortunately, the index is not available for some countries, which are excluded from the estimation sample.¹⁷

Table 6 shows the estimates of equation (1) interacting the main effect with the dummy variable indicating high level of employment protection. Column (1) shows that the negative impact of the credit crunch was higher in countries with higher levels of employment protection. More specifically, while total employment declined by an additional percentage point among high FD sectors in countries with low levels of employment protection, that figure is about 6.7 percentage points in countries with high levels of employment protection. To a large extent, this effect seems to be driven by the impact of the credit crunch on the employment of temporary workers. As seen in column (2), while the effect of the credit crunch on both temporary and permanent workers was rather similar in countries with lower levels of employment protection (in the sense that their shares in total employment did not significantly change), the impact on temporary workers was negative and significant only in countries with high levels of

¹⁶ ILO (2015) provides a full description of the index and methodology.

¹⁷ Ideally, we would have liked to include a measure of the EPL for temporary workers as an additional interaction term in these regressions. However, the EPLex counterpart for temporary workers is not available for our sample of countries.

employment protection. Accordingly, the negative impacts on small firms as well as on unskilled, young and migrant workers were exacerbated in countries with stronger employment protection legislation.

These results are consistent with Bentolila and Dolado (1994), who provide empirical evidence that temporary contracts offer a buffer to firms by insulating permanent workers from employment adjustment in response to shocks. When firms adjust labor costs in response to a decline in credit, temporary workers (who tend to be unskilled and younger) are disproportionately hit. Further, our finding that employment in small firms was more severely affected by lack of credit in countries with higher level of employment protection suggests that small firms are less able to cope with the additional labor costs brought up by employment protection laws.

6. Conclusions

Building on the seminal paper by Rajan and Zingales (1998), this paper proposes a differences-in-differences methodology to estimate the effects of financial crises. This method, which is based on creating an industry-level measure of inherent vulnerability to financial volatility, is used to examine the impact of the 2007-08 banking crisis on employment and its composition in Central and Western Europe.

Our estimates, based on the differential impacts across high and low financial dependence industries, suggest that the decline in employment after 2007-08 was in part due to the decline in credit supply in Europe during this period, and not just due to the general slowdown in global economic activity. The credit crunch had heterogeneous effects on workers, affecting temporary, younger, less skilled and migrant workers more severely. For a credit to GDP drop of 20 percentage points (the average level of decline in our sample), the differential decline in the employment share of temporary workers was 0.6 percentage point, which is notable given baseline values of around 11%.

We then investigate if these patterns are related to the strength of legal job protection of permanent workers, exploiting cross-country variation in these laws. The estimated impacts on

employment, including the disproportionate impacts on temporary, younger, less skilled and migrant workers, are significantly higher in countries with stronger protection of permanent workers from dismissal. This finding is in line with studies arguing that the combination of strict regulation of permanent employment with lax regulation of temporary work contracts has created a dual labor market in Europe, one in which the burden of adjustment falls disproportionately on temporary workers (who also tend to be less skilled and younger than permanent workers). It is thus a contribution to the ongoing policy debate on the reform of labor laws in Europe.

Our findings indicate that the heterogeneity in the impact of the financial crisis in Europe was not driven purely by heterogeneity in the extent of the financial shock across firms or sectors. It was related to how firms respond to tightening financial constraints given their regulatory environment: in this case, labor regulations. There could be other factors, too, that affect how firms respond to such crises. The more severe impact on less skilled and younger workers, for instance, is consistent with the idea that in the face of a credit shock of uncertain duration, firms may wish to hold on to workers in which they have made more investment. We are unable to test this hypothesis in our setting. More research on how firms respond to financial constraints caused by banking crises could therefore help to further explain and generalize these findings.

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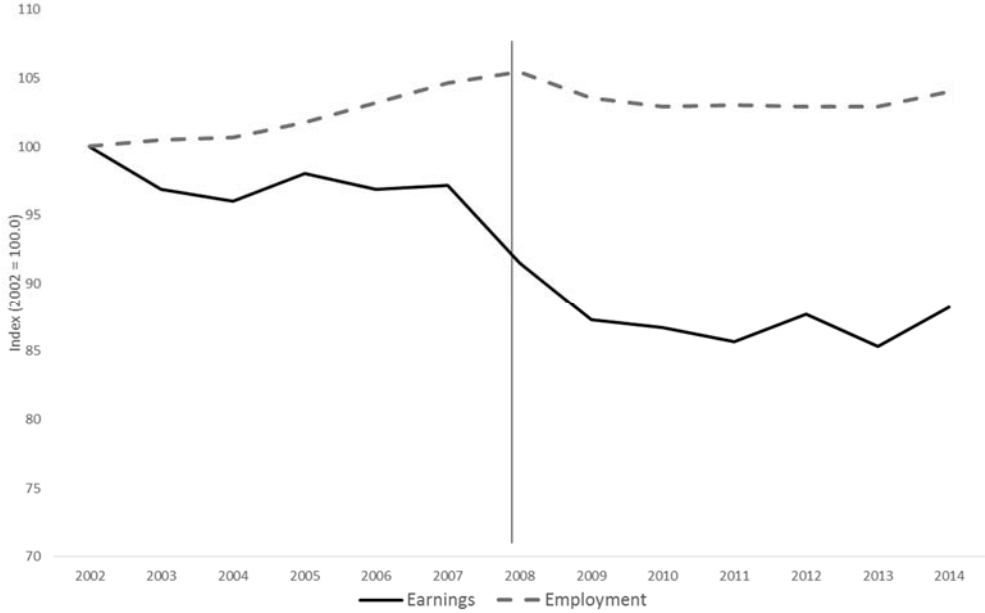
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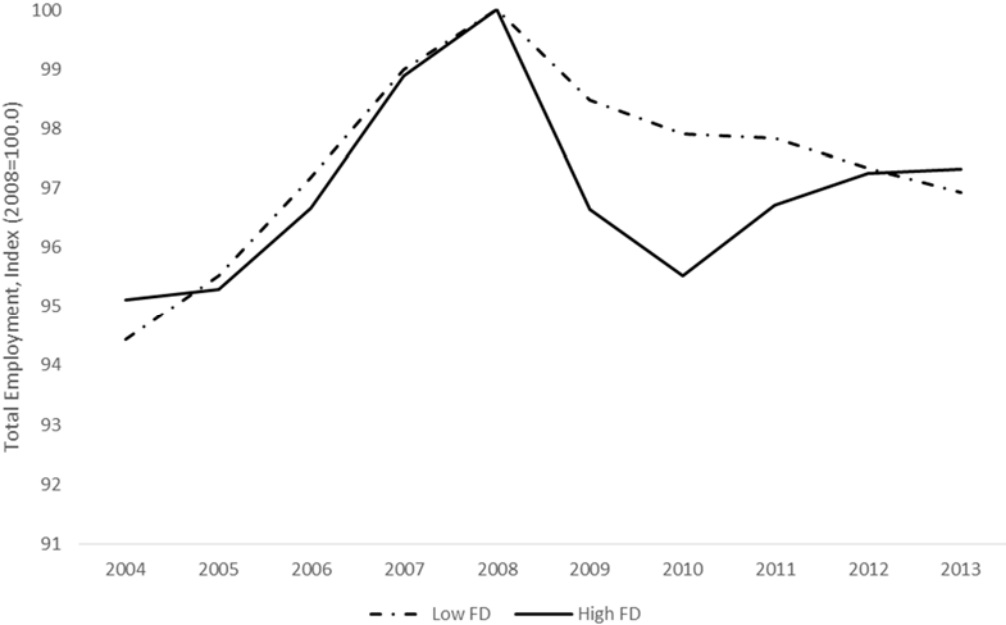
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Figure 1. Average Real Earnings and Employment Rates in Europe during the Financial Crisis (index 2002=100.0)



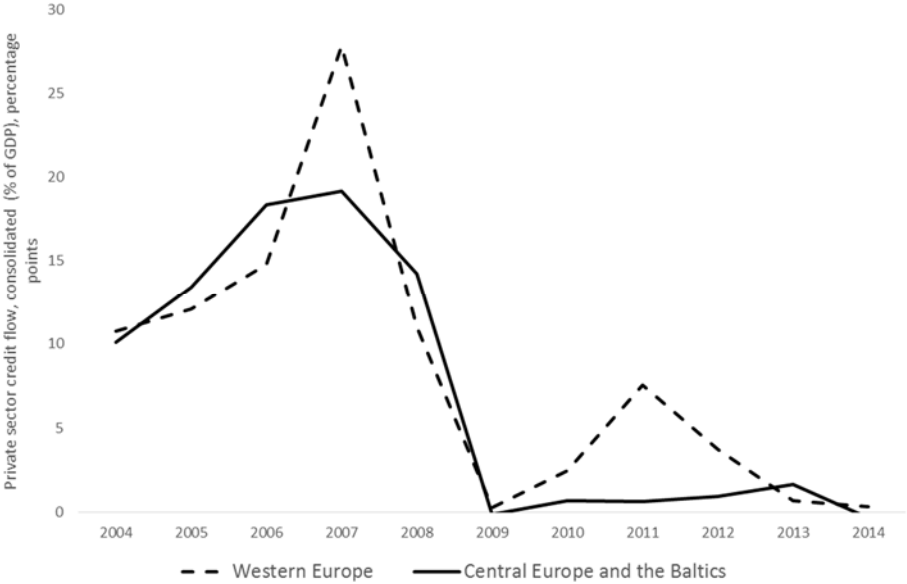
Source: Eurostat, average for the European Union’s 28 member countries. Earnings are deflated using the Harmonized Indices of Consumer Prices (HICP).

Figure 2. Total Employment in High and Low Financially Dependent Sectors (Index, 2008=100.0)



Source: based on Eurostat National Accounts, detailed sectoral breakdown. Sample includes all countries in EU28. High FD sectors are those in the highest quartile of the distribution of the FD variable calculated using US data (see main text for full description of this variable).

Figure 3. Private Sector Credit Flow, Consolidated (% GDP)



Note: Based on data from Eurostat. Each line shows the average for each group of countries.

Table 1. Descriptive Statistics

	Absolute change 2007-2009, percentage points					Employment Protection Index
	Credit Crunch (Decrease in Private Sector Credit Flow, Consolidated (% GDP))	Employment Rate, Change	Share Temporary Workers, Change	Share of Workers without a College Degree, Change	Share Employed in firms with 10 or less employees, Change	
AT	4.0	0.4	1.6	0.1	-1.1	0.48
BE	4.4	-0.4	-1.2	1.5	0.1	0.37
BG	22.0	0.9	1.4	0.1	-0.5	0.37
CY	10.2	-2.0	0.2	-0.6	0.2	0.35
CZ	4.3	-0.7	-0.4	-2.6	-2.5	0.65
DK	8.7	-1.7	0.8	-1.5	1.3	0.46
EE	9.8	-6.0	1.0	0.7	-4.0	0.47
ES	21.4	-5.8	-2.3	-1.4	0.0	0.49
FI	4.4	-1.6	1.4	-4.6	2.9	0.32
FR	4.7	-0.2	-0.6	-0.3	-0.1	0.47
GR	7.2	-0.1	0.5	-1.4	-0.2	0.55
HR	7.5	0.4	-2.0	1.0	3.2	
HU	6.6	-2.0	1.9	-0.1	-0.3	0.46
IE	16.3	-7.3	0.6	-0.1	-0.5	
IT	8.3	-1.2	0.2	-0.4	-0.4	0.48
LT	22.3	-5.1	-2.8	-1.3	0.4	
LU	258.9	1.0	-0.7	2.2	0.7	0.44
LV	29.4	-7.8	2.7	5.3	0.7	
NL	3.9	1.0	-0.3	-3.9	-1.3	0.55
PL	1.9	2.3	-7.7	-1.8	1.9	
PT	7.6	-1.5	-1.1	0.2	-0.8	0.78
RO	14.4	-0.2	-1.2	0.9	0.3	0.46
SE	8.7	-2.0	-2.3	0.9	-1.6	0.48
SI	12.1	-0.3	-2.9	-3.3	-0.6	0.45
SK	2.7	-0.5	0.1	-3.5	-2.6	0.70
UK	16.0	-1.6	-1.0	-0.2	1.5	0.42
Average	19.9	-1.6	-0.5	-0.5	-0.1	0.49

Note: the table shows the countries included in the estimation. The employment rate of individuals aged 15 to 64 years comes from Eurostat online database. The changes in the share of workers with temporary jobs, without a college degree and employed in smaller firms were estimated using the EULFS microdata. The employment protection index (EPLX) comes from ILO. EPLX goes from 0 to 1, and a higher number indicates a higher level of employment protection.

Table 2. Labor market outcomes in 2007, by level of sectoral financial dependence

	log(total employment)	Share of workers				
		Temporary Contracts	Part-time jobs	With a Second Job	Firms with 10 employees or less	Firms with more than 10 employees
Low FD	11.7	12%	12%	4%	24%	66%
High FD	12.7	11%	10%	4%	23%	68%
Difference	1.0	-1%	-1%	0%	-1%	1%

	Share of workers					
	Low education	Middle Education	High Education	Low-skill occupations	Middle-skill occupations	High-skill occupations
Low FD	21%	52%	27%	23%	31%	38%
High FD	21%	50%	28%	18%	41%	41%
Difference	1%	-1%	0%	-5%	10%	3%

	Share of workers					
	29 years or younger	30-49 years	50 years or older	Women	Migrant	Rural
Low FD	21%	55%	24%	43%	6%	42%
High FD	22%	55%	22%	41%	8%	46%
Difference	1%	1%	-2%	-2%	2%	4%

Note: estimated for the year 2007 using EULFS microdata. Low, middle and high education are workers with less than high school education, high school graduates and college graduates, respectively. Low, middle and high skill occupations are defined following Autor (2014). High-skill occupations include legislators, senior officials and managers, professionals, technicians, and associate professionals. Middle-skill occupations comprise clerks, craft and related trades workers, plant and machine operators, and assemblers. Low-skill occupations refer to service and sales workers, skilled agricultural, forestry, and fishery workers, and elementary occupations. Migrant workers are those with a foreign nationality.

Table 3. Impact of the credit crunch on total employment

	log(total employment)		
Credit Decline x FD	-0.000202*		
	(0.000118)		
Credit Decline x FDq4		-0.000714***	
		(0.000250)	
Credit decline dummy variable x FDq4			-0.0239**
			(0.0116)
Constant	11.95***	11.95***	11.95***
	(0.00527)	(0.00526)	(0.00570)
Country-Sector Fixed Effects	YES	YES	YES
Country-Year Fixed Effects	YES	YES	YES
Sector-Year Fixed Effects	YES	YES	YES
Observations	3,640	3,640	3,640
R-squared	0.534	0.534	0.534

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Credit decline is equal to private sector credit flow (consolidated as a share of GDP) multiplied by -1. The credit decline dummy variable is equal to one when private sector credit flow (consolidated as a share of GDP) is negative of below half of the previous year's level. The FD variable measures financial dependence and it is described in the data section. The dummy variable FDq4 is equal to one for sectors in the highest quartile of financial dependence.

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Table 4. Impact of the credit crunch on total employment, robustness checks

	(1)	(2)	(3)	(4)	(5)
	Baseline	Excluding banking sector	Excluding Real Estate Sector	Two-period collapse	Bootstrap standard errors
Credit Decline x FDq4	-0.000714*** (0.000250)	-0.000663*** (0.000256)	-0.000962*** (0.000282)	-0.00410* (0.00237)	-0.000714* (0.000404)
Country-Sector Fixed Effects	YES	YES	YES	YES	YES
Country-Year Fixed Effects	YES	YES	YES	YES	YES
Sector-Year Fixed Effects	YES	YES	YES	YES	YES
Observations	3,640	3,380	3,380	728	3,640
R-squared	0.534	0.546	0.462	0.803	0.534
Number of country_sector	364	338	338	364	364

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Credit decline is equal to private sector credit flow (consolidated as a share of GDP) multiplied by -1.

Table 5. Impact of the credit crunch on employment structure

	Dependent variables: Share of Workers					
	(1)	(2)	(3)	(4)	(5)	
	Temporary Contracts	Part-time jobs	With a Second Job	Firms with 10 employees or less	Firms with more than 10 employees	
Credit Decline x FDq4	-0.000294*** (8.40e-05)	1.65e-05 (6.37e-05)	5.14e-05* (2.83e-05)	-0.000185* (0.000111)	0.000290** (0.000141)	
Observations	3,640	3,626	3,640	3,639	3,639	
R-squared	0.0365	0.0135	0.0832	0.0570	0.0625	
	(6)	(7)	(8)	(9)	(10)	(11)
	Low education	Middle Education	High Education	Low-skill occupations	Middle-skill occupations	High-skill occupations
Credit Decline x FDq4	-0.000555*** (7.63e-05)	7.85e-05 (9.48e-05)	0.000482*** (8.16e-05)	-0.000729*** (0.000127)	0.000246** (0.000114)	0.000472*** (0.000145)
Observations	3,640	3,640	3,640	3,640	3,640	3,640
R-squared	0.0263	0.0279	0.0241	0.0485	0.0175	0.0485
	(12)	(13)	(14)	(15)	(16)	(17)
	29 years or younger	30-49 years	50 years or older	Women	Migrant	Rural
Credit Decline x FDq4	-0.000521*** (7.82e-05)	0.000528*** (9.14e-05)	-6.72e-06 (7.19e-05)	7.25e-05 (6.93e-05)	-0.000330*** (5.78e-05)	-0.000114 (9.70e-05)
Observations	3,640	3,640	3,640	3,640	3,640	3,458
R-squared	0.170	0.217	0.178	0.00403	0.670	0.228

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Low, middle and high education are workers with less than high school education, high school graduates and college graduates, respectively. Low, middle and high skill occupations are defined following Autor (2014). High-skill occupations include legislators, senior officials and managers, professionals, technicians, and associate professionals. Middle-skill occupations comprise clerks, craft and related trades workers, plant and machine operators, and assemblers. Low-skill occupations refer to service and sales workers, skilled agricultural, forestry, and fishery workers, and elementary occupations. Migrant workers are those with a foreign nationality. Credit decline is equal to private sector credit flow (consolidated as a share of GDP) multiplied by -1. All specifications control for country-sector, sector-year and country-year fixed effects.

Table 6. Results for different levels of employment protection legislation.

	Dependent variables:					
	(1)	(2)	(3)	(4)	(5)	(6)
	log(total employment)	Temporary Contracts	Part-time jobs	Share of workers With a Second Job	Firms with 10 employees or less	Firms with more than 10 employees
Credit Decline x FDq4	-0.000535** (0.000252)	6.27e-05 (0.000112)	9.87e-05 (8.31e-05)	3.37e-05 (3.64e-05)	5.32e-05 (0.000154)	2.28e-05 (0.000198)
Credit Decline x FDq4 x EPLex	-0.00281*** (0.000856)	-0.000777*** (0.000123)	-8.65e-06 (9.12e-05)	-4.52e-05 (3.99e-05)	-0.000478*** (0.000170)	0.000552** (0.000218)
Observations	2,940	2,940	2,940	2,940	2,939	2,939
R-squared	0.517	0.0370	0.0122	0.0817	0.0637	0.0696
	(7)	(8)	(9)	(10)	(11)	(12)
	Low education	Middle Education	High Education	Share of workers Low-skill occupations	Middle-skill occupations	High-skill occupations
Credit Decline x FDq4	-0.000200* (0.000103)	0.000116 (0.000122)	9.11e-05 (0.000105)	0.000139 (0.000170)	0.000156 (0.000157)	-0.000403** (0.000185)
Credit Decline x FDq4 x EPLex	-0.000647*** (0.000113)	-0.000154 (0.000134)	0.000799*** (0.000116)	-0.00189*** (0.000186)	0.000557*** (0.000172)	0.00141*** (0.000204)
Observations	2,940	2,940	2,940	2,940	2,940	2,940
R-squared	0.0271	0.0219	0.0213	0.0563	0.0193	0.0552
	(13)	(14)	(15)	(16)	(17)	(18)
	29 years or younger	30-49 years	50 years or older	Share of workers Women	Migrant	Rural
Credit Decline x FDq4	5.03e-05 (9.88e-05)	-5.77e-05 (0.000121)	7.41e-06 (9.49e-05)	7.37e-05 (9.20e-05)	-0.000242*** (7.76e-05)	-0.000123 (0.000128)
Credit Decline x FDq4 x EPLex	-0.000825*** (0.000109)	0.000834*** (0.000133)	-8.59e-06 (0.000104)	9.78e-05 (0.000101)	-0.000359*** (8.53e-05)	-2.91e-05 (0.000142)
Observations	2,940	2,940	2,940	2,940	2,940	2,786
R-squared	0.174	0.198	0.171	0.00412	0.757	0.233

Note: EPLEX is a dummy variable equal to 1 for countries in the top 50% of the Employment Protection Legislation index from ILO (see

Table 1). Low, middle and high education are workers with less than high school education, high school graduates and college graduates, respectively. Low, middle and high skill occupations are defined following Autor (2014). High-skill occupations include legislators, senior officials and managers, professionals, technicians, and associate professionals. Middle-skill occupations comprise clerks, craft and related trades workers, plant and machine operators, and assemblers. Low-skill occupations refer to service and sales workers, skilled agricultural, forestry, and fishery workers, and elementary occupations. Migrant workers are those with a foreign nationality. Credit decline is equal to private sector credit flow (consolidated as a share of GDP) multiplied by -1. All specifications control for country-sector, sector-year and country-year fixed effects.