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Do Firms Demand Temporary Workers When They Face Workload Fluctuation? Cross-Country Firm-Level Evidence

Vanessa Dräger and Paul Marx·

[[abstract]] The growth of temporary employment is one of the most important transformations of labor markets in the past decades. Theoretically, firms' exposure to short-term workload fluctuations is a major determinant of employing temporary workers when employment protection for permanent workers is high. The authors investigate this relationship empirically with establishment-level data in a broad comparative framework. They create two novel data sets by merging 1) data on 18,500 European firms with 2) measures of labor-market institutions for 20 countries. Results show that fluctuations increase the probability of hiring temporary workers by 8 percentage points in countries with strict employment protection laws. No such effect is observed in countries with weaker employment protections. Results are robust to subgroups, subsamples, and alternative estimation strategies.

Temporary employment accounts for a considerable share of the European Union (EU-27) workforce—approximately 14%, 60% of which is involuntary (Eurostat 2012). Workers on temporary contracts are one of the groups most vulnerable to economic downturns (Boeri 2011: 1207), which implies a large risk of incurring losses in well-being (Frey and Stutzer 2002; Lucas 2007). Moreover, temporary employment comes with fewer training opportunities, lower wages, and higher job insecurity compared to permanent employment (Booth, Francesconi, and Frank

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Keywords: temporary employment, employment protection, labor demand, firm-level data

2002; De Cuyper, de Jong, De Witte, and Schalk 2008). Hence, gaining deeper insights into the mechanisms that generate temporary employment is relevant for policymaking.

This article contributes to such insights by studying firms'[1] demand for temporary workers in various institutional contexts. Studying the firm level is important for two reasons: first, firms' workload fluctuations are a main reason for the use of temporary workers (Houseman 2001; Morikawa 2010; Eslava, Haltiwanger, Kugler, and Kugler 2014). Second, firm-level workload fluctuations are positively related to macroeconomic business cycle volatilities (Buch, Döpke, and Stahn 2008). Hence, recent increases in macroeconomic volatilities caused by the economic crisis in many European countries might have increased fluctuations on the firm level. As a result, the propensity of firms to employ temporary workers might have increased.

Firm-level workload fluctuations do not determine the use of temporary employment in isolation, however. Research shows that the institutional context also matters, particularly employment protection legislation for permanent workers (EPLP) (Bentolila and Saint-Paul 1992; Houseman 2001; Cahuc and Postel-Vinay 2002; Boeri and Garibaldi 2007; Kahn 2010; Centeno and Novo 2012; Hijzen, Mondauto, and Scarpetta 2013; Eslava et al. 2014). Moreover, research has shown that real shocks interact with institutions in determining the extent of temporary employment (Bentolila and Saint-Paul 1992; Nunziata and Staffolani 2007; Eslava et al. 2014).

Building on this literature, we ask: Is the effect of workload fluctuations on firms' decision to employ temporary workers stronger in countries that impose strict rules on the dismissal of permanent workers? Based on a recent search-and-matching model by Cahuc, Charlot, and Malherbet (2012), we expect that firms are more likely to employ temporary workers if they face a high shock arrival rate, that is, if they expect jobs to have only a short duration. The extent of this effect depends on sufficiently high employment protection for permanent workers. To the best of our knowledge, ours is the first comparative study to investigate how heterogeneity in the expected duration of jobs and labor market institutions jointly affect the firms' decision to employ temporary workers.

[1] We employ firms and establishments interchangeably. Thereby, we assume that in firms with more than one establishment, these establishments operate independently when it comes to employment decisions.

Our contribution is threefold: First, in contrast to Bentolila and Saint-Paul (1992), Nunziata and Staffolani (2007), and Eslava et al. (2014), we use a measure of shocks that is more closely related to the theoretical model by Cahuc et al. (2012). This model emphasizes heterogeneity in expected shock arrival rates, which is captured by our measure of workload fluctuation. Hence, we are the first to empirically test the theoretical argument made by Cahuc et al. (2012). Second, in contrast to Nunziata and Staffolani (2007), who used macro-data, we add a micro-perspective. By combining institutional data with establishment-level data we are, for instance, better able to account for composition effects. Third, we add a broad cross-country perspective, whereas Eslava et al. (2014) and Bentolila and Saint-Paul (1992) used firm-level data. This approach enables us to exploit variation in institutional context.

Our empirical strategy uses novel data from two waves of the European Company Survey (with approximately 18,000 establishments each) clustered in up to 20 European countries. We merge this information with macro-level variables, most notably on variation in employment protection legislation (Boeri and Jimeno 2005). Although the cross-sectional character clearly limits our analyses, the broad international scope offers a unique opportunity to analyze firms' hiring decisions in a variety of institutional contexts.

We estimate a binary choice model with the pooled data set and use clustered standard errors as well as country dummies to account for autocorrelation (resulting from clustering and unobserved heterogeneity at the country level). We find that establishments facing workload fluctuations within a year in flexible regimes are not more likely to employ temporary workers compared to establishments without workload fluctuations. In countries with a sufficiently high level of employment protection legislation (EPL), however, establishments are significantly more likely to employ temporary workers (78% compared with 70%). This outcome is the same for the subgroups of temporary agency and fixed-term contract workers. Our results are robust if we account for differential enforcement of employment protection. They are also robust across different country subsamples, years of observation, estimation strategies, and model specifications.

We begin with our theoretical argument based on labor demand and search-and-matching models. From there, we derive our reduced-form empirical labor demand model and discuss the empirical strategy. After describing data sources and central concepts, we present our results and discuss endogeneity as well as robustness issues.

[[h1 (level one subhead)]]Theory and Empirical Literature

European labor markets are characterized by heterogeneous employment protection for permanent and temporary workers. These are typically presented as either dynamic labor demand models under uncertainty (e.g., Bentolila and Saint-Paul 1992; Hamermesh 1996; Boeri and Garibaldi 2007; Nunziata and Staffolani 2007)[2] or search-and-matching models (e.g., Blanchard and Landier 2002; Cahuc and Postel-Vinay 2002; Bentolila, Cahuc, Dolado, and Le Barbanchon2010). Most theoretical models, however, analyze the impact of two-tier labor market reforms (i.e., a partial deregulation of temporary contracts only) on macroeconomic outcomes such as employment or unemployment rates (e.g., Boeri and Garibaldi 2007). The impact of employment protection on the distribution of permanent and temporary jobs is often neglected. Nunziata and Staffolani (2007) are an important exception. In a dynamic labor demand model, they predicted that an increase or decrease of temporary employment depends on the state of the economy and on the constraints in employing permanent workers.

As Berton and Garibaldi (2006) noted, the literature on two-tier labor market reforms in rigid labor markets often assumes (or implies) that after partial deregulation, firms rely on temporary employment exclusively when filling vacancies. It is more realistic, however, to assume a continuing coexistence of permanent and temporary contracts. For employers, the choice between contract types entails a trade-off: permanent contracts may exhibit a higher job-filling rate, but temporary contracts provide flexibility in case of productivity shocks (Berton and Garibaldi 2006). If at least some employers continue to hire permanently,[3] the important question becomes what determines employers' choice between permanent and temporary employment contracts.

Cahuc et al. (2012) and Eslava et al. (2014) explicitly modeled the choice between contract types. Cahuc et al. (2012: 2) pointed to the relevance of the "heterogeneity of expected duration of jobs" for this choice. In this article, we are interested in this aspect, specifically. Other search-and-matching models or labor demand models include stochastic shocks modeled, for instance, as Geometric Brownian motion (Lotti and Viviano 2012), but not heterogeneity in

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[2] Labor demand models with heterogeneous workers are often based on the classical labor demand model and firing costs with one type of worker, by Bentolila and Bertola (1990).

[3] C In some contributions the stock of permanent contracts is not necessarily completely crowded-out over timebecause they allow for the conversion of temporary contracts into permanent contracts (e.g., Blanchard and Landier 2002; Nunziata and Staffolani 2007)..

the expected duration of jobs. Intuitively, the choice of employment contracts is most likely based on expectations about the durability of production opportunities. Permanent contracts are associated with dismissal costs, whereas temporary contracts can be terminated (after a predetermined duration) at no cost. If dismissal protection imposes sufficiently high turnover costs on permanent workers, and if employers expect that the task a worker performs is limited in time, a temporary contract is chosen. If employment protection is low for permanent workers, permanent contracts are always chosen—even for jobs with an expected short duration. Hence, dismissal costs and the probability of a worker becoming unproductive (the job's shock arrival rate) interact in determining the choice of employment contracts.

The theoretical models on the use of temporary work point to the paramount importance of firm and job characteristics *in interaction with* institutional features determining firing costs. Taking the view of the firm (and leaving workers' decisions aside),[4] we formulate the following hypothesis for the choice between temporary and permanent contracts: firms' propensity to offer temporary contracts increases with the probability that jobs within the firm become unproductive, *conditional upon* sufficiently high adjustment costs for permanent workers.

Empirical research analyzing this specific interaction at the firm level in a cross-country design does not exist, but empirical studies have shown that firing costs are important for the impact of shocks on the workforce. First, single-country firm-level studies show that workload fluctuations influence firms' decision whether to (at least partially) hire on temporary contracts (Boockmann and Hagen 2001; Houseman 2001) as well as the size of the workforce (Bentolila and Saint-Paul 1992). These findings are in line with Cahuc et al. (2012), who showed that workers become unproductive with production opportunities of differing lengths. Second, in the vein of Cahuc et al. (2012), studies have shown that firing costs are relevant for the effect of fluctuations or cyclical elements on employment. For instance, Bentolila and Saint-Paul (1992) showed that for Spain in the 1980s, firm-level cyclical elasticity to sales increased with the availability of temporary contracts. At the aggregated level, Nunziata and Staffolani (2007) found that temporary employment rates vary more strongly over the business cycle than do permanent employment rates, and that this cyclical response is even stronger if temporary agency

[4] As most temporary contracts are involuntary, we expect firms to be the more powerful actor in the bargaining process, and hence we focus on modeling their behavior. In the EU-27, 60.4% of temporary workers preferred a permanent job over a temporary job in 2009 (Eurostat 2012).

workers are well protected. The cyclical elasticity of temporary employment changes only to a minor extent with protection for permanent workers at the aggregated level, however. Eslava et al. (2014) showed that when Colombian firms created (destroyed) jobs, the share of temporary workers increased (decreased). They also showed that this relationship became stronger when dismissal costs for permanent workers increased after 2001. Although these studies are strongly related to ours, we add a broad cross-country perspective (in contrast to Eslava et al. [2014] and Bentolila and Saint-Paul [1992]), the firm-level (in contrast to Nunziata and Staffolani [2007]), and the measurement of heterogeneous shock arrival rates (in contrast to all three).

To assess our theoretical hypotheses, we ideally require the combination of institutional variables (firing costs) and firm-level variables (firm-specific shock arrival rates).[5] Alternatively, cross-country or within-country variation could be exploited (Boeri and Jimeno 2005). Within-country variance is relatively small, however. Employment protection legislation is highly path-dependent, particularly for permanent workers. Variable enforcement of employment protection by firm size offers some, but rather limited, within-country variation. Aggregated (national) data, by contrast, disguises heterogeneity in shock arrival rates across sectors and firms. Hence, to account empirically for both institutional differences and heterogeneity in expected job duration, one would ideally employ comparative firm-level data. We meet these requirements for European firms by employing a relatively new data set.

[[h1]]Empirical Specification

Our hypothesis is that a firm's propensity to use temporary contracts is high if the job is expected to be of a relatively short duration and if employment protection for permanent workers is high. To link our theoretical argument to a reduced-form empirical labor demand model, we make simplifying arguments that are driven partly by pragmatic reasons and partly by data availability (as discussed later). The propensity to use temporary contracts is best measured with flow data (the composition of hiring), and the probability of a job becoming unproductive refers to job-specific characteristics (which can differ within firms). Ideally, therefore, we would have linked employer–employee data, but such data are difficult to obtain in a comparative framework.

[5] Theoretically, the shock arrival rate is specific to jobs not to firms, because temporary and permanent workers coexist in many firms. As we argue below, however, characteristics determining choice of employment contract are easier to observe at the firm level than at the level of specific jobs. Estimating job-specific shock arrival rates would require comparable linked employer–employee data.

Hence, in our main analyses we use a binary dependent variable taking the value of 1 if establishments employ at least one temporary worker. In additional analyses, we use the composition of the stock of employees by contract type. To measure the shock arrival rate, we employ workload fluctuations over different periods. Finally, adjustment costs are strongly influenced by employment protection legislation for permanent workers at the national level. This fact allows us to rephrase our hypothesis as follows: firms' likelihood of having temporary workers in their workforce is higher, ceteris paribus, if the firm is exposed to workload fluctuations, but only if the costs for dismissal of permanent workers (as stipulated by law or collective agreement) are sufficiently high.

In our baseline specification, we assume that the profit of employing at least one temporary worker for firm *i* in country *j* can be characterized by a latent variable y_{ij}^*:

$$y_{ij}^* = \beta_0 + \beta_1 EPLP_j * WF_{ij} + \beta_2 WF_{ij} + \boldsymbol{\beta}_3 \mathbf{C} + R_{ij} + U_j$$

with

$y_{ij} = 1$ if $y_{ij}^* > c$,

$y_{ij} = 0$ otherwise

and with employment protection legislation for permanent workers $EPLP_j$, short-term workload fluctuation WF_{ij}, a vector of controls **C**, and the error term components R_{ij} and U_j.

At least one temporary worker is in the workforce of a firm ($y_{ij} = 1$) if the profit of employing the worker exceeds the threshold c. We replace the dependent variable by the two subgroups, fixed-term contract (FTC) and temporary agency workers (TAW), to which our theoretical argument applies similarly. We extend the analysis by using the percentage of fixed-term contract workers at the date of the interview as a dependent variable. We estimate a two-component model, taking account of corner solutions and different processes for the intensive and extensive margin (Cameron and Trivedi 2009: 538ff.; Eslava et al. 2014).

The main variable of interest is the effect of WF_{ij} in different institutional contexts (employment protection legislation for permanent workers [EPLP]) on the propensity that a firm employs temporary workers. For this, we require variation on the institutional level. As mentioned above, the options are within- and between-country variance (Boeri and Jimeno 2005). Because of data limitations, we are restricted to variation of EPLP across countries rather than within countries.

Concerning our estimation strategy, we assume that the firm-specific error component R_{ij} is i.i.d. and logistically distributed. Because firms are clustered within countries, however, the error terms might be correlated within countries. Furthermore, there might be unobservables at the country level that are correlated with other covariates, which would yield biased estimates. We tackle these issues by clustering the standard errors at the country level in all models and by including country fixed effects in some models.[6] We define the models at the end of this section. For robustness checks, we estimate models that correct for clustering but not for unobserved heterogeneity at the country level. The results are robust with regard to WF_{ij} and $EPLP_j$*WF_{ij}. Furthermore, we estimate different specifications, for example, subsample models. Overall, the results are quite robust, in particular with regard to fluctuations within a year.

The vector **C** includes several controls on the firm level, such as firm size and industry, as well as country-level variables and country dummies (depending on the specification). For the firm level, some researchers have argued that workplace representation may have an impact on the use of temporary jobs (Salvatori 2009). Empirical results are ambiguous, though, and the direction of the effect of workplace representation is theoretically unclear (Bentolila and Dolado 1994; Böheim and Zweimüller 2009). First, given that works councils are not at the core of our argument, we refrain from making an explicit theoretical claim, but we include a control dummy taking the value of 1 if workplace representation is present in the establishment. Second, Houseman (2001) found in a company survey that temporary workers are employed to fill positions of absent regular workers or to screen candidates for vacancies. We therefore control for the rates of absent workers and new workers (the latter is measured as an increased number of workers). Third, in empirical labor demand models, labor costs, costs of intermediate goods, capital stocks, and performance indicators are usually controlled for (Bentolila and Saint-Paul 1992). Some of these aspects are captured by including the change in the number of employees. For the others, we control indirectly by firm size and economic sector. Fourth, we control for the rate of female and high-skilled employees in the workforce, because these groups differ in their likelihood of holding temporary contracts (Kahn 2007). Finally, we control for whether the firm

[6] Because clustered data are generally short-panel data with within-individual clustering (Cameron and Trivedi 2009: 307ff), one can employ panel methods (random effects and fixed effects) to deal with the clustering. Clustering can also be dealt with by cluster-robust standard errors (ibid.: 306). The random effects model is also referred to as a type of "multilevel model" (Snijders and Bosker 1999; Rabe-Hesketh and Skrondal 2008).

makes use of flexible working time, because such arrangements might serve as a functionally equivalent way to cope with fluctuation.

Depending on whether we include country dummies, we also include control variables at the country level. First, authors have argued in the literature that wage rigidity exacerbates the effect of EPL, since higher turnover costs cannot be compensated for by lower wage costs (Lazear 1990). Empirical studies on wage rigidity found that downward real wage rigidity depends on labor market institutions such as collective bargaining (Babecký et al. 2010). Therefore, we include the proportion of eligible workers covered by collective agreements (collective bargaining coverage rate) in our model (singly and interacted with EPL for permanent and temporary workers, as well as interacted with annual workload fluctuations). The data are obtained from Hayter and Stoevska (2011) and Eurofound (2007). Second, high EPLP often goes hand-in-hand with low EPL for temporary workers, and low EPL for temporary workers increases the probability of being a temporary worker (Kahn 2010). Therefore, we control for EPL for temporary workers and its interaction with annual workload fluctuation, as well as its interaction with EPLP. Finally, we control for the national unemployment rate in the first quarter of 2009 (as provided by Eurostat) to control for higher pressure for job seekers to accept temporary jobs (Polavieja 2005).

We define two models, to which we refer in the following analyses. Model (1) allows for unobserved country fixed effects by including country dummies. By contrast, Model (2) explicitly models the country-level variables that were shown to be relevant for temporary employment. For this reason, Model (2) is more directly related to the theoretical and empirical research on temporary employment. Model (1) and Model (2) both control for the above-mentioned establishment controls, as well as for interactions between annual workload fluctuation and country-level variables.[7] Standard errors are clustered at the country level in both models.

[[h1]]Stylized Facts and Data Sources

We utilize establishment-level data from approximately 18,000 establishments in up to 20 European countries for two years and merge them with country-level data. The European Company Survey (ECS) provides our data on the establishment level (Eurofound 2006, 2010b;

[7] Model (1) is robust to different covariates at the establishment level, such as excluding firm size and sector dummies. Results are available from the authors upon request.

Gensicke, Hajek, and Tschersich 2009).[8] The ECS (formerly the Establishment Survey on Working Time [ESWT]) started in 2004–2005 and is comparable across countries.[9] The survey is repeated every four years. Our analysis mainly focuses on the most recent wave collected in spring 2009, but we provide robustness analyses with data collected between autumn 2004 and spring 2005.[10] The 2004–2005 and the 2009 ECS are representative for establishments with more than 10 employees.[11]

The original 2009 ECS comprises approximately 27,000 establishments from 30 European countries. A considerable number of countries had to be excluded because of missing data on either the micro-level or the institutional level. Since the loss of countries and observations is considerable, we provide a description of the original sample, as well as the reason for dropping certain countries in Appendix C. The final 2009 sample comprises 20 European countries and 18,407 establishments. In the original 2004–2005 ECS, 21,031 establishments from 21 European countries participated. Our final sample comprises 17 countries and 17,923 establishments.

To our knowledge, only one data source on the establishment level is comparable with the ECS in its broad coverage and details on contract types—the purely cross-sectional firm survey of the Wage Dynamics Network (WDN) (Bertola et al. 2012). The WDN covers 14 countries and 15,235 responses. The ECS, to its advantage, utilizes a larger sample of countries and establishments. A second advantage is that the unit of observation is establishments. These advantages provide us with a more disaggregated perspective and a broader sample. Other firm-

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[8] The unit of observation in the ECS is the establishment. Establishments are local production sites, and firms may consist of multiple local production sites.

[9] Comparability across countries for the ECS 2009 is strong regarding questionnaire translation and the fieldwork period, but the sampling frame differs slightly for large firms in Belgium, Denmark, Greece, France, Luxembourg, Hungary, Poland, and Turkey (Eurofound 2011).

[10] Unfortunately, data for 2013 were not available at the time of writing this article.

[11] The unit of the interviews for the 2009 ECS was the establishment. In the case of multisite firms, one of the establishments was randomly selected. The sampling was conducted on the basis of a 10-cell matrix (size and sector). Large firms were overrepresented in order to have a sufficiently large number of those firms. Employing country-specific employer weights, our descriptives correct for this. The survey covers all relevant sectors from the Statistical Classification of Economic Activities in the European Community (NACE [Rev. 1.1]), excluding sectors A (agriculture, hunting, forestry), B (fishing), P (private household with employed persons), and Q (extra-territorial organisations and bodies).The latter two sectors are both of negligible size (Eurofound 2010a: 3).

level databases, such as Amadeus, cover a broad sample, but variables on the composition of the workforce are not available. One possible limitation of the ECS is that the sampling procedure excludes agriculture and forestry. These sectors experience major seasonal fluctuation, which is one of our main variables. But, as these sectors are small in most countries, we do not believe their absence unduly biases our results.

[[h2]]Establishment-Level Variables

The ECS asks separately whether temporary agency workers or fixed-term workers were employed within the past 12 months by the establishment, that is, between spring 2008 and spring 2009 (between autumn 2003 and spring 2005 in 2004–2005 sample). Temporary agency workers (TAWs) are employed by an agency and sent on temporary assignments to user firms. As an alternative, establishments can employ workers directly on fixed-term contracts (FTCs). In this case, the establishment has a contract with the worker. We code a dummy variable Temp, which is 1 if the establishment employs at least one FTC or TAW, and 0 otherwise.

In addition, the 2009 survey includes the proportion of employees holding an FTC in the establishment.[12] The question asked is: "About what proportion of your employees is holding a fixed-term contract?" For a number of reasons we do not expect the mediating role of EPLP to be as clear as for the binary variable. First, the variable on the share of FTCs refers to the date of the interview, but our main explanatory variable (annual workload fluctuation) does not provide any information on the workload *at the date* of the interview. Because of this inconsistency in the time frame, it might be that the survey in many cases misses the production peaks during which temporary workers are employed. Second, our main explanatory variable is also binary (see below) and thus less suitable for predicting precise shares of FTCs in an establishment. Predicting the share of FTCs would require information on the *intensity* of fluctuations, which we do not have. Third, data were collected in spring 2009, a period during which most countries in our sample experienced a severe economic crisis. The precise share of FTCs is arguably more sensitive to asymmetric adjustments of staff levels in the crisis than it is to the binary variable. As mentioned earlier, the wording of the question from which our binary dependent variable derives refers to the entire previous year rather than merely to the time of the interview. Therefore, the binary variable should be less affected by the crisis (Eurofound 2010a: 2).

[[Table 1 about here]]

[12] Unfortunately, the share of FTCs is not available for the 2004–2005 sample.

The descriptives for both variables are shown in Table 1. In our sample, approximately 61% of the establishments use temporary contracts. Usage varies from 27% in Slovakia to almost 85% in the Netherlands (Figure 1). Around 53% of establishments employ FTCs, but only 22% use TAWs. This result corresponds with the observation that TAWs have only a minor share in the total workforce (less than 2% in most included countries), whereas FTCs are more prevalent. Hence, FTCs clearly have a stronger influence on our results. The average share of FTCs on the establishment level (including establishments without any such contracts) is 10%, ranging from 2.7% in Austria to 19% in Poland.

[[Figure 1 about here]]

According to our theoretical argument, firms expecting a short duration of jobs should anticipate that some workers will become unproductive and thus hire (partly) on temporary contracts. Hence, we need a proxy variable for expected shock arrival rates. Shocks in labor demand models are usually modeled as stochastic processes with a specific degree of uncertainty (e.g., Geometric Brownian motion). Some empirical work or calibrations focus on the uncertain part of these shocks, such as in Lotti and Viviano (2012) (squared difference of upper and lower bound of expected output), or in Bentolila and Saint-Paul (1994) (variance parameter in a model). A major part of the empirical work approximates shocks in labor demand models by real shocks, such as in Bentolila and Saint-Paul (1992) (change in sales) or in Nunziata and Staffolani (2007) (Hodrick-Prescott-Filter–based GDP recession measure).

To analyze our hypotheses, we need information on heterogeneity in expected shock arrival rates across firms. The ECS contains an item on workload fluctuation that captures this concept fairly well. The survey asks: “Does your establishment normally have to cope with major variations of the workload . . . 1) within a day, 2) within a week or 3) within a year?” This variable provides information on whether firms expect to have to cope with shocks, but we do not have any information on the current state of the firm. This measurement is more closely related to real shocks, rather than a proxy for uncertainty (variances in the expected shocks).

We include all three variables as dummies in the model. FTC and TAW should be more affected by fluctuations within a year than by fluctuations within days and weeks. TAW might be a little more important for weekly fluctuation, because establishments can obtain staff at short notice (the typical recruitment procedures for FTCs do not allow being responsive to unforeseen

weekly fluctuations). Fluctuations within a week or a day, however, can be dealt with mostly by hiring part-time workers or by relying on flexible working time.

[[Figure 2 about here]]

Figure 2 shows that workload variations within a year are the dominant form of fluctuations in most countries. In our sample, 64% of the establishments have to deal with such fluctuations (ranging from 42% in Turkey to 76% in Finland). Yearly fluctuations are particularly strong in sectors that have to deal with seasonal variations, such as hotels and restaurants; construction; or community, social, and personal services. They are less relevant in sectors with a constant workload, such as health, social work, education, and manufacturing and energy. In countries with low shares of establishments facing yearly fluctuation, such as Turkey and Slovakia, more establishments are active in the manufacturing and energy sectors. For instance, in Turkey the textile industry plays a crucial role, and textile production is probably less affected by seasonal fluctuation. By contrast, other community, social, and personal services play a stronger role in countries that have experienced a stronger shift toward a postindustrial labor market (e.g., Finland and Germany).

[[h2]]Country-Level Variables

The effect of fluctuation on the likelihood of employing temporary contracts should be conditional on sufficiently high firing costs for permanent workers. Hence, we need data on firing costs for permanent workers. For this purpose, we use the well-established OECD indicator on the strictness of EPL for 2004 and 2008 (Venn 2009).[13] The indicator has various subcomponents measuring how strictly different contract types are regulated. In our case, the main important indicator is the sub-indicator for dismissal of employees on permanent contracts (EPLP). We also include the sub-indicator for the strictness of regulation of temporary contracts (EPL Temp). This additional indicator is necessary because it has been shown to interact with the regulation of permanent contracts (Nunziata and Staffolani 2007). We expect the effect of institutions to be dominated by regulation of permanent contracts, however. In this context, note that the values of EPLP and EPL Temp are not directly comparable because they measure entirely different phenomena. To be clear, similar values on EPLP and EPL Temp do *not*

[13] Bentolila et al. (2010) criticized the OECD indicator for Spain for being too high for regulations on temporary contracts and too lax for regulations on permanent contracts. To the best of our knowledge though, this indicator is the best known and most commonly employed for comparative studies.

indicate similar adjustment costs for both types of workers. Even if temporary contracts are strictly regulated by comparison, they are usually still more flexible than permanent contracts. Hence, irrespective of their level of regulation, temporary contracts should be attractive if firing costs for permanent workers are high (see Kramarz and Michaud [2010] for a similar argument).

The OECD sub-indicator for EPL Temp is an aggregate of two sub-sub-indicators: EPL for fixed-term contracts (EPL FTC) and EPL for agency workers (EPL TAW). EPL FTC includes, for instance, measures on the maximum number of successive contracts and cumulated duration. EPL TAW includes information such as equal treatment legislation, maximum cumulated duration, and types of work for which TAW is permitted.

[[Figure 3 about here]]

[[Table 2 about here]]

The 2008 OECD indicators EPLP and EPL Temp are shown in Figure 3 and Table 2. Typically, permanent contracts in southern European countries, such as Portugal, are relatively strongly regulated (with 3.51 in EPLP and 1.147 in centered EPLP), whereas Ireland and the United Kingdom have more flexible regulation (with 1.17 in EPLP and –1.193 in centered EPLP for the United Kingdom). High EPL Temp means that regulation of temporary employment is rather restrictive. Countries with low restrictions are again the United Kingdom and Ireland. Some countries with high EPLP decreased EPL Temp to make their labor markets more flexible. Dual labor markets are characterized by strict EPLP and lenient EPL Temp. EPL FTC is lowest in Slovakia and highest in Greece, and EPL TAW is lowest in United Kingdom and highest in Turkey.

[[h1]]Empirical Results

[[h2]]Workload Fluctuation and Temporary Contracts

[[h3]]Temporary Workers

Theoretically, we expect establishments facing workload fluctuations to be more likely than establishments without workload fluctions to hire temporary workers. This effect, however, should be conditional on sufficiently high EPLP. The results presented in Table 3 largely confirm this hypothesis for our binary choice model.[14]

[14] The full model is presented in Appendix Table A.1. Results are robust to the use of employer weights (Appendix Figure B.1).

Table 3 presents the two models for our binary dependent variable with Model (1) in column (1) and Model (2) in column (2). The coefficients of annual workload fluctuation and of the interaction between annual workload fluctuation and EPLP are both quite robust across the two models. In columns (1) and (2), annual fluctuation is significantly and positively related to the decision of employing at least one temporary worker. Also, the magnitude is rather similar: For establishments with annual fluctuations, the odds of using temporary workers are 33% higher in column (1) and 32% higher in column (2). Given these similarities, we do not expect that the estimate on workload fluctuation in column (2) captures much unobserved heterogeneity at the country level. We also observe in both columns that the odds increase with higher EPLP. EPLP*WF annual is positive and statistically significant, although the effect is smaller in column (1). In sum, Model (1) (which accounts for unobserved heterogeneity at the country level) and Model (2) do not differ substantially. In the following we focus on Model (2), which we consider more directly related to the theoretical and empirical literature on temporary employment.

[[Table 3 about here]]

The results for annual fluctuations (if EPLP is held constant at the mean) provide strong support for the argument that fluctuations are a main motive for establishments to employ temporary workers (Bentolila and Saint-Paul 1992; Boockman and Hagen 2001; Houseman 2001). In line with our argument, the odds ratio is even higher when EPLP increases by one unit (1.69).[15]

As expected, other types of fluctuation have little or no effect on the likelihood of employing temporary workers. Although annual fluctuation is robust, this is not true for weekly and daily fluctuation. The lack of robustness is also revealed in subsample estimations and individual country regressions, which find robust positive coefficients for annual fluctuation but not for daily and weekly fluctuation. This finding is in line with the argument that establishments adjust for weekly and daily fluctuations by using part-time workers or working time accounts.

To present the substantive effect of our explanatory variables, Figure 4 plots average predicted probabilities of employing at least one temporary worker over different values of

[15] This interpretation is corroborated by the average marginal effects depicted in Figures 5 and 6. Presented in odds ratios, the interaction term in this model tells us by how much the effect differs, although it does so in a multiplicative way (Buis 2010: 307). Hence, the relevant odds ratio for annual fluctuation is obtained by multiplying its odds ratios with the coefficient of the interaction term (Buis 2010).

EPLP, broken down by establishments with and without annual fluctuations.[16] These predicted probabilities are based on column (2) in Table 3. The predicted probabilities confirm that the gap between the two types of establishments increases with strictness of EPLP and that this gap is substantively relevant. In a flexible regime such as the United Kingdom (with –1.193 in centered EPLP), establishments employ temporary workers with a probability of 59% and the establishment types do not differ (calculated at –1.1 in centered EPLP). In rigid regimes such as Portugal (with 1.147 in centered EPLP), the probability of employing temporary workers is 78% for establishments with annual fluctuations, compared to 70% for those without fluctuations (calculated at 1.2 in centered EPLP).

[[Figure 4 about here]]

To determine if the differences between the two types of establishments are significant, we calculate the average marginal effects of annual workload fluctuation on the probability of employing at least one temporary worker at different values of EPL for permanent workers and at the mean of the other interaction terms, as well as their confidence intervals.[17]

$$DP = P\left(y_{ij} = 1 \mid WF = 1,\ EPL = x\right) - P\left(y_{ij} = 1 \mid WF = 0,\ EPL = x\right)$$

The results are plotted in Figure 5 over different levels of EPLP. Irrespective of the level of EPL Temp, the average marginal effect of annual workload fluctuation requires a sufficient level of EPLP to become significant. In rigid labor markets, the probability is 8 percentage points higher for establishments with annual workload fluctuations. In average regimes such as in Finland (with 0.0170 in centered EPLP), these two groups of establishments still differ by 5 percentage points. In both cases, probability differences between establishment types are significant. In flexible labor markets, however, workload fluctuations cease to make a significant difference in the probability of hiring temporary workers.

[[Figure 5 about here]]

As marginal effects in logistic models depend on covariates, we calculated DP for low and high values (one standard deviation difference from the mean) of EPL Temp (Figure 6). Of note, we find that the threshold for EPLP, above which DP becomes significantly different from

[16] Confidence intervals are not presented here, as the significance of the average marginal effect of workload fluctuation on the probability to employ temporary workers is presented in Figure 5.

[17] We sometimes refer to the average marginal effect as the "difference in the predicted probabilities of establishments with annual fluctuation compared to establishments without fluctuation."

0, is higher if temporary work is strongly regulated. Furthermore, DP is largest if EPL for temporary workers is low. This result is quite intuitive: the easier it is to hire temporary workers, the more often they are used to circumvent the numerical adjustment to production shocks by firing permanent workers.

[[Figure 6 about here]]

Overall, we find that the effect of workload fluctuations on establishments' demand for temporary workers depends on EPLP. This finding is in line with the discussed results of Bentolila and Saint-Paul (1992) and Eslava et al. (2014). Although our study evidently differs in terms of the dependent and independent variables, institutions change the impact of variations in the workload (either sales shocks or expected workload fluctuations) on employment. Our findings differ slightly from those of Nunziata and Staffolani (2007), however, who found a significant negative impact of recessions on the aggregated share of temporary employment, and that EPLP does not substantially change this effect. The divergence from our results should not be very surprising. First, the micro-composition of the economy is not accounted for by macro-data. Second, we use different concepts because we study the impact of expected workload fluctuations and not the impact of the current state of the economy.

[[h3]]Fixed-Term Contract and Temporary Agency Workers

In this article, temporary workers consist of FTCs and TAWs. We examine the probability of employing at least one FTC or TAW in the establishment and present the estimation results in Appendix Table A.2.[18] Our focus is again on Model (2). The results are presented in column (2) for FTCs and in column (4) for TAWs of Appendix Table A.2.[19]

Theoretically, we do not expect strong differences between these two subgroups concerning the impact of annual fluctuation at different levels of rigidity. We generally find this to be the case. The direct effect of annual workload fluctuation on employing TAWs or FTCs is positive and significant in column (2) and column (4). For TAWs, the annual workload effect is slightly lower, which may be because FTCs are a much more frequent type of employment. Another explanation is that annual workload fluctuations are to some extent foreseeable, which

[18] EPL FTC and EPL TAW next to EPLP are included in the models (Appendix Table A.2). One might be concerned about high correlations between indicators with only 20 countries; however, correlations seem relatively modest between EPLP and EPL FTC (0.31) or EPL TAW (0.43).

[19] Results (available by request) are robust for excluding TAW and FTC as independent variables. See the Robustness Analyses section for more information.

makes it easier to hire on FTCs at the appropriate time (when they are most needed). TAWs might be more relevant in the case of unforeseeable fluctuations, because the recruitment is sourced out to agencies. As expected, we do not find strong and robust effects for weekly and daily fluctuation.

We are mainly interested in the marginal effect of workload fluctuations in different institutional contexts. We expect the impact of annual fluctuation to differ at varying levels of rigidity—and this is what we find. The probabilities of using TAWs or FTCs are significantly higher for establishments with annual workload fluctuations, given sufficiently strong EPLP[20] (Figures 7 and 8). We find that the estimates are quite robust across these subgroups for different levels of EPL TAW and EPL FTC, but the results seem to be more strongly driven by FTCs than by TAWs. Again, this could be explained by the relatively small macroeconomic relevance of TAWs.

[[Figure 7 about here]]

[[Figure 8 about here]]

[[h3]]Share of Fixed-Term Workers

Finally, we use the share of FTCs at the date of the interview as the dependent variable. The share of FTCs peaks at 0. Following the approach of using different processes for the extensive and intensive margin (Eslava et al. 2014), we estimate a two-component model (a probit model and an ordinary least squares [OLS] model for the subsample with values in the group with FTC shares larger than zero).[21] We find robust and expected relations for the extensive margin (left graph in Figure 9), but less robust results for the intensive margin (right graph in Figure 9). Establishments in rigid labor markets with annual fluctuations are more likely to employ at least one FTC at the date of the interview, compared to establishments without annual fluctuation (left graph in Figure 9). This result is not observed in flexible labor markets.

For the share of FTCs, institutional rigidity does not seem to moderate the effect of workload fluctuation (right graph in Figure 9).[22] As discussed previously, the non-finding at the intensive margin can be explained by the measurement period, the binary nature of the explanatory variable, and the recession at the time of the survey.

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[20] Estimation results are shown in Appendix Table A.2.

[21] Estimation results are shown in Appendix Table A.3.

[22] This outcome is independent of whether we control for establishment weights. Results with establishment weights are available upon request.

[[Figure 9 about here]]

[[h2]]Endogeneity

In summary, establishments facing annual fluctuations are more likely to employ temporary workers, and this likelihood increases with the presence of EPLP. But, to what extent can we talk about causal relationships? Our identifying assumption is that workload fluctuation and EPLP are exogenous to the hiring behavior of establishments. Given that our empirical identification is relatively weak, we now discuss to what extent our estimators can be interpreted as effects rather than as correlations. We discuss three issues: endogeneity of workload fluctuations, endogeneity of EPLP, and omitted unobservables at the country level.

[[h3]]Endogeneity of Workload Fluctuations

We assume that workload fluctuations are exogenous to hiring decisions and interpret them as characteristic of the establishment's product or as induced by macroeconomic variations. Regarding product characteristics, the workload in restaurants, for instance, fluctuates with peaks in the summer, whereas retail stores face peaks before Christmas. The establishment could invest in other products, although this might be more costly compared to adjusting hiring and firing decisions. Therefore, product characteristics and workload fluctuations should be causally prior to hiring decisions.

Regarding macroeconomic variations, reverse causality might be an issue. Recent matching models (e.g., Costain, Jimeno, and Thomas 2010; Sala, Silca, and Toledo 2012) showed that high shares of temporary workers yield higher employment volatility, a condition that may jeopardize private domestic demand. Increased volatility in private domestic demand produces, in turn, more workload volatility at the firm level (at least for firms producing for the domestic sector). To assess the potential relevance of this mechanism, Figure 10 shows the share of establishments employing at least one temporary worker by sector. The highest shares are observed in the sectors of education (M); other community, social, and personal services (O); health and social work (N); and public administration (L).[23] Domestic private demand might play

[23] The growing importance of temporary employment, particularly in teaching and care occupations, has been documented by a recent collection of comparative case studies (Eichhorst and Marx 2015). A similar pattern emerges if shares of temporary workers in the sectoral workforces are analyzed. In 2007 data for the EU-28 (obtainable upon request), these sectors were in the group with relatively high shares. Note that their high ranking in our establishment-level data is presumably biased by the fact that large public organizations are overrepresented in

a role for sectors N and M. All four sectors, however, are to some extent publicly provided, and private domestic demand arguably plays a limited role. Therefore, the use of temporary workers is not restricted to private domestic demand, and concerns about reverse causality are weakened (but such an effect cannot be ruled out).

In addition, the notion that workload variations determine the hiring of temporary workers (rather than the other way around) is supported by Lotti and Viviano (2012) and Houseman (2001). Lotti and Viviano (2012) showed that the positive relationship between uncertainty of product demand as a covariate and the share of temporary employment in the workforce remains if uncertainty is lagged over more than one year. Houseman (2001) found in her survey that the main motive to employ temporary workers in U.S. establishments is expected variation in the workload (40% on average). Overall, we do not rule out reverse causality, but it seems to be of limited relevance in our case. We account for this issue by interpreting the positive effect of workload fluctuation on temporary employment as an upper bound of the true effect.

[[Figure 10 about here]]

[[h3]]Endogeneity of EPL for Permanent Workers

Because we do not employ exogenous variation in EPLP to test its role as a moderator, reverse causality could be an issue. Reverse causality means that the hiring behavior of establishments would have an effect on EPLP; —however, we argue that plausible reverse causality would actually support our arguments. First, Marx (2012) has shown for France that changing hiring behavior of employers (an increase in hiring of temporary workers) facilitated the political process of deregulating EPL for temporary workers. If a similar mechanism would lead to a deregulation of EPLP, it would be negatively correlated to the employment of temporary workers. Similarly, Bentolila, Dolado, and Jimeno (2012) pointed to the relationship between the share of "outsiders" in a country and reforms in EPLP. The higher the share of temporary workers, the higher the share of outsiders, who are assumed to benefit (or at least not suffer) from lower EPLP. Therefore, liberalizing reforms are more likely if the share of temporary workers is high. This condition again implies that our positive estimator between EPLP and the employment of temporary workers suffers from a downward bias. In sum, any theoretically

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these sectors (which, given their size, naturally have a higher chance to employ at least one temporary worker compared to some of the small firms in construction or hospitality services).

plausible reverse causality between hiring temporary workers and EPLP would suggest that that our estimator provides the lower bound of the true effect. EPLP is a highly path-dependent institution, however, with few changes over the past decades (Boeri 2011), and Spain clearly is the exception in that regard. This institutional resilience makes a strong pattern of reverse causation unlikely.

[[h3]]Omitted Variables at the Country Level

To better account for unobserved heterogeneity at the country level, we control for relevant other factors. One problem might be that EPLP is often negatively correlated with EPL Temp, which in turn is negatively related to the employment of temporary workers. Therefore, we include the interaction between workload fluctuation and EPL Temp in our regressions. This approach rules out the possibility that the increase in the effect of workload fluctuation with EPLP is driven by low levels of EPL Temp.

[[h2]]Robustness Analyses

Our results for annual workload fluctuation and its interaction term with EPLP are quite robust across various sensitivity checks (including models accounting for the differential enforcement of EPLP, different country subsamples, different years of observation, and different specifications of the relevant EPL measure).[24]

[[h3]]Differential Enforcement of EPLP

EPLP might be differentially enforced. First, more than half of the countries in our sample have some kind of exemptions for small firms (Venn 2009).[25] Controlling for establishment size dummies in column (2) of Table 3 does not account for this. Hence, we estimate the specification from column (2) in Table 3 (without controlling for establishment size dummies) for different subsamples, each excluding one establishment size category. No differences in the estimates are observed if small establishments are excluded.[26] Second, it was found that industrialized and developing countries differ in their enforcement of EPL because of governance capacities (Micco and Pages 2007; Haltiwanger, Scarpetta, and Schweiger 2014). We therefore use governance indicators (government effectiveness, rule of law, control of corruption) as proxies for the

[24] We do not have precise information about the age of the establishment for either the 2009 or the 2004–2005 data set.

[25] Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Portugal, Slovenia, Sweden, and Turkey.

[26] Results are available upon request.

enforcement of regulations (Kaufmann, Kraay, and Mastruzzi 2004; Micco and Pages 2007).[27] In our sample of developed countries, these indicators have relatively high values. Our results (obtainable upon request) show that the relationship does not differ significantly between countries with high and low levels of enforcement. We explain this by the fact that, in European countries, these indicators show little variation and that enforcement is specifically relevant in developing countries (Venn 2009). For instance, Micco and Pages (2007) found that their EPL indicator had no effect on job flows in countries with low scores on the rule of law indicator. The mean in their sample of industrial and developing countries is approximately –0.18, with a minimum at –1.27, and the mean in our sample of developed countries is at 1.26, with a minimum at 0.13.

[[h3]]Excluding Countries

Because our results might be driven by a single country, we provide subgroup estimations. Figure 11 presents the average marginal effect of annual workload fluctuation on the probability of employing at least one temporary worker, and confidence intervals (based on column (2) in Table 3) for subsamples, each excluding one country from the sample. As the plots show, the average marginal effect of annual workload fluctuation requires a sufficient level of EPLP in every subsample to be significant. Hence, the results are not driven by one specific country.[28]

[[Figure 11 about here]]

[[h3]]Results in the 2004–2005 Data

The survey for the main analyses was conducted in spring 2009, when most European countries experienced a severe economic crisis. Because our results might be sensitive to the downturn, we estimate column (2) in Table 3 with establishment data from the 2004–2005 ECS. Figure 12 shows that the relationship is as expected for temporary workers. Examining FTCs and TAWs separately, it becomes evident that the relationship is driven by FTCs and not by TAWs. This finding is similar to the results based on the 2009 data.[29] The expected relationship is less clear if Germany is included. This outcome is unsurprising, given that an extensive deregulation of temporary agency work took place in Germany between 2003 and 2006.

[[Figure 12 about here]]

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[27] A description of the governance indicators can be found in Appendix D.

[28] Results for employing at least one TAW or FTC are similarly robust.

[29] Results of the 2004–2005 ECS are a bit more sensitive to employer weights compared to results of the 2009 sample.

[[h3]]Alternative Specification of EPL

Concerning the measurement of EPL, the difference between EPLP and EPL Temp might be the more relevant measure rather than EPLP itself (although, as previously mentioned, the two indicators measure completely different phenomena and therefore do not provide common scales to assess flexibility or adjustment costs). Accepting their difference as a valid measure would suggest that establishments in Ireland and the United Kingdom face higher incentives to employ temporary workers than do establishments in France. The share of temporary workers in France is higher compared to Ireland and the United Kingdom, however, which confirms our argument that it is primarily EPLP that matters. Controlling for other institution- and establishment-level variables, we do not find the difference between EPL types to be a significant moderator of the relationship between workload fluctuations and the probability of employing temporary workers (results are obtainable upon request). Hence, even if temporary work is relatively highly regulated, temporary workers still are more attractive compared to permanent workers if EPLP is high. Although we do not conclude that relative costs have no role to play, in our case they are not highly relevant.

[[h3]]Results by Sectors

We check whether our results are robust across different sectors, and find that the results are not driven by one specific sector (Appendix Figure E.1). Sector-specific estimates are less robust, although these estimates partly suffer from a small number of observations (approximately 300). (Results are obtainable upon request.)

[[h1]]Conclusions

Our intention in this article was to analyze the interaction between workload fluctuation and employment protection as an element explaining firms' demand for temporary work in Europe. In line with recent theories, we have hypothesized a higher propensity to hire temporary workers if a firm is exposed to short-term workload fluctuations, but only if dismissal costs for workers with permanent contracts are sufficiently high.

We constructed a novel data set combining establishment-level variables (for approximately 18,000 establishments and up to 20 European countries) with institutional variables for 2004–2005 and 2009. Using pooled, cross-country establishment data, we were able to confirm our hypothesis across a number of robustness checks. Establishments with expected workload fluctuation within a year are more likely to hire workers on temporary contracts, and

this effect is conditional upon a certain level of EPLP (our measure for firing costs). The results are not only statistically significant but they also matter in substantive terms. Although we do not observe a significant effect of workload fluctuations in flexible labor markets, the difference between establishments with and without fluctuations is 8 percentage points in heavily regulated labor markets. This outcome is also true for the employment of FTCs and TAWs, although to a lesser extent for the latter. This fact might be explained by the stronger role of FTCs on the macro-level in Europe. Another explanation could be that the measure of annual workload fluctuations predominantly measures foreseeable fluctuations, whereas TAWs arguably are more suitable for coping with unforeseeable fluctuations.

Generally speaking, our results are in line with previous studies that have shown EPL to matter at the macro- or micro-level. We complement these findings by showing that labor market institutions moderate the effect of firm characteristics. Further elucidating how the two levels interact is a fruitful task for future research. For instance, the effect of national economies' composition by firm type on the share of temporary contracts could be assessed in a macro-framework. The data for such an assessment are readily available. More difficult, regarding data requirements, would be analyzing the links among institutions, establishments, and workers' characteristics. The improved availability of linked employer–employee data sets may make such a study possible in the future. More generally, our analysis suffers from various data limitations, particularly regarding the dichotomous nature of the dependent and the main explanatory variable. Here, too, progress will be conditional upon improved comparative data sources.

What are the broader implications of our study? Based on our results, we share well-known concerns that firing costs for permanent workers produce two-tier labor markets. As we have shown, such costs encourage the use of temporary contracts for establishments with annual workload fluctuations. Furthermore, our results indicate that the need for flexibility is inherent to some establishments' production processes. Reforms ignoring the fundamental role of economic volatilities are likely to produce worse economic outcomes. A modest deregulation of EPL—while being aware of a possible trade-off concerning direct negative effects on well-being (Salvatori 2010)—may be justified to make it easier for establishments to cope with productivity shocks and to reduce dualism of the labor market.

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[[h1]]Appendix A

[[Table A.1 here]]

[[Table A.2 here]]

[[h1]]Appendix B

[[Figure B.1 here]]

[[h1]]Appendix C

[[h2]] Description of the Sample

Comparing the original 2009 ECS with the selected sample, we drop a major share of observations (descriptive comparisons of both samples are available upon request). Out of 27,160 establishments, 73 and 64 establishments have missing values in FTC and TAW, respectively, and 142 (210, 201) establishments with missing values in yearly fluctuation (weekly, daily). These adjustments leave us with 26,649 establishments. EPL TAW and EPL FTC are not available in 2008 for Bulgaria, Cyprus, Lithuania, Malta, Romania, Croatia, and the Former Yugoslav Republic of Macedonia. As a result, we are left with 22,802 observations. Furthermore, the variables on temporary employment are not comparable for Spain and Italy (Eurofound 2010), which are 1,509 and 1,502 establishments, respectively. Hence, 20 countries and 19,791 establishments are left. Excluding the publicly owned establishments leaves 19,711 observations. Excluding missing values in the other micro-variables further reduces the sample to 18,407 observations. The majority of missing values (approximately 1,000) relate to the variables on the gender and high-skilled share.

We are therefore left with only one-third of the original ECS countries, which might create concern that the resulting variation of EPL remains sufficient to identify the coefficients. Although we are left with only 20 countries, we fortunately do not suffer in terms of variation in EPL. The maximum and the minimum of the EPL indicators do not change if the 10 countries are dropped. Standard deviation even increases for EPL for permanent workers, EPL for temporary workers, and EPL for fixed-term workers.

In the original 2004–2005 ECS, 21,031 establishments from 21 European countries participated. The final sample comprises 17 countries and 17,923 establishments, because the OECD EPL indicator for January 2004 was not available for Cyprus, Latvia, Luxembourg, and

Slovenia. After excluding observations with missing values in the relevant variables, the sample consists of 17,923 establishments.

[[Table C.1 here]]

[[h1]]Appendix D

[[h2]] Governance Indicators

Three governance indicators of the World Bank (Kaufmann et al. 2004) were chosen to capture the degree of enforcement of EPL for permanent workers attributable to differences in governance: government effectiveness, rule of law, and control of corruption. They are aggregated indicators on perceptions of governance. Government effectiveness as an aggregated indicator includes the quality of public service provision, as well as the independence of civil services from political pressure and the trustworthiness of the government's commitment to rules. Rule of law is an aggregated measure on the confidence in rules; for instance, the enforceability of contracts is included. All three indicators are normally distributed and range from around –2.5 to 2.5.

[[h1]]Appendix E

[[Figure E.1 here]]

*

[[Tables]]

Table 1. Summary Statistics of Establishment Characteristics (2009)

Variable	Mean	SD	Min	Max	Count
If any temp	0.61	0.49	0	1	18,450
If any TAW	0.22	0.42	0	1	18,450
If any FTC	0.53	0.50	0	1	18,450
Share of FTC	9.80	21.63	0	100	18,036
If any WF daily	0.32	0.47	0	1	18,450
If any WF weekly	0.44	0.50	0	1	18,450
If any WF annual	0.64	0.48	0	1	18,450
If any freelancer	0.19	0.39	0	1	18,407
If any works council	0.37	0.48	0	1	18,450
Number of workers increased 2006 to 2009	0.34	0.47	0	1	18,450
Number of workers decreased 2006 to 2009	0.22	0.42	0	1	18,450
If high absenteeism and/or sickness rates (absent)	0.14	0.34	0	1	18,450
Gender share (centered)	5.59	31.82	–41	59	18,450
High-skilled share (centered)	0.94	29.70	–24	76	18,450
If flexible working time schemes	0.57	0.50	0	1	18,450
Establishment size (1–10)	1.90	1.51	1	10	18,450
NACE					
Manufacturing and energy (C-E)	0.19	0.39	0	1	18,450
Construction (F)	0.07	0.26	0	1	18,450
Wholesale/retail trade, repair of goods (G)	0.19	0.40	0	1	18,450
Hotels and restaurants (H)	0.04	0.21	0	1	18,450
Transport and communication (I)	0.05	0.21	0	1	18,450
Financial intermediation (J)	0.03	0.16	0	1	18,450
Real estate and business activities (K)	0.13	0.34	0	1	18,450
Public administration (L)	0.05	0.22	0	1	18,450
Education (M)	0.10	0.30	0	1	18,450

Health and social work (N)	0.09	0.29	0	1	18,450
Other community, social and personal services (O)	0.06	0.24	0	1	18,450

Source: ECS 2009 (Eurofound 2010a).

Notes: Descriptive statistics with employer weights. Centered variables are centered based on summary statistics of the sample without employer weights. High absenteeism means that an establishment encounters a human resource problem related to absenteeism and/or sickness. The share of high-skilled means the proportion of employees working in high-skilled jobs that usually require an academic degree. The figures are representative for establishments with more than 10 employees. In countries, with high shares of establishments below 10 employees, the overall share of establishments employing at least one temporary worker would be smaller compared to our descriptives. FTC, fixed-term contract worker; NACE, Statistical classification of economic activities in the European Community; TAW, temporary agency workers; Temp, temporary workers; WF, workload fluctuation.

Table 2. Summary Statistics for Country-Level Variables (2009)

Variable	Mean	SD	Min	Max
EPLP (centered)	0	0.563	–1.193	1.147
EPL Temp (centered)	0	1.147	–1.940	2.650
EPL FTC (centered)	0	1.370	–1.663	2.338
EPL TAW (centered)	0	1.320	–2.213	2.954
Bargaining coverage rate (centered)	0	30.374	–51.580	37.120
Unemployment rate (centered)	0	2.079	–3.815	3.785
N countries	20			

Source: For data sources, see Stylized Facts and Data Sources section in the text.

Notes: EPL, employment protection legislation; EPLP, EPL for permanent workers; FTC, fixed-term contract workers; TAW, temporary agency workers; Temp, temporary workers.

Table 3. Workload Fluctuations and Odds Ratios (Logistic Model) of Hiring Temps

	If any temporary worker	
Regressor	(1)	(2)
WF annual	1.329***	1.316***
	(6.25)	(3.95)
WF weekly	1.148*	1.198*
	(2.07)	(2.26)
WF daily	0.895	0.857*
	(–1.94)	(–2.16)
EPLP* WF annual	1.144*	1.283*
	(2.13)	(2.35)
EPLP		1.349
		(0.9)
Establishment variables	Yes	Yes
Establishment size fixed effect	Yes	Yes
Sectors fixed effect	Yes	Yes
Interaction country and establishment variables	Yes	Yes
Country fixed effect	Yes	No
Country variables	No	Yes
Establishments	18,407	18,407
Countries	20	20
LL	–8612	–9213

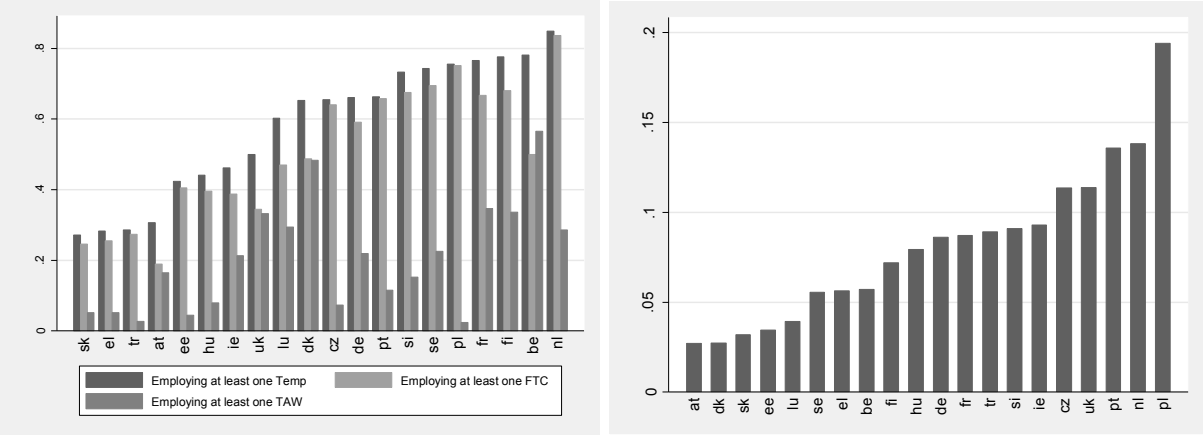
Notes: Coefficients are reported as odds ratios and are from logistic regression models with clustered standard errors, z-values in parentheses. Continuous variables are centered. Country variables: EPL for temporary workers, bargaining coverage, EPLP*bargaining coverage, EPL for temporary workers*bargaining coverage, EPLP*EPL for temporary workers, unemployment rate. Establishment variables: freelancer, works council, number of workers increased, number of workers decreased, high absenteeism and/or sickness rates (i.e., absenteeism and/or sickness causes human resource problems), gender share, share of high-skilled workers (i.e., the

proportion of employees working in high-skilled jobs that usually require an academic degree), flexible working time. Interaction between country and establishment variables: WF annual*EPL for temporary workers, WF annual*bargaining coverage. Establishment-level variables described in Table 1. Country-level variables described in Table 2. EPL, employment protection legislation; EPLP, EPL for permanent workers; Temp, temporary workers; WF, workload fluctuation.

***Significant at 0.1%; ** significant at 1%; * significant at 5%.

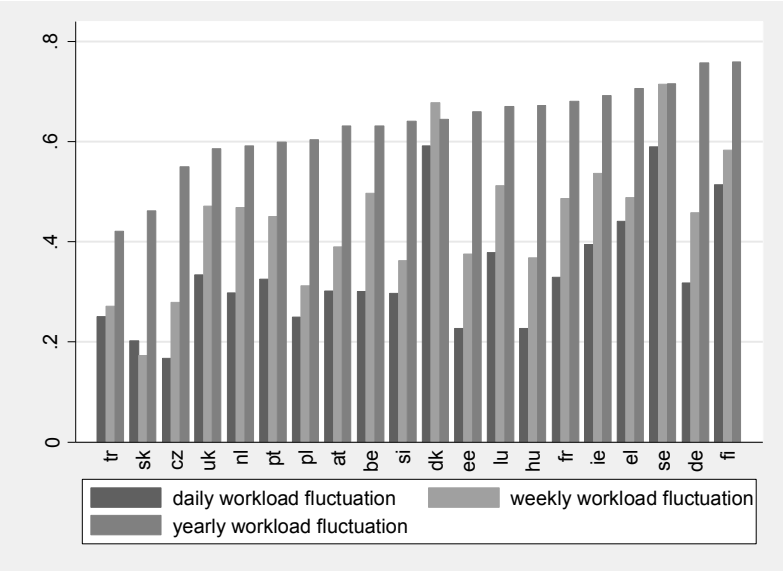
[[Figures]]

Figure 1. Employment of Temporary and Fixed-Term Contract Workers by European Establishments



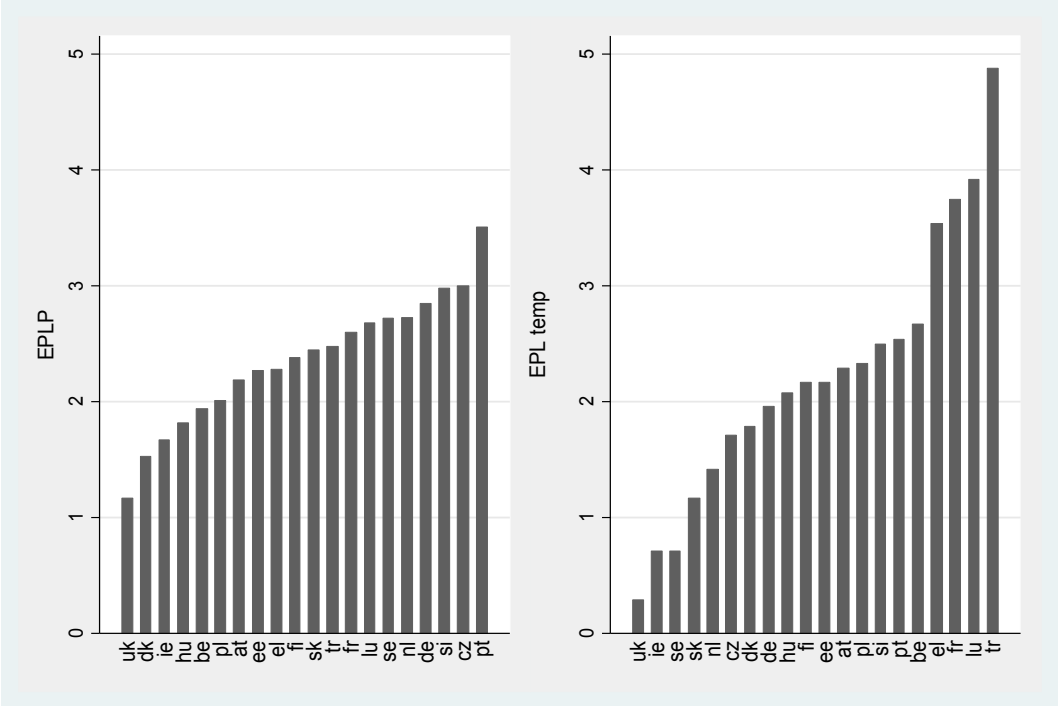
Source: ECS 2009 (Eurofound 2010a).
Notes: Descriptive statistics with employer weights. FTC, fixed-term contract workers; TAW, temporary agency workers; Temp, temporary workers.
Country codes: at, Austria; be, Belgium; cz, Czech Republic; de, Germany; dk, Denmark; Ee, Estonia; el, Greece; fi, Finland; fr, France; hu, Hungary; ie, Ireland; lu, Luxembourg; nl, Netherlands; pl, Poland; pt, Portugal; se, Sweden; si, Slovenia; sk, Slovakia; tr, Turkey; uk, United Kindgdom.

Figure 2. Workload Fluctuations in Europe



Source: ECS 2009 (Eurofound 2010a).
Notes: Descriptive statistics with employer weights.
Country codes: at, Austria; be, Belgium; cz, Czech Republic; de, Germany; dk, Denmark; Ee, Estonia; el, Greece; fi, Finland; fr, France; hu, Hungary; ie, Ireland; lu, Luxembourg; nl, Netherlands; pl, Poland; pt, Portugal; se, Sweden; si, Slovenia; sk, Slovakia; tr, Turkey; uk, United Kindgdom.

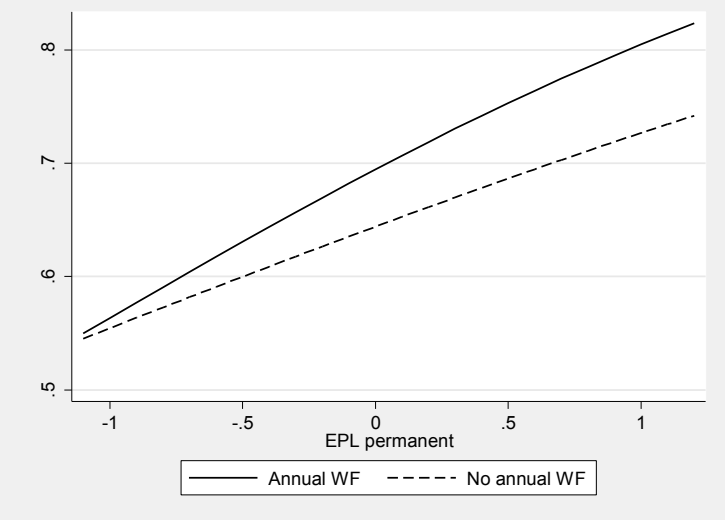
Figure 3. How Strongly Protected Are European Permanent Workers and Temporary Workers? [[AU: possible rephrase: Employment Protection for European Permanent Workers and Temporary Workers]]



Source: EPL 2008 (OECD 2012).
Notes: EPL, employment protection legislation; EPLP, EPL for permanent workers; EPL Temp, EPL for temporary workers.
Country codes: at, Austria; be, Belgium; cz, Czech Republic; de, Germany; dk, Denmark; Ee, Estonia; el, Greece; fi, Finland; fr, France; hu, Hungary; ie, Ireland; lu, Luxembourg; nl, Netherlands; pl, Poland; pt, Portugal; se, Sweden; si, Slovenia; sk, Slovakia; tr, Turkey; uk, United Kindgdom.

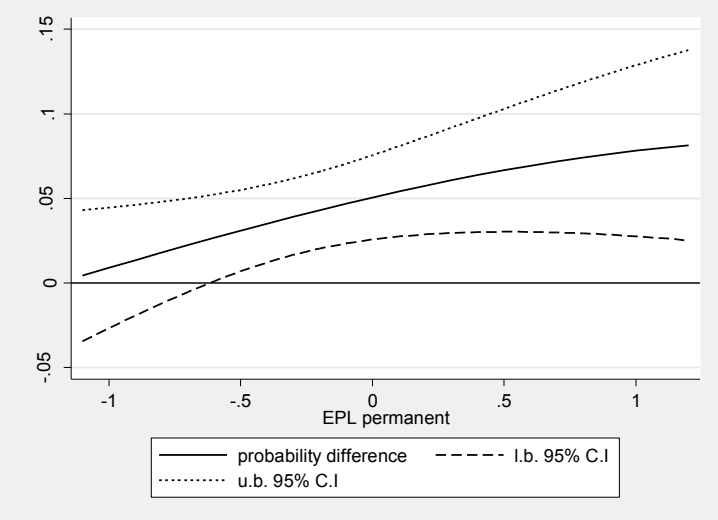
[[AU: Journal style prefers a capital letter at the beginning of the label for y axes (and x axes), e.g., Probability employing Temps; here and throughout, please update figures.]]

Figure 4. Do Workload Fluctuations Increase the Probability of Hiring Temps and Does This Relationship Become even Stronger with an Increase in EPLP? [[AU: Probability of Hiring Temps When Workload Fluctuates]]



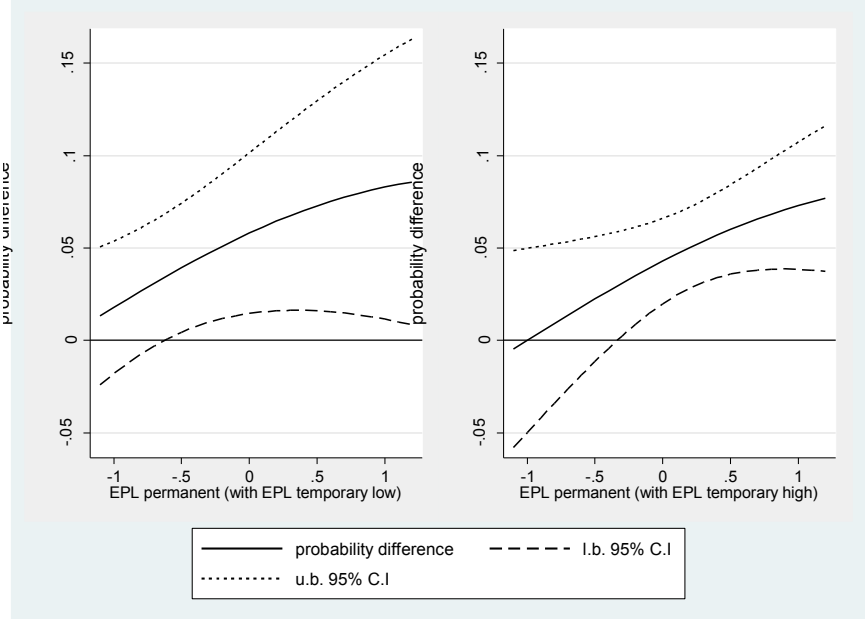
Notes: Average of predicted probabilities, column (2) in Table 3, calculated at 0 for all institutions (EPL for temporary workers (Temps), bargaining coverage rate), except EPL permanent, EPL permanent is centered. EPL, employment protection legislation; WF, workload fluctuations.

Figure 5. Does the Positive Relationship of Fluctuation with the Probability of Employing Temps Differ Significantly with EPLP? [[AU: possible rephrase: EPLP Effect on Probability of Employing Temps]]



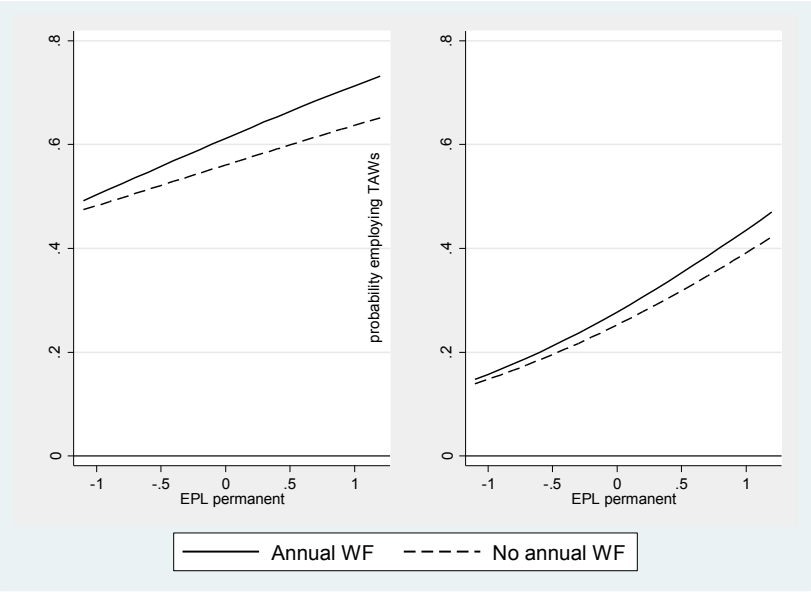
Notes: Difference in the predicted probabilities of employing at least one temporary worker by establishments with annual fluctuation compared with establishments without fluctuation, column (2) in Table 3, calculated at 0 for all institutions (EPL for temporary workers (Temps), bargaining coverage rate), except EPL permanent, EPL permanent is centered. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation.

Figure 6. Does the Positive Relationship of Fluctuation with the Probability of Employing Temps Differ Significantly with EPLP Even for Different Values of EPL Temporary? [[AU: possible rephrase: Varying EPL Temp Affects Probability of Employing Temps]]



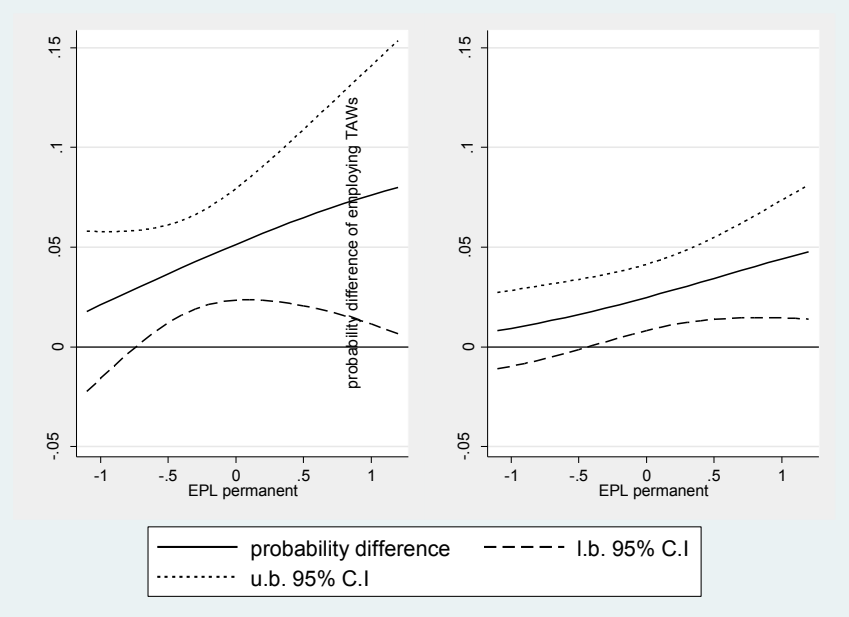
Notes: Difference in the predicted probabilities of employing at least one temporary worker by establishments with annual fluctuation compared with establishments without fluctuation, column (2) in Table 3, calculated at 0 for all institutions (bargaining coverage rate), except EPL permanent and EPL for temporary workers (Temps) (+/– one standard deviation from 0), EPL permanent and EPL for temporary workers is centered. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation.

Figure 7. Do Workload Fluctuations Increase the Probability of Hiring FTCs (or TAWs) and Does This Relationship become Even Stronger with an Increase in EPLP? [[AU: possible rephrase: Probability of Hiring FTCs (or TAWs) during Workload Fluctuations as EPLP Increases]]



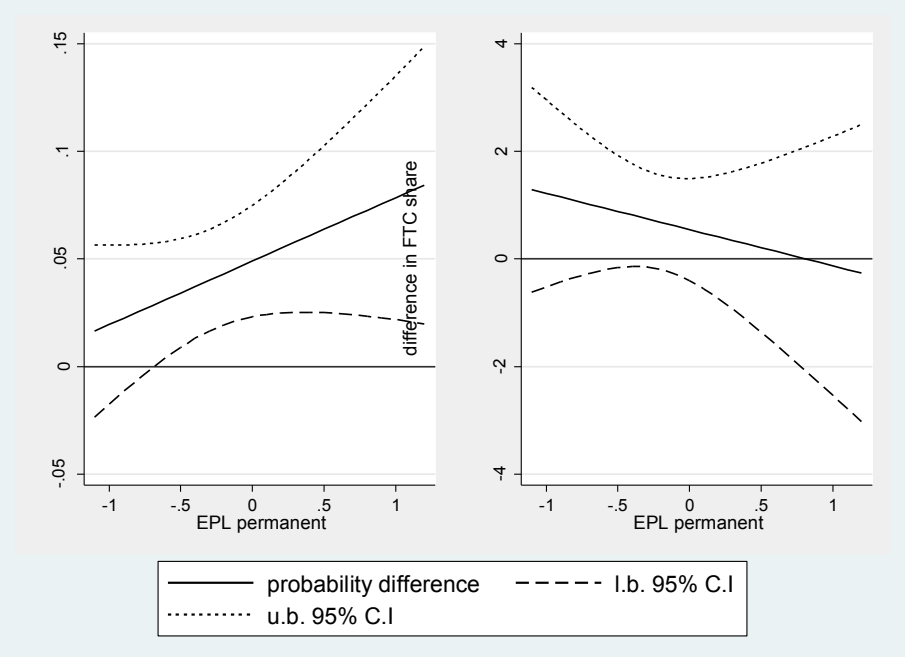
Notes: Predicted probabilities of employing at least one TAW/FTC by establishments with annual fluctuation compared with establishments without fluctuation, columns (2) and (4) in Appendix Table A.2, calculated at 0 for all institutions (bargaining coverage rate, EPL for fixed-term contract (FTC) workers, EPL for temporary agency workers (TAW)), except EPL permanent, EPL permanent is centered. EPL, employment protection legislation.

Figure 8. Effect of EPLP on the Positive Relationship of Fluctuation with the Probability of Employing FTCs (or TAWs)



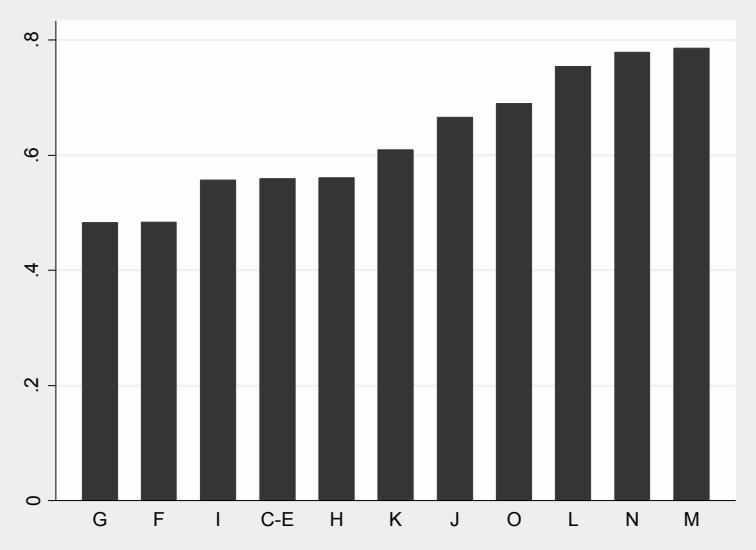
Notes: Difference in the predicted probabilities of employing at least one TAW/FTC by establishments with annual fluctuation compared with establishments without fluctuation, columns (2) and (4) in Appendix Table A.2, calculated at 0 for all institutions (bargaining coverage rate, EPL for fixed-term contract (FTC) workers, EPL for temporary agency workers (TAW)), except EPL permanent, EPL permanent is centered. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation.

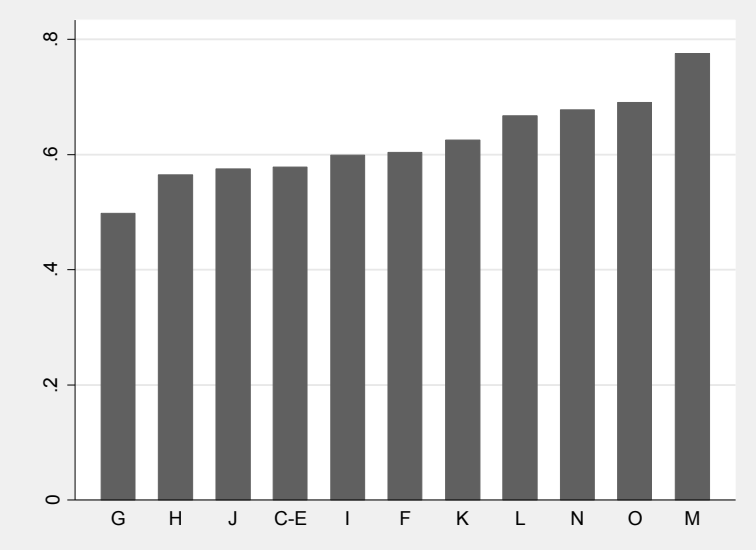
Figure 9. Relationships of Fluctuation with the Probability and the Share of Employing FTCs at the Interview Date Compared with EPLP in 2009



Notes: Difference in the predicted probabilities of employing at least one FTC (graph 1) or FTC shares at the date of the interview (graph 2) by establishments with annual fluctuation compared with establishments without fluctuation, Model (2) (see Appendix Table A.3) with different dependent variables and estimators (graph 1: dummy for employing at least one FTC at the date of the interview, probit model; graph 2: share of FTC at the date of the interview for firms with at least one FTC, OLS model) without employers' weight, calculated at 0 for all institutions (bargaining coverage rate, EPL for fixed-term contract (FTC) workers), except EPL permanent, EPL permanent is centered. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation; OLS, ordinary least squares.

Figure 10. Share of Establishments' Employing at Least One Temporary Worker by Sector



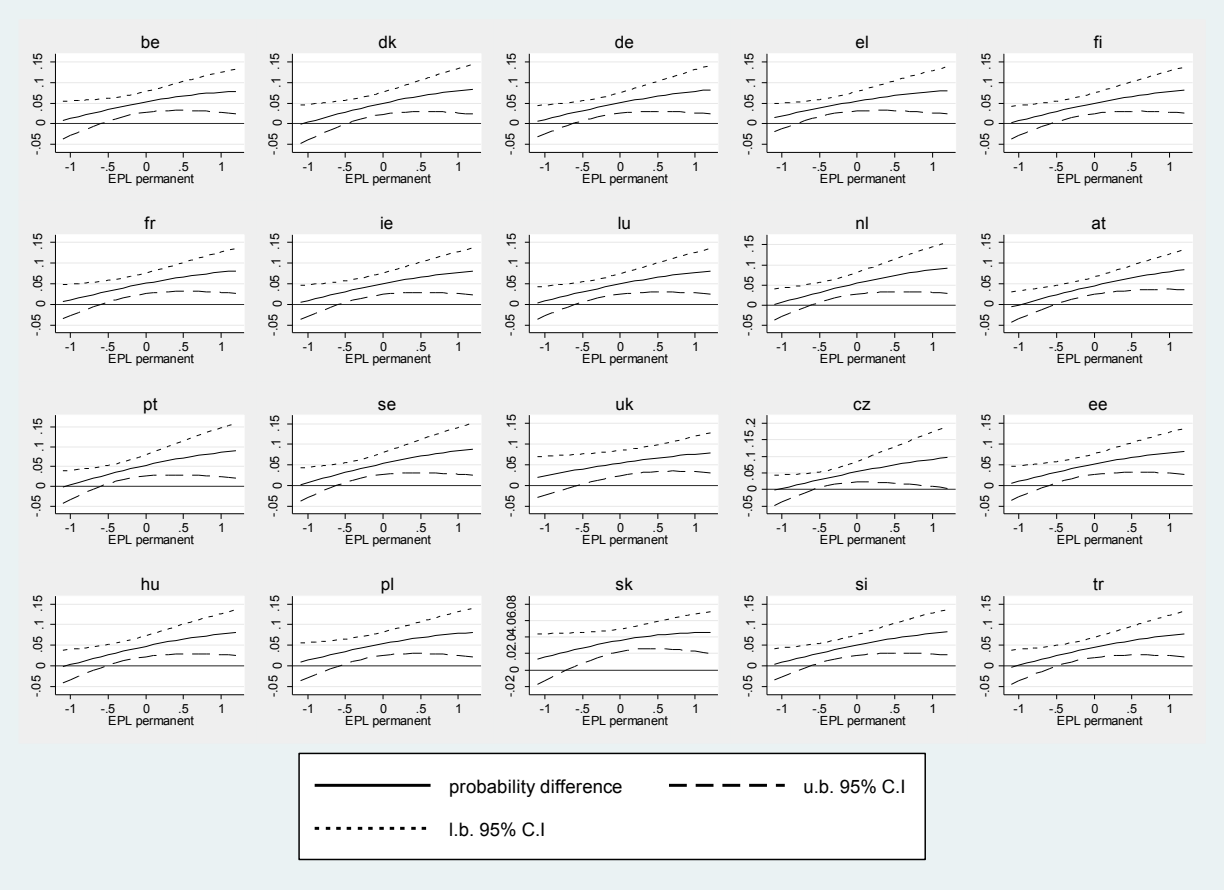


Source: ECS 2009 (Eurofound 2010a).

Notes: Descriptive statistics with employer weights. NACE Rev. 1.1: C-E, Manufacturing and energy; F, Construction; G, Wholesale and retail trade, repair of goods; H, Hotels and restaurants; I, Transport and communication; J, Financial intermediation; K, Real estate and business activities; L, Public administration; M, Education; N, Health and social work; O, Other community, social, and personal services. NACE, Statistical classification of economic activities in the European Community

[[AU: I'm concerned the x and y axes labels may be difficult to read with the small point size needed to fit all of the graphs in one composite figure. Think about whether it makes sense to make one x and one y label that relates to all of the line graphs, or maybe add the labels to the key?]]

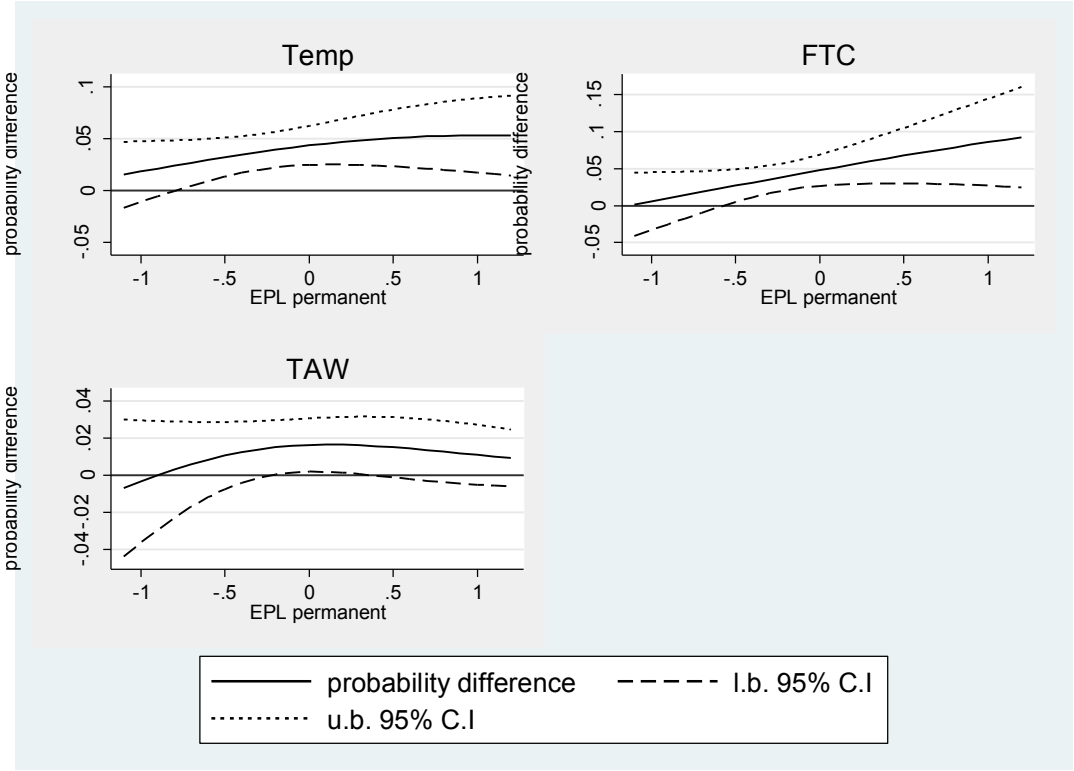
Figure 11. Effect of One Specific Country on the Relevance of EPLP for the Relationship of Fluctuation with the Probability of Employing Temps in 2009



Notes: Difference in the predicted probabilities of employing at least one temporary worker by establishments with annual fluctuation compared with establishments without fluctuation, column (2) in Table 3 for different subsamples, calculated at 0 for all institutions (bargaining coverage rate, EPL for temporary workers [Temps]), except EPL permanent, EPL permanent is centered. Samples exclude the country mentioned in the title. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation; EPLP, EPL for permanent workers.

Country codes: at, Austria; be, Belgium; cz, Czech Republic; de, Germany; dk, Denmark; Ee, Estonia; el, Greece; fi, Finland; fr, France; hu, Hungary; ie, Ireland; lu, Luxembourg; nl, Netherlands; pl, Poland; pt, Portugal; se, Sweden; si, Slovenia; sk, Slovakia; tr, Turkey; uk, United Kindgdom.

Figure 12. Positive Relationship of Fluctuation with the Probability of Employing Temps (or FTCs, TAWs) Compared with EPLP in 2004–2005



Notes: Difference in the predicted probabilities of employing at least one Temp (FTC or TAW) by establishments with annual fluctuation compared with establishments without fluctuation, Model (2) but with the 2004–2005 sample with employers' weight, calculated at 0 for all institutions (bargaining coverage rate, EPL for temporary workers [Temps], EPL for fixed-term contract [FTC] workers, EPL for temporary agency workers [TAW]), except EPL permanent, EPL permanent is centered. Sample excludes Germany. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation; EPLP, EPL for permanent workers.

[[Tables Appendix]]

Table A.1. Workload Fluctuations, Higher Odds Ratios (Logistic Model) of Hiring Temps, and an Increase in EPLP

	If any temporary worker	
Regressor	(1)	(2)
Establishment controls		
WF annual	1.329***	1.316***
	(6.25)	(3.95)
WF weekly	1.148*	1.198*
	(2.07)	(2.26)
WF daily	0.895	0.857*
	(–1.94)	(–2.16)
Freelancer	1.830***	1.814***
	(7.08)	(4.51)
Works council	1.416***	1.833***
	(5.1)	(3.74)
Number of workers up	1.305***	1.350***
	(7.48)	(7.14)
Number of workers down	0.987	1.016
	(–0.25)	(0.26)
Absent	1.474***	1.624***
	(5.87)	(5.33)
Gender share	1.004**	1.004**
	(3.06)	(3.16)
High-skilled share	1.001	1
	(0.48)	(0.05)
Flexible working time	1.206***	1.290***
	(3.92)	(4.39)
Interaction between country and establishment controls		

EPLP*WF annual	1.144*	1.283*
	(2.13)	(2.35)
EPL Temp*WF annual	1.019	0.946
	(0.65)	(–0.98)
Bargaining*WF annual	0.999	0.996
	(–0.78)	(–1.26)
Country controls		
EPLP		1.349
		(0.9)
Bargaining coverage		0.994
		(–0.53)
EPLP*bargaining		1.016
		–1.4
Unemployment rate		0.859
		(–1.45)
EPL Temp		0.704
		(–1.26)
EPLP*EPL Temp		0.745
		(–0.91)
EPL Temp*bargaining		1.006
		–1.45
Establishment size fixed effect	Yes	yes
Sectors fixed effect	Yes	yes
Country fixed effect	Yes	no
Establishments	18,407	18,407
Countries	20	20
LL	–8612	–9213

Notes: Coefficients are reported as odds ratios and are from logistic regression models with clustered standard errors, z-values in parentheses. Continuous variables are centered. Country variables: EPLP, EPL for temporary workers, bargaining coverage, EPLP*bargaining coverage,

EPL for temporary workers*bargaining coverage, EPLP*EPL for temporary workers, unemployment rate. Establishment variables: WF annual, WF weekly, WF daily, freelancer, works council, number of workers increased, number of workers decreased, high absenteeism and/or sickness rates (i.e., absenteeism and/or sickness causes human resource problems), gender share, share of high-skilled workers (i.e., the proportion of employees working in high-skilled jobs that usually require an academic degree), flexible working time. Establishment-level variables described in Table 1. Country-level variables described in Table 2. EPL, employment protection legislation; EPLP, EPL for permanent workers; Temp, temporary workers; WF, workload fluctuation.

***Significant at 0.1%;** significant at 1%; * significant at 5%.

Table A.2. Workload Fluctuations, Higher Odds Ratios (Logistic Model) of Hiring FTCs (or TAWs), and an Increase in EPLP

	If any FTC		If any TAW	
Regressor	(1)	(2)	(3)	(4)
Establishment controls				
WF annual	1.316***	1.319***	1.126*	1.163**
	(6.11)	(3.73)	(2.07)	(3.01)
WF weekly	1.085	1.137*	1.05	1.116*
	(1.44)	(2.03)	(1.06)	(2.29)
WF daily	0.968	0.949	0.902	0.861*
	(–0.56)	(–0.84)	(–1.40)	(–1.96)
Freelancer	1.596***	1.603***	1.666***	1.503***
	(6.54)	(4.92)	(7.32)	(4.43)
TAW	1.822***	2.020***		
	(5.94)	(6.12)		
FTC			1.855***	2.011***
			(5.57)	(6.02)
Works council	1.333***	1.563***	1.281**	1.504***
	(3.31)	(3.32)	(2.67)	(4.05)
Number of workers up	1.208***	1.233***	1.151***	1.165***
	(4.2)	(4.51)	(3.6)	(3.99)
Number of workers down	0.973	1.028	0.985	0.951
	(–0.47)	(0.45)	(–0.27)	(–0.81)
Absent	1.346***	1.454***	1.252***	1.288**
	(5.02)	(5.66)	(3.32)	(2.79)
Gender share	1.007***	1.007***	0.996*	0.995**
	(5.64)	(6.15)	(–2.54)	(–2.99)
High-skilled share	1.001	1	1.002	1.002

	(0.4)	(0.13)	(1.15)	(1.16)
Flexible working time	1.210***	1.259***	1.103	1.128*
	(5.15)	(4.22)	(1.6)	(1.98)
Interaction between country and establishment controls				
EPLP*WF annual	1.087	1.181	1.027	1.072
	(1.16)	(1.41)	(0.37)	(1.24)
EPL FTC*WF annual	0.984	0.989	1.031	1.022
	(–0.49)	(–0.23)	(0.6)	(0.42)
EPL TAW*WF annual	0.999	0.945	1.069	1.091*
	(–0.04)	(–1.26)	(1.73)	(2.47)
Bargaining*WF annual	0.997	0.994*	0.999	0.997
	(–1.95)	(–2.14)	(–0.54)	(–1.74)
Country controls				
EPLP		1.515		2.16
		(1.1)		(1.76)
Bargaining coverage		0.999		1.030***
		(–0.13)		(6.24)
EPLP*bargaining		1.038**		0.942***
		(2.72)		(–3.69)
Unemployment rate		0.862		1.02
		(–1.49)		(0.25)
EPL FTC		0.976		0.770*
		(–0.15)		(–2.27)
EPL TAW		1.097		0.705**
		(0.59)		(–2.74)
EPLP*EPL FTC		0.589		4.441***
		(–1.38)		(3.6)
EPLP*EPL TAW		0.775		1.268

		(–1.23)		(1.45)
EPL FTC*bargaining		1.007		0.997
		(1.57)		(–0.87)
EPL TAW*bargaining		0.996		1.007*
		(–1.01)		(2.29)
Establishment size	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes
Country dummies	Yes	No	Yes	No
Establishments	18,407	18,407	18,407	18,407
Countries	20	20	20	20
LL	–9060	–9601	–8340	–8623

Notes: Coefficients are reported as odds ratios and are from logistic regression models with clustered standard errors, z-values in parentheses. Continuous variables are centered. Number of workers up means that the number of workers increased; number of workers down means that the number of workers decreased; absent means that the level of absenteeism and/or sickness causes human resource problems; high-skilled share means the proportion of employees working in high-skilled jobs that usually require an academic degree. Establishment-level variables described in Table 1. Country-level variables described in Table 2. EPL, employment protection legislation; EPLP, EPL for permanent workers; FTC, fixed-term contract workers; TAW, temporary agency workers; Temp, temporary workers; WF, workload fluctuation.

***Significant at 0.1%; ** significant at 1%;* significant at 5%.

Table A.3. Do the Relationships of Fluctuation with the Probability and the Share of Employing FTCs at the Interview Date Compared with EPLP in 2009

	If any FTC	Share of FTC
Regressor	(1)	(2)
Establishment controls		
WF annual	0.155***	0.545
	(0.0425)	(0.483)
WF weekly	0.0425	–0.601
	(0.0345)	(0.708)
WF daily	–0.0108	0.868
	(0.0344)	(0.836)
Freelancer	0.239***	–1.182
	(0.0457)	(0.987)
Works council	0.209***	–8.035***
	(0.0650)	(1.261)
Number of workers up	0.136***	0.901
	(0.0275)	(0.680)
Number of workers down	–0.0713**	0.153
	(0.0352)	(0.576)
Absent	0.222***	1.155
	(0.0423)	(0.704)
Gender share	0.00377***	0.0267
	(0.000712)	(0.0158)
High-skilled share	0.000432	–0.0460**
	(0.00112)	(0.0173)
Flexible working time	0.110***	0.719
	(0.0322)	(0.695)
TAW	0.232***	–3.100**
	(0.0686)	(1.282)
Interaction between country and establishment controls		

EPLP*WF annual	0.0927	–0.672
	(0.0649)	(0.956)
EPL FTC*WF annual	0.0116	–0.205
	(0.0195)	(0.329)
EPL TAW*WF annual	–0.0573***	–0.613**
	(0.0192)	(0.260)
Bargaining*WF annual	–0.00356**	0.0254
	(0.00148)	(0.0191)
Country controls		
EPLP	0.0930	0.520
	(0.203)	(1.823)
Bargaining coverage	–0.000893	–0.0443*
	(0.00357)	(0.0232)
EPLP*bargaining	0.0263***	0.0876
	(0.00798)	(0.0716)
Unemployment rate	–0.113*	0.524
	(0.0586)	(0.577)
EPL FTC	–0.0318	–1.764***
	(0.0777)	(0.604)
EPL TAW	0.172**	2.712***
	(0.0868)	(0.603)
EPLP*EPL FTC	–0.508**	6.572**
	(0.215)	(2.641)
EPLP*EPL TAW	–0.0332	0.105
	(0.110)	(0.863)
EPL FTC*bargaining	0.00474**	–0.00409
	(0.00227)	(0.0196)
EPL TAW*bargaining	–0.00191	–0.0634***
	(0.00213)	(0.0173)
Firm size fixed effect	Yes	Yes

Sectors fixed effect	Yes	Yes
Country fixed effect	No	No
Establishments	17,995	9,095
Countries	20	20
R^2 and Pseudo R^2	0.1346	0.2294

Notes: Coefficients are reported from a probit regression model (column (1)) and reported from an OLS model (column (2)) with clustered standard errors, test statistics in parentheses. Continuous variables are centered. Number of workers up means that the number of workers increased; number of workers down means that the number of workers decreased; absent means that the level of absenteeism and/or sickness causes human resource problems; high-skilled share means the proportion of employees working in high-skilled jobs that usually require an academic degree. Establishment-level variables described in Table 1. Country-level variables described in Table 2. EPL, employment protection legislation; EPLP, EPL for permanent workers; FTC, fixed-term contract workers; OLS, ordinary least squares; TAW, temporary agency workers; Temp, temporary workers; WF, workload fluctuation.

***Significant at 0.1%; ** significant at 1%; * significant at 5%.

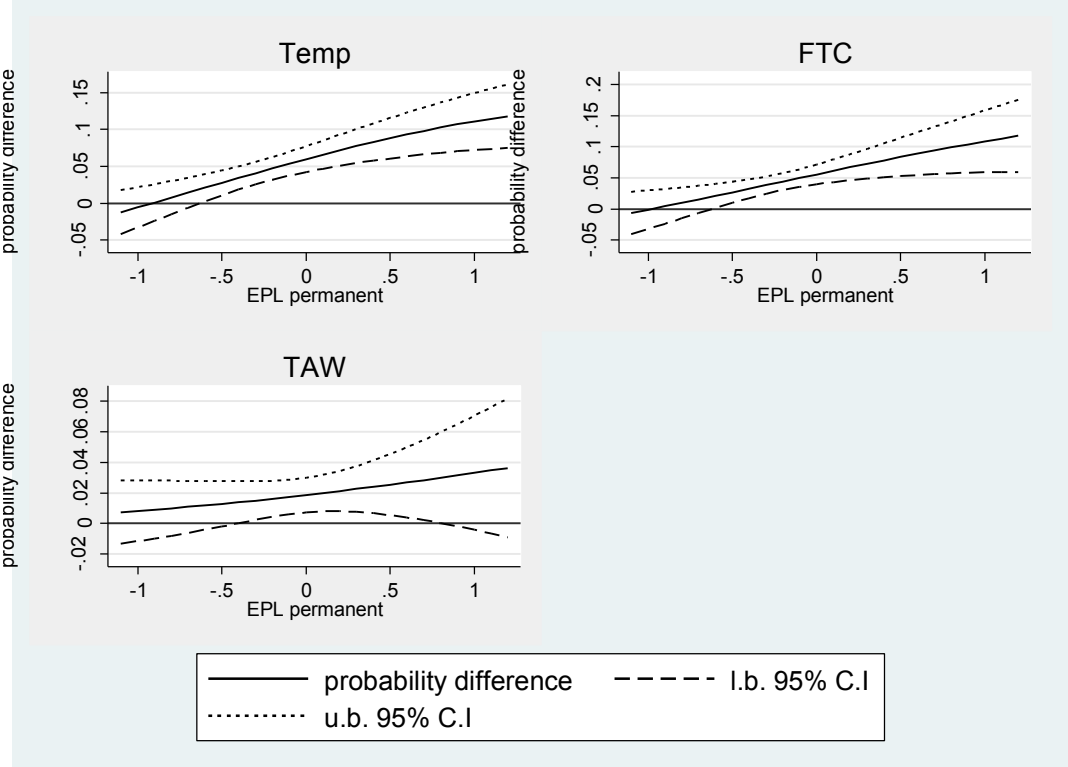
Table C.1. ECS Countries Included in the Samples

Country	Included in 2004–2005	Included in 2009
Austria	Yes	Yes
Belgium	Yes	Yes
Bulgaria		
Croatia		
Cyprus		
Czech Republic	Yes	Yes
Denmark	Yes	Yes
Estonia		Yes
Finland	Yes	Yes
France	Yes	Yes
Germany	Yes	Yes
Greece	Yes	Yes
Hungary	Yes	Yes
Ireland	Yes	Yes
Italy	Yes	
Latvia		
Lithuania		
Luxembourg		Yes
Malta		
Netherlands	Yes	Yes
Poland	Yes	Yes
Portugal	Yes	Yes
Romania		
Slovakia		Yes
Slovenia		Yes
Spain	Yes	
Sweden	Yes	Yes
Turkey		Yes

United Kingdom	Yes	Yes
FYR of Macedonia		

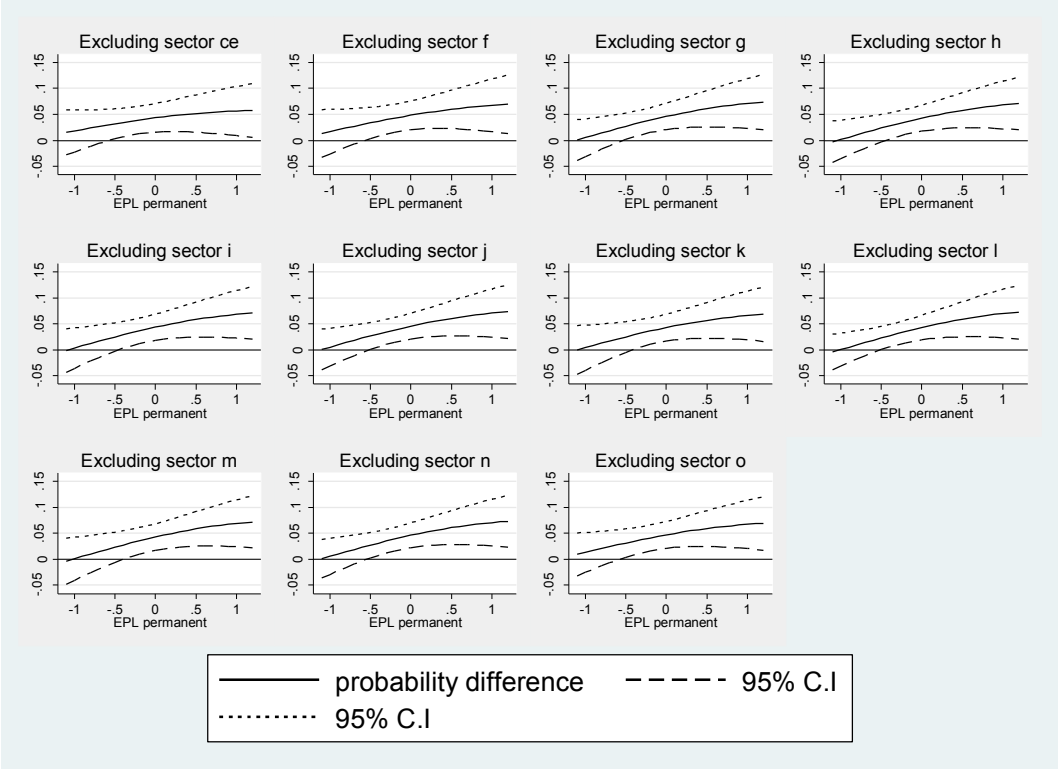
[[Figures Appendix]]

Figure B.1. Positive Relationship of Fluctuation with the Probability of Employing Temps (or FTCs, TAWs) Compared with EPLP in 2009



Notes: Difference in the predicted probabilities of employing at least one Temp (FTC or TAW) by establishments with annual fluctuation compared with establishments without fluctuation, column (2) in Table 3, columns (2) and (4) in Appendix Table A.2 with employers' weight, calculated at 0 for all institutions (bargaining coverage rate, EPL for temporary workers (Temps)), EPL for fixed-term contract (FTC) workers, EPL for temporary agency workers (TAW)), except EPL permanent, EPL permanent is centered. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). EPL, employment protection legislation; EPLP, EPL for permanent workers.

Figure E.1. Positive Relationship of Fluctuation with the Probability of Employing Temps Compared with EPLP in 2009



Notes: Difference in the average of predicted probabilities of employing at least one Temp by establishments with annual fluctuation compared with establishments without fluctuation, column (2) in Table 3 for different subsamples, calculated at 0 for all institutions (bargaining coverage rate, EPL for temporary workers (Temps)), except EPL permanent, EPL permanent is centered. Samples exclude the sector mentioned in the title. 95% confidence interval (C.I.) presented with the lower bound (l.b.) and upper bound (u.b.). High (low) enforcement means sample is restricted to firms in countries with governance indicators larger than (smaller or equal to) the mean. EPL, employment protection legislation; EPLP, EPL for permanent workers.

Sector codes: C-E, Manufacturing and energy; F, Construction; G, Wholesale and retail trade, repair of goods; H, Hotels and restaurants; I, Transport and communication; J, Financial intermediation; K, Real estate and business activities; L, Public administration; M, Education; N, Health and social work; O, Other community, social, and personal services.