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Kristel JACQUIER

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We investigate the impact of reforms on employment protection for temporary contracts on Total Factor Productivity (TFP) using panel data of industries across 14 European countries. Within-industry variation over the period 1992-2007 is exploited to capture reforms. The legislation on temporary contracts (EPT) affects the use of such contracts, making it a valid instrument to prove a causal relationship between a change in legislation and macroeconomic performances. Indeed, the two stage estimates emphasize the negative relationship between the share of temporary employment and TFP at the industrial level. Marginal effects prove that increasing regulation on temporary jobs has a strong negative impact on the use of fixed-term contracts if employment protection on regular contract (EPR) is low. When employment protection on open-ended contract reaches its highest level; this effect is stronger. Our study shows that asymmetric institutional change might indeed leads to lower productivity growth through a surge in temporary employment.

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INTRODUCTION

Employment protection legislation sets norms and procedures to be followed for the two main types of labor contracts: open-ended and fixed term contracts¹. Employment protection on open-ended contracts (hereafter "EPR") imposes legal restrictions on dismissals and sets compensations to workers in case of early termination. Employment protection on temporary jobs (hereafter "EPT") imposes restrictions on the hiring of workers under temporary contracts (Boeri and Ours, 2013).

The present analysis proposes to investigate the link between employment legislation and productivity at the industrial level with a focus on the use of fixed-term contracts.

Theoretically the easing in legislation on temporary contracts can be assimilated to a reduction in firing costs, thus the impact on productivity of such institutional change is ambiguous. Hopenhayn and Rogerson (1993) build a general equilibrium model of job reallocation across firms, calibrated using data from the US Census of Manufactures and simulate a tax on job destruction to measure the welfare cost of such policy. They find that the substantial welfare costs emerge from the decrease in average productivity. Indeed the reduction in employment turnover has a limited impact on welfare and the fraction of total payroll that is paid in dismissal costs accounts for less than 5% of total payroll. But on the other hand, the tax on job destruction creates a distortion and firms allocate resources less effectively. As a consequence labor productivity substantially drops which dampens welfare. It should be cautioned that the analysis focuses on the costs associated with certain policies and ignores benefits that may be associated with employment protection. However according to this model a surge in temporary employment might improve productivity. Samaniego (2006) develops a model where plants reduce its workforce when they fall behind in technology. Since employment protection offsets this mechanism, in countries where regulations are more stringent firms are encouraged to specialize in industries with slow rate of technological change. The paper focuses on the cross-industry effect of employment protection and regards industry composition as a new channel through which labor market legislation impacts macroeconomic aggregates. Saint Paul (2002) also argues that high firing costs induce a bias towards secondary innovation with smaller productivity growth potential. As a result countries implementing employment reforms might engage in high-tech activities

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¹ agency work and other atypical contracts will be assimilated to this category in the present analysis

and display higher total factor productivity levels. A third theoretical channel through which employment protection might decrease productivity is rational worker shirking behavior (Shapiro Stiglitz 1984). Layoff protection might reduce the incentive for workers to exert efforts, because the threat of layoff in response to low performance is smaller. Thus, temporary workers might work harder than permanent ones and increase productivity. Other trends of the literature document the positive impact of employment protection on productivity. The theory of human capital (Becker, 1964; Mincer, 1974) predicts that investment in skills results in higher productivity. Individual investment decisions in education and training are linked to the expected returns of education. Both employment uncertainty associated with a fixed-term contract and the risk of unemployment after termination of a fixed-term contract have negative consequences on the returns to investment in education, training and further training.

Several empirical studies focus on the increase in temporary employment and the channels through which it affects productivity. Firm level analysis focusing on Spain (Dolado et al., 2012) and Italy (Cappellari et al., 2012) find a negative and significant impact of temporary employment on productivity. Lisi (2013) is the only industry-level analysis that finds a significant impact of temporary employment on productivity. However Lisi (2013) does not emphasize the role played by asymmetric employment reforms. In the present paper, we document the institutional complementarity between legislation on regular and temporary jobs, its influence on the actual use of temporary jobs, which in turn is expected to affect macroeconomic performances. Indeed, the high protection for permanent employment along with a less stringent regulation for temporary jobs appears as a driving force behind the development of fixed-term contracts. We want to test this hypothesis and complement the literature on asymmetric institutional change (Cahuc & Postel-Vinay, 2002; Boeri and Garibaldi 2007) that points to bad consequences of such reforms on both employment and productivity. Our results are consistent with the literature: the legislations on regular and temporary contracts jointly influence the use of fixed-term contracts, and asymmetric institutional change might indeed leads to lower productivity.

THE DATA

The study includes 14 countries (Austria, Belgium, Denmark, Spain, Finland, France, Germany, Ireland, Italy, the Netherlands, Sweden, Greece, Portugal and the United-Kingdom²) and 13 sectors (see appendix) from 1992 to 2007.

The main source of data is EU KLEMS Growth and Productivity Accounts (November 2009 Release, updated March 2011) constructed by the Groningen Growth and Development Center (GGDC). We use information on multifactor productivity (TFP). The methodology of EUKLEMS ensures conceptual consistency between variables. Further documentation can be found in O'Mahony and Timmer (2009).

Employment protection legislation indicators are provided by the OECD. A set of two indicators is used: Employment protection for regular contracts, including collective dismissals (EPRC) and Employment protection for temporary contracts (EPT)³. EPR imposes legal restrictions on dismissals and sets compensations to workers to be paid by their former employers in case of early termination of an open-ended contract. EPT imposes restrictions on the hiring of workers under temporary contracts. See the appendix for more details.

The last source of data mobilized is Labor Force Survey data provided by EUROSTAT. The data are used to document the composition of the labor force within sectors in terms of skills, work contract and tenure. At the national level, unemployment rates are considered.

ESTIMATION STRATEGY

The exploratory analysis relies on a reduced form regression:

$$lnTFP_{ijt} = \theta_0 + \theta lnshtemp_{ijt-1} + D_t + D_{ij} + w_{ijt}$$
(1)

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² Data on TFP are unavailable for Greece and Portugal. Therefore in the estimates including TFP Portugal and Greece are dropped

³ Data on collective dismissals is only available from 1998. Since the time span of the study is from 1995-2007, legislation on collective dismissals will not be considered here .We use EPRC_V1, which corresponds to the index of employment protection for regular workers (EPR_V1).

The indexes indicate countries (i), industries (j) and time (t). D stands for a set of dummy controlling for each dimension of the dataset. The objective is to establish a naïve relationship between temporary employment and productivity. Explanatory variables are lagged values⁴.

This specification fails to take into account skill composition and labor market conditions. Unemployment and the share of high skilled workers are thus included in the equation:

$$lnTFP_{iit} = \gamma_0 + \gamma_1 lnshtemp_{iit-1} + \gamma_2 lnshHS_{iit-1} + \gamma_3 lnU_{it-1} + D_t + D_{ii} + v_{iit}$$
 (2)

As opposed to "between estimator" focusing on cross-sectional differences that might reflect measurement errors, we use a within estimator that considers variation in TFP in each industry in a country, over time. Since we use country-industry fixed effects, variables available at the country-level (such as unemployment or employment protection) are not correlated with our fixed effects. Unobservable differences between countries constant over time (such as variety of capitalism, other labor market institutions etc that influence both productivity and employment protection legislation) are controlled for. We seek to identify reforms on temporary employment that occurred during the period considered. Although employment protection on regular contracts did not vary much over time, we consider that employment protection on temporary contracts provides sufficient variation to produce robust estimates of the impact of employment reforms on productivity. See descriptive statistics in the next section.

We study the level of TFP as opposed to productivity growth because we hypothesize that to capture the impact of temporary employment on the dynamic efficiency of production, a longer time span is required. Additionally, it is reasonable to assume that the reforms in employment protection are too recent to have had an influence on innovation. The level of TFP is regarded as a measure of allocative efficiency to assess the complementarity between capital and labor inputs. Estimations using TFP growth were constantly insignificant⁵.

The reduced-form regression suffers from several limitations. The most important of which is its incapacity to control for endogeneity. Indeed, labor market conditions, the composition of skills, or demand shocks affect both the use of temporary contracts and TFP. As a

⁴ Results remain unchanged when present values are used

⁵ Tables are available upon request

consequence, we use an instrumental variable to prove a causal relation between temporary employment and TFP. Employment protection legislation is used as an instrument since it directly influences the share of temporary employment but influences productivity only through the use of temporary contracts. The following two-stage least-squares regression is estimated:

$$\hat{z}_{ijt} = \beta_0 + \beta_1 lnept_{it-1} + \beta_2 lnepr_{it-1} + \beta_3 lnshHS_{ijt-1} + \beta_4 lnU_{it-1} + D_t + D_{ij}$$
 (3)

$$lnTFP_{ijt} = \alpha_0 + \alpha_1 \hat{z}_{ijt} + \varepsilon_{ijt} \tag{4}$$

Equation (3) corresponds to the first stage of the estimation process. \hat{z} is the estimated instrument corresponding to the share of temporary employment in each industry.

The next step is to test the complementarity between EPR and EPT. We hypothesize that the relationship between legislation and the share of temporary employment is non linear, and that there is a joint effect of legislations on the share of temporary employment. Thus a translog (transcendendal logarithmic) function is estimated:

$$lntemp = \delta_0 + \delta_1 lnept_{it-1} + \delta_2 lnepr_{it-1} + \delta_3 lneptX lnepr_{it-1} + \delta_4 lnept_{it-1}^2 + \delta_5 lnepr_{it-1}^2 + \delta_6 lnshHS_{ijt-1} + \delta_7 lnU_{it-1} + D_t + D_{ij} + u_{ijt}$$

$$(5)$$

Lntemp represents the log of the share of temporary contracts. It is explained by the log of the legislation on temporary and regular contracts, a quadratic term for both of them, year dummy variables and a country-by-industry dummy. We then calculate marginal effects to see if the impact of legislation for temporary employment (EPT) on the share of temporary contracts is different according to the level of regulation on regular contracts:

$$\frac{\partial lntemp}{\partial ept} = \delta_1 + \delta_3 lnepr + 2\delta_4 lnept$$

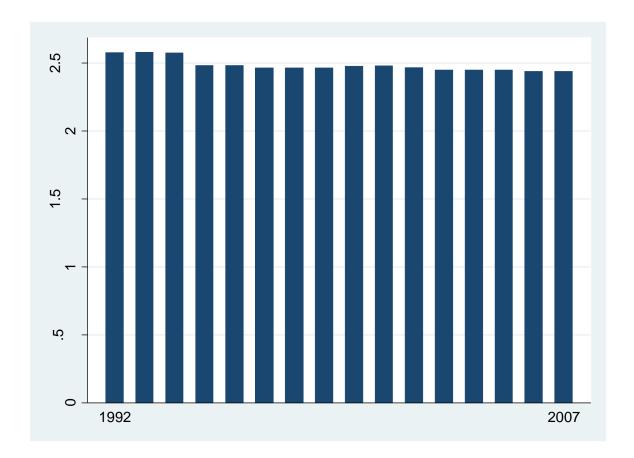
EPR is set to its minimum, mean less one standard deviation, mean, mean plus one standard deviation and maximum.

Finally, equation (3) is estimated again, using an index of dualisation (dual) as instrument:

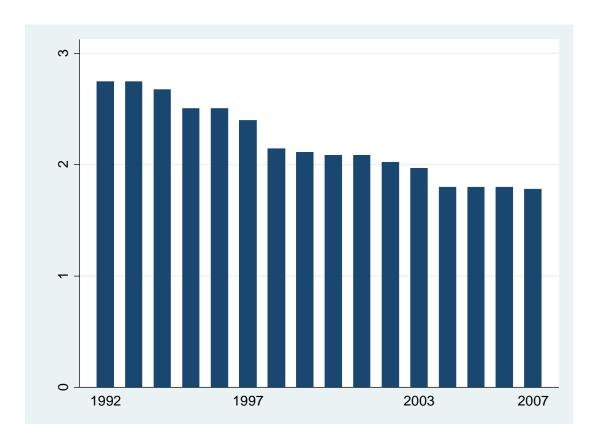
$$dual = \frac{EPR}{EPT}$$

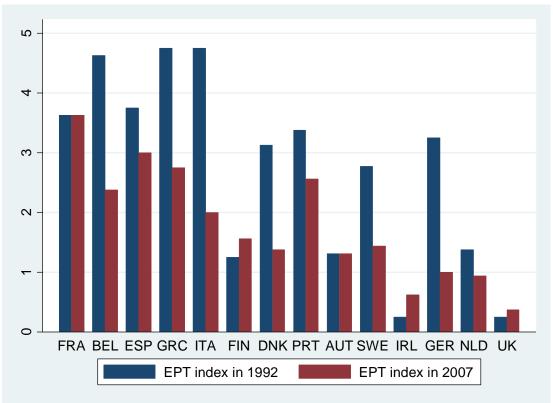
DESCRIPTIVE STATISTICS

As stated in the previous section, the OECD index of legislation on permanent contract has remained almost unchanged over the period considered.



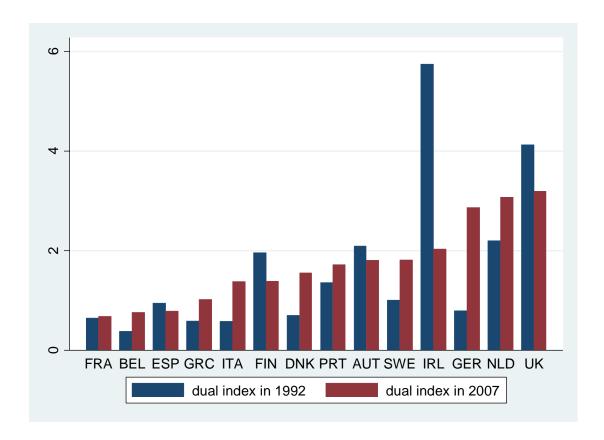
However temporary employment has been subject to more reforms. There is a clear decreasing trend from 2.74 to 1.78 in 2007. It has to be noted that countries are heterogeneous in the reforms implemented. In Italy for example, the EPT index reduced from 4.75 to 2 over the period, while in Ireland and the United-Kingdom the restrictions on the use of fixed-term contracts were increased.





As a result EU countries appear to converge towards a medium level of legislation on temporary employment while legislation on open-ended contracts is almost untouched. The

above graphic shows that with the exception of the UK, Ireland and Finland, the EU has become more dual during the study period.



RESULTS

As a preliminary approach, reduced-form regressions are estimated. We seek to analyze the impact of temporary employment (expressed as the log of the share of temporary employment in each industry considered) on Total Factor Productivity. A set of dummies controlling for time, country and industry fixed effects are implemented. The results presented in table 1 show a significantly positive relationship between the share of temporary employment and Total Factor Productivity. When additional controls are included, results are unchanged: the higher the share of temporary employment in an industry, the higher the TFP. This result is inconsistent with the literature and is very likely to reflect endogeneity.

TABLE 1
Reduced-form regressions (fixed effect model)
Dependent variable: Total Factor Productivity

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Lnshareoftemp(t-1)	0.039***	0.060***	0.064***	0.040***	0.033***	0.057***	0.058***	0.032***
	(0.007)	(0.011)	(0.012)	(0.007)	(0.008)	(0.011)	(0.012)	(0.009)
LnUnemp(t-1)					0.022*	-0.179	-0.041	0.023*
					(0.013)	(0.238)	(0.037)	(0.013)
InshareLS(t-1)					-0.079***	-0.081***	-0.077***	-0.077***
					(0.015)	(0.018)	(0.020)	(0.016)
constant	4.870***	4.952***	4.827***	4.708***	4.733***	5.130***	4.769***	4.544***
	(0.041)	(0.049)	(0.062)	(0.019)	(0.051)	(0.388)	(0.099)	(0.050)
year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
industry dummies	Yes	Yes	No	No	Yes	Yes	No	No
country dummies	Yes	Yes	No	No	Yes	Yes	No	No
country year dummies	No	Yes	Yes	No	No	Yes	Yes	No
Number of Obs	2079	2079	2079	2079	1988	1988	1988	1988
individuals	156	156	156	156	156	156	156	156

In order to control for endogeneity, a two-stage equation is estimated (presented in table 2). Employment protection legislation is used as instrument. We want to emphasize the channel through which employment legislation affects productivity. This time, as predicted by the literature, a higher share of temporary employment reduces Total Factor Productivity.

^{*} p<0.10, ** p<0.05, *** p<0.01

TABLE 2
Two stage estimates

FIRST STAGE ESTIMATES		Dependent variable: share of temporary				
employment						
	[1]	[2]	[3]	[4]	[5]	
lnUnemp(t-1)	0.598***	0.599***	0.597***	0.597***	0.575***	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Lnept(t-1)	-0.364***	-0.371***	-0.366***	-0.374***	-0.510***	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
lnLS(t-1)		-0.134***		-0.138***		
		(0.001)		(0.001)		
Lnepr(t-1)			-0.179**	-0.201**	-0.299***	
			(0.025)	(0.012)	(0.000)	
lneptXlnepr(t-1)					0.225***	
					(0.000)	

SECOND STAGE ESTIMATES		Dependent variable: Total			
Factor Productivity					
Lnshareoftemp(t-1)	-0.068***	-0.046*	-0.070***	-0.048*	-0.061**
	(0.007)	(0.068)	(0.006)	(0.054)	(0.013)
lnUnemp(t-1)	0.092***	0.081***	0.093***	0.082***	0.087***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnLS(t-1)		-0.077***		-0.076***	
		(0.000)		(0.000)	
Lnepr(t-1)			0.064*	0.061*	
			(0.050)	(0.056)	
year dummies	Yes	Yes	Yes	Yes	Yes
Number of Obs	2079	1988	2079	1988	2079
individuals	156	156	156	156	156

Instruments: Employment Protection on Temporary contracts column 1 to 4

Column 5: Employment Protection on Temporary contracts (EPT), Employment Protection on Regular contracts (EPR) and EPTxEPR

We now focus on the first stage of the estimated relationship. Marginal effects are estimated to test whether employment protection on regular contracts affects the use of temporary employment (table 3 and 4).

^{*} p<0.10, ** p<0.05, *** p<0.01

Table 3: The impact of regulation on temporary employment (fixed effect model)

Dependent variable: the share of temporary employment

Table 3	
lnept(t-1)	-0.168***
	(0.047)
<pre>lnept*lnepr(t-1)</pre>	-0.043
	(0.062)
lnepr(t-1)	-0.163*
	(0.091)
lnunemp(t-1)	0.639***
	(0.029)
InshareLS(t-1)	0.015
	(0.041)
year dummies	Yes
Number of Obs	2313
individuals	182

Table 4	
Minimum	-0.169***
	(0.045)
Mean less one standard deviation	-0.189***
	(0.026)
Mean	-0.204***
	(0.026)
Mean plus one standard deviation	-0.219***
	(0.040)
Maximum	-0.233***
	(0.058)
year dummies	Yes
Number of Obs	2313
individuals	182

As emphasized by the literature, the impact of legislation on temporary employment is not independent from legislation on regular contract. Table 4 shows when EPR is at its maximum value, the marginal effect of a variation in EPT is the strongest. When EPR is set at its minimal value, raising EPT strongly reduces temporary employment. This effect is all the more important the higher the protection on regular contracts is. The opposite is true for a decrease in EPT. The theoretical literature predicts that when employment protection is too stringent for permanent contracts, employers are prompted to resort to fixed-term contracts (Cahuc & Postel-Vinay, 2002). Consequently, asymmetric institutional change (decreasing protection on temporary jobs while keeping unchanged protection on regular contracts) is expected to boost temporary employment. Our estimates are in line with this view.

Secondly, a translog function is estimated to take into account the non linear relationship between the level of regulation and the use of fixed-term contracts (table 5). Marginal effects are computed: table 6 displays the impact of legislation on regular contracts at various levels of legislation on temporary jobs and confirms the results of table 4: reducing legislation on temporary jobs increases the share of temporary employment the higher the regulation on open-ended contracts is.

^{*} p<0.10, ** p<0.05, *** p<0.01

Table 5: Translog function (fixed effect estimates)

0.099
(0.063)
-2.477***
(0.308)
-0.375***
(0.093)
-0.029
(0.018)
1.424***
(0.193)
0.683***
(0.029)
-0.075*
(0.042)
-2.824***
(0.140)
Yes
2727
224

Table 6: Impact of fixed-term employment protection on the share of temporary contracts conditional on employment protection on regular contracts

Minimum	0.057
	(0.070)
Mean less one standard deviation	-0.117***
	(0.033)
Mean	-0.247***
	(0.026)
Mean plus one standard deviation	-0.378***
	(0.048)
Maximum	-0.503***
	(0.076)

Note: Standard errors in parentheses

^{*} p<0.10, ** p<0.05, *** p<0.01

^{*} p<0.10, ** p<0.05, *** p<0.01

Finally in table 7 we propose an IV estimation using as instrument an index of dualism in regulation of the labor market (EPR/EPT).

TABLE 7
Two stage estimates

FIRST STAGE ESTIMATE Deperements	ndent variabl	e: share of tem	porary
	[1]	[2]	[3]
lnUnemp(t-1)	0.646***	0.629***	0.622***
	(0.000)	(0.000)	(0.000)
Lndual(t-1)	0.341***	0.387***	0.379***
	(0.000)	(0.000)	(0.000)
lnepr(t-1)		-0.563***	-0.567***
		(0.000)	(0.000)
lnLS(t-1)			0.000
			(0.992)
SECOND STAGE ESTIMATES	Dependent	variable: Tota	al Factor
Productivity	<u>-</u>		
Productivity Lnshareoftemp(t-1)	-0.055**	-0.060**	-0.045*
•			
•	-0.055**	-0.060**	-0.045*
Lnshareoftemp(t-1)	-0.055** (0.038)	-0.060** (0.016)	-0.045* (0.078)
Lnshareoftemp(t-1)	-0.055** (0.038) 0.099***	-0.060** (0.016) 0.103***	-0.045* (0.078) 0.096***
Lnshareoftemp(t-1) lnUnempt-1	-0.055** (0.038) 0.099***	-0.060** (0.016) 0.103*** (0.000)	-0.045* (0.078) 0.096*** (0.000)
Lnshareoftemp(t-1) lnUnempt-1	-0.055** (0.038) 0.099***	-0.060** (0.016) 0.103*** (0.000) 0.019	-0.045* (0.078) 0.096*** (0.000) 0.015
Lnshareoftemp(t-1) lnUnempt-1 lnepr(t-1)	-0.055** (0.038) 0.099***	-0.060** (0.016) 0.103*** (0.000) 0.019	-0.045* (0.078) 0.096*** (0.000) 0.015 (0.662)
Lnshareoftemp(t-1) lnUnempt-1 lnepr(t-1) lnLS(t-1)	-0.055** (0.038) 0.099***	-0.060** (0.016) 0.103*** (0.000) 0.019	-0.045* (0.078) 0.096*** (0.000) 0.015 (0.662) -0.061***
Lnshareoftemp(t-1) lnUnempt-1 lnepr(t-1)	-0.055** (0.038) 0.099***	-0.060** (0.016) 0.103*** (0.000) 0.019	-0.045* (0.078) 0.096*** (0.000) 0.015 (0.662) -0.061***

Note: Standard errors in parentheses

individuals

As expected, dual employment protection legislation decreases Total Factor Productivity.

175

175

175

^{*} p<0.10, ** p<0.05, *** p<0.01

CONCLUDING REMARKS

Using panel data of industries across 12 European countries over the period 1992-2007 we investigate the impact of reforms on employment protection for temporary contracts on Total Factor Productivity (TFP). We control for the rate of unemployment and skill composition and solve the endogeneity issue using an instrumental variable. Our study confirms that temporary employment has a significant and negative impact on productivity. Additionally, asymmetric institutional change is documented. We find that lowering employment protection on temporary jobs while employment protection on regular contracts is high creates a surge in temporary employment that is not desirable for productivity performances. It has to be mentioned that marginal effects provide insights into the impact on temporary employment of a change in the regulation. However the analysis does not produce evidence on the optimal level of regulation.

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APPENDIX

AtB

LISTE OF SECTORS

Agriculture, hunting and forestry

	118110110110, 1101101118 0110 1010011
D	Manufacturing
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and
	household goods
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities, consulting
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work
O	Other community, social and personal service activities

THE OECD EPL INDICATORS

Individual dismissal of workers with regular contracts incorporates three aspects of dismissal protection:

- (i) Procedural inconveniences that employers face when starting the dismissal process, such as notification and consultation requirements;
- (ii) Notice periods and severance pay, which typically vary by tenure of the employee;
- (iii) Difficulty of dismissal, as determined by the circumstances in which it is possible to dismiss workers, as well as the repercussions for the employer if a dismissal is found to be unfair (such as compensation and reinstatement).

Regulation of temporary contracts includes:

- (i) Regulation of fixed-term and temporary work agency contracts with respect to the types of work for which these contracts are allowed and their duration
- (ii) Regulation governing the establishment and operation of temporary work agencies and requirements for agency workers to receive the same pay and/or conditions as equivalent workers in the user firm