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How do Institutions Affect Structural Unemployment in Times of Crises?

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ABSTRACT/RESUMÉ

How do institutions affect structural unemployment in times of crises?

This paper examines the effect of economic crises on structural unemployment using an Autoregressive Distributed Lags model and accounting for the role of institutional settings. Analysing an unbalanced panel of 30 OECD economies from 1970 to 2008, we found that downturns have, on average, a significant positive impact on the level of structural unemployment rate. The maximum impact varies with the severity of the downturn. Institutions (such as Employment Protection Legislation, average replacement ratio and product market regulation) influence both the extent of the initial shock and the adjustment pattern in the aftermath of a downturn.

JEL Classification: E62, H10

Keywords: Crisis; structural unemployment; institutions; Employment Protection Legislation

Comment les institutions influencent-elles le chômage structurel en temps de crise ?

Ce papier examine l'effet des crises économiques sur le chômage structurel en utilisant un modèle Autorégressif à Retards Distribués et en prenant en compte l'effet des institutions. A partir d'un panel non cylindré de 30 économies de l'OCDE de 1970 à 2008, les crises économiques sont estimées avoir, en moyenne, un effet significatif et positif sur le niveau du taux de chômage structurel. L'effet maximal varie avec la sévérité de la crise. Les institutions (législation sur la protection de l'emploi, ratio de remplacement moyen et régulation sur les marchés des produits) influencent à la fois l'amplitude du choc initial et l'ajustement suivant le choc.

Classification JEL: E62, H10

Mots clés : crise; chômage structurel; institutions; législation sur la protection de l'emploi

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HOW DO INSTITUTIONS AFFECT STRUCTURAL UNEMPLOYMENT IN TIMES OF CRISES?

by

Davide Furceri and Annabelle Mourougane¹

1. Introduction

1. There is now a broad consensus that the financial crisis will severely affect growth perspectives over the next years. But the crisis is also likely to have long-lasting implications on productive capacity and factor inputs. Indeed, in past economic downturns the increase in cyclical unemployment has frequently led to higher structural unemployment, as defined as the unemployment rate consistent with price stability, through persistence or hysteresis effects. At the same time, the resilience of countries both in terms of the initial impact of the crisis on the economy and the speed of recovery varies importantly depending on institutional settings. Indeed, while several European countries have experienced sustained rises in structural unemployment during past economic downturns, these developments were much less pronounced in Anglo-saxon economies.

2. The purpose of this paper is to shed light on this issue through an empirical analysis covering OECD countries. The impact of the economic downturns on structural unemployment is assessed using an Autoregressive Distributed Lags (ADL) model and accounting for the role of labour and product market institutions.

3. The main results of the paper are as follow:

- Crises are found to have, on average, a significant positive impact on the level of structural unemployment. The maximum impact is found to vary with the severity of the economic downturn. It could reach almost 1.5 percentage points after five years in the case of very deep economic downturns, while it would be around 0.6 percentage points for crises of lower magnitude.
- The impact of banking and currency crises on structural unemployment does not appear to be fundamentally different from the effect of other economic downturns.

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- Institutions affect the impact of crises on structural unemployment by influencing both the extent of the initial shock and the adjustment pattern in the aftermath of a crisis. This suggests that structural unemployment in countries with flexible labour and product markets is likely to be relatively untouched by economic downturns while some sizeable increases in structural unemployment could be observed in other economies.
- Countries where Employment Protection Legislation (EPL) is high are likely to experience a marked rise in structural unemployment in the short and medium term while low-EPL countries will see very little change. In particular, the effect of a crisis on structural unemployment is found to be very large in high-EPL countries in situations of extremely severe downturns (around 5 percentage points increase after five years). These findings appear to be mostly driven by the stringency of EPL for permanent contracts. Average replacement ratio and the index of product market regulation are also found to matter. In all cases, the impact of crises on structural unemployment appears to be significant only for countries with a more rigid economy than on average across OECD countries.

4. The remainder of the paper is structured as follows. Section 2 reviews the main channels through which crises influence structural unemployment developments and how institutional settings can affect these adjustments. Section 3 describes the empirical methodology adopted in this paper and section 4 the data. Sections 5 and 6 detail the main findings and the last section concludes.

2. Structural unemployment and economic crises

5. The impact of economic downturns on structural unemployment will depend on the drivers of the crisis: while supply shocks should affect structural unemployment developments, the latter should stay unchanged to demand-driven shocks.

6. By weakening the labour market situation, economic downturns can lead to an increase in structural unemployment, through hysteresis effects whereby the path of actual unemployment influences structural unemployment (Blanchard and Summers, 1986; Ball, 2009). Several types of hysteresis mechanisms exist. First, hysteresis could be explained by “insider/outsider” effects in the context of wage bargaining. When workers lose their jobs, they generally lose this ability to compete for jobs with those who are employed. Hence, workers who are still employed will be able to raise their wage demands before all those made unemployed in the previous downturn have been reabsorbed, thereby preventing some of the unemployed from being re-hired. Second, hysteresis can arise because the skills of the long-term unemployed deteriorate. They tend to become detached from the labour market and to reduce their job search intensity (Machin and Manning, 1999). The extent of the downward pressure on wages stemming from the rise in unemployment is thus reduced and leads to persistence in unemployment. On the empirical side, the patterns of structural unemployment and inflation developments in the past decades are consistent with hysteresis theories (Ball, 1997 and 1999).

7. Institutional settings may magnify the impact of the downturn, or the adjustments that follow (Blanchard and Wolfers, 2000; Bertola *et al.*, 2001, Bassanini and Duval, 2006). Past evidence suggests indeed that the rise in the unemployment rate experienced by many European countries in the 1970s was driven by the interaction of exogenous shocks and institutional features (Blanchard, 2006). Amongst the different institutions, EPL is likely to play a major role. On the one hand, stringent EPL could dampen the initial effect of a shock by providing job security. On the other hand, it will affect countries’ ability to adjust to the shock by hampering the reallocation of labour. While there is only very mixed evidence on a

direct and significant impact of EPL on aggregate unemployment², stringent EPL is found to have robust, detrimental effects on the incidence of long-term unemployment or the resilience of labour markets to shocks (Bertola *et al.*, 2002; Duval *et al.*, 2007).

8. Other institutions are also likely to affect developments in structural unemployment. Higher unemployment benefits, especially when available for a long duration, improve the fallback position of workers in the event that they lose their jobs. It is also possible that such benefits may reduce the search effectiveness of those already unemployed, and thereby reduce their incentives to put downward pressure on wages by competing with those currently employed. Either way, more generous unemployment benefits may be expected to lead to upward wage pressure and thereby to a rise in structural unemployment.

9. A number of labour market institutional settings such as the presence of a minimum wage and the role of trade unions may also influence developments in structural unemployment through their effects on wages. However, given the paucity and the lack of reliability of these data, these aspects have not been examined in this paper. Active labour market policies may also play a role but their strong endogeneity precludes their inclusion in the analysis.

10. Finally, flexibility on product markets can facilitate the restructuring process including the creation and destruction of new firms following an economic downturn.

3. Empirical methodology

11. In order to analyse the effects of economic downturns on structural unemployment a two-step approach is adopted. In a first step, an ARDL has been estimated on an unbalanced panel of 30 OECD countries over the period 1960-2006. The sample period has been restricted to 2006 in order to exclude the ongoing current crisis. Including only the first years of the current crisis would likely bias the impact estimates downward, as it will take time until the full effect of structural unemployment can be visible.

12. The procedure is similar to the one adopted by Cerra and Saxena (2008) and Furceri and Mourougane (2009) to assess the impact of financial crises on output and potential output, but applied to structural unemployment:

$$\Delta u_{it}^* = \alpha_i + \gamma_t + \sum_{j=1}^8 \beta_j \Delta u_{it-j}^* + \sum_{j=0}^8 \delta_j DOWNTURN_{it-j} + \varepsilon_{it} \quad (1)$$

where u^* is structural unemployment, $DOWNTURN$ is a dummy variable which is equal to 1 at the start of an economic downturn (see below for its construction), and α_i and γ_t are country and time fixed effects. The number of lags has been tested and selected equal to 8. The coefficients β_j and δ_j are assumed to be the same in all countries. Although the direct impact of economic downturns and the adjustment dynamic of structural unemployment are likely to differ across countries, the very limited degrees of freedom prevent to test this assumption and the use of country-specific coefficients. Impulse response functions are subsequently computed to show the adjustment of structural unemployment in the aftermath of a downturn. Confidence bands at 90% are derived from Monte-Carlo simulations to assess the significance of the results.

2. Although Scarpetta (1996) and Elmeskov *et al.* (1998) and a large body of micro-economic studies find a significant effect of EPL on aggregate unemployment, such an effect was not found in the context of the restated Job Strategy (Bassanini and Duval, 2006). Part of this may reflect the inherent shortcomings of the measures used to capture EPL. Morgan and Mourougane (2005) for instance show that the EPL impact on unemployment can be positive, negative or non significant depending on the measures used. In addition, the limited number of reforms on EPL makes it hard to identify their effects on unemployment.

13. Given the simplicity of the framework, the effect captured through equation (1) also encompasses the policy reaction triggered by the downturn and its consequences on the real economy. However, it is not easy to disentangle the pure exogenous shock effect from the policy response, given the absence of a counterfactual.

14. Since the dependent variable is non-observable and estimated through econometric techniques, the regression residuals can be thought of as having two components. The first component is sampling error (the difference between the true value of the dependent variable and its estimated value). The second component is the random shock that would have been obtained even if the dependent variable was directly observed as opposed to estimated. This would lead to an increase in the standard error of the estimates and a decrease in the t-statistics. This means that any correction to the presence of this un-measurable error term will increase the significance of our estimates. In most of the estimations reported, heteroskedasticity turns out not to be a problem. When it does, we correct using White standard errors. Finally, as structural unemployment is likely to be highly persistent, autocorrelation could be an issue. This problem is addressed by allowing a sufficient number of autoregressive lags in the estimation.

15. In a second step, we test whether the response of structural unemployment to economic downturns differs significantly depending on institutional settings: EPL, average replacement ratio and product market regulation. This is done by using a dummy (D_{INST}^H) which splits observations depending on whether the examined institutional variable is greater than the over time and over country average or not. More precisely the following equation has been estimated:

$$\begin{aligned} \Delta u_{it}^s = & \alpha_t + \gamma_t + \theta D_{it}^{INST} \\ & + \sum_{j=1}^8 \beta_j D_{it-j}^{INST} \Delta u_{it-j}^s + \sum_{j=1}^8 \gamma_j (1 - D_{it-j}^{INST}) \Delta u_{it-j}^s + \sum_{j=0}^8 \theta_j D_{it-j}^{INST} DOWNTURN_{it-j} \\ & + \sum_{j=0}^8 \varphi_j (1 - D_{it-j}^{INST}) DOWNTURN_{it-j} + \varepsilon_{it} \end{aligned} \quad (2)$$

16. An alternative approach would have been to introduce interaction terms between the value of institutions and respectively the dummies or the autoregressive terms. This would have allowed to account for the information contents of institutional series. However, the extremely high correlation between institutions and interactions and between current and lagged terms prevents the implementation of this approach.

4. Data

17. Dummies corresponding to the start of the economic downturn have been constructed based on cumulative output gaps to identify major economic downturns. They are constructed as follows:

$$\begin{aligned} DOWNTURN_{it}^s &= 1 \text{ if } GAP_{it} < -1\% \text{ and } \sum_{\tau=t}^T GAP_{it} < s \text{ where } GAP_{T+1} > 0 \\ DOWNTURN_{it}^s &= 0 \text{ otherwise.} \end{aligned}$$

where *DOWNTURN* is the crisis dummy, *GAP* is the OECD measure of output gap³, and *s* is a measure of the economic downturn severity captured through output losses. In practice, three values have been examined: *s* = 10, 15 and 20%.

18. The construction of start-of-the-crisis dummies has two main advantages. First, starting dates of economic downturns can be thought of as independent from structural unemployment developments, limiting the risk of endogeneous bias in the estimation.⁴ The hypothesis of exogeneity has nonetheless been tested (see below). Second, it is possible to differentiate among crises depending on their degree of severity. Using this definition, 32 episodes corresponding to losses of at least 10 % have been identified, 16 episodes for losses of at least 15% and 8 episodes for losses of more than 20% (Figure 1).

3. It is based on a production function approach (see Befy *et al.* 2006) for more details on the construction of this variable.

4. By contrast measures based on cumulative GDP growth or output gap would be highly endogenous and resulting estimates would likely to be biased.

Figure 1. Structural unemployment and past economic downturns

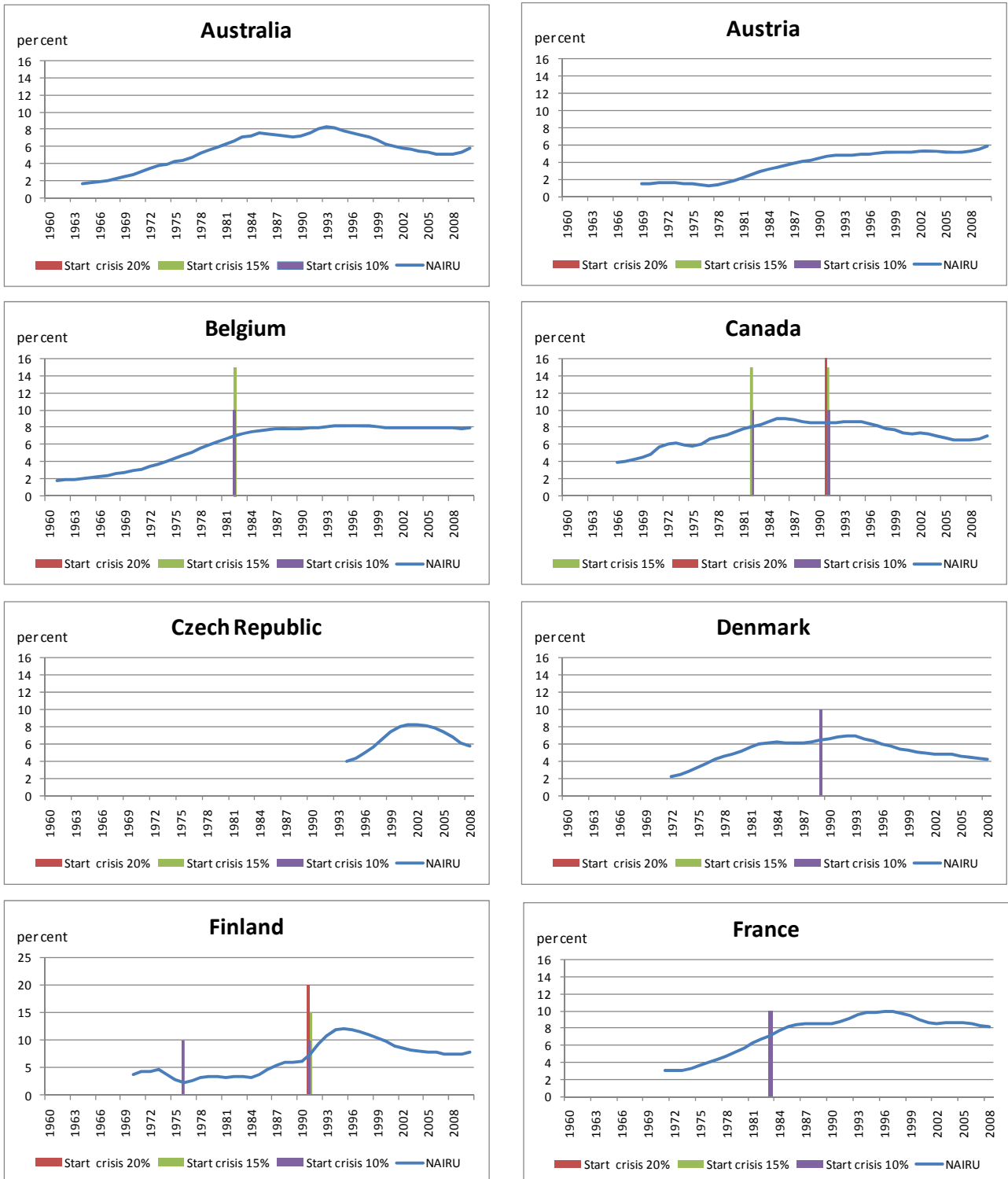
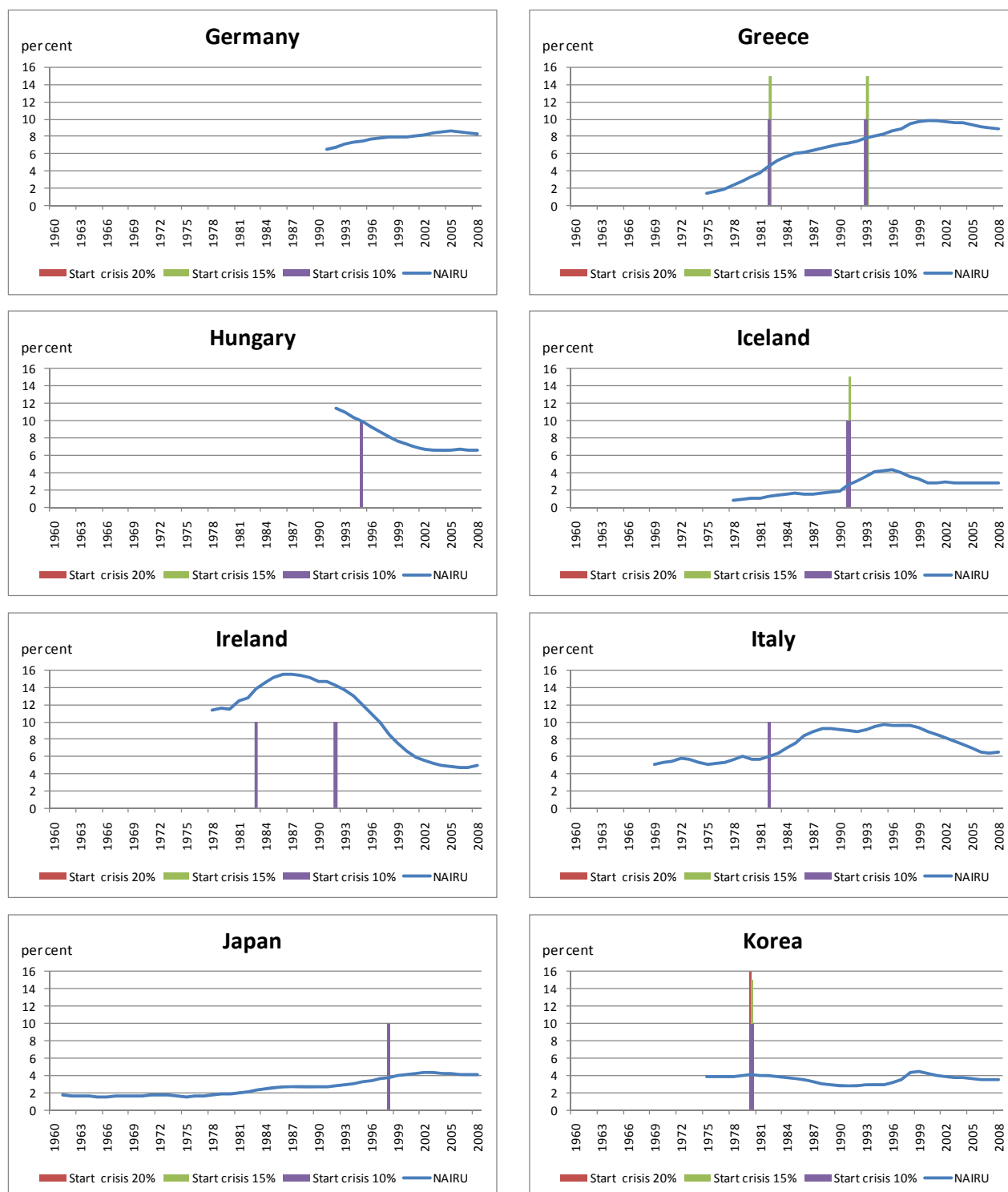


Figure 1. Structural unemployment and past economic downturns (*contd*)

Source: Economic Outlook database and authors' calculation.

Figure 1. Structural unemployment and past economic downturns (contd)

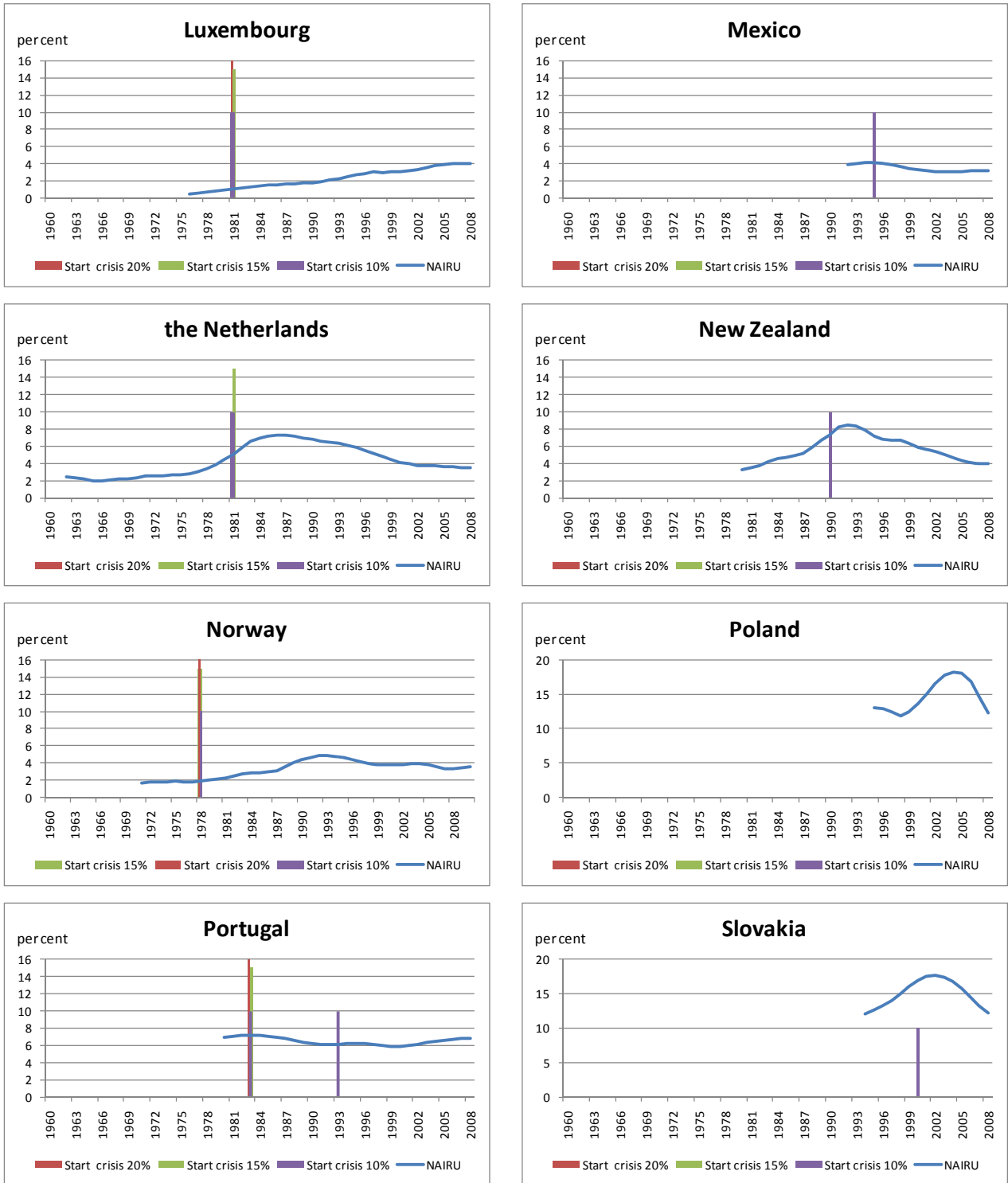
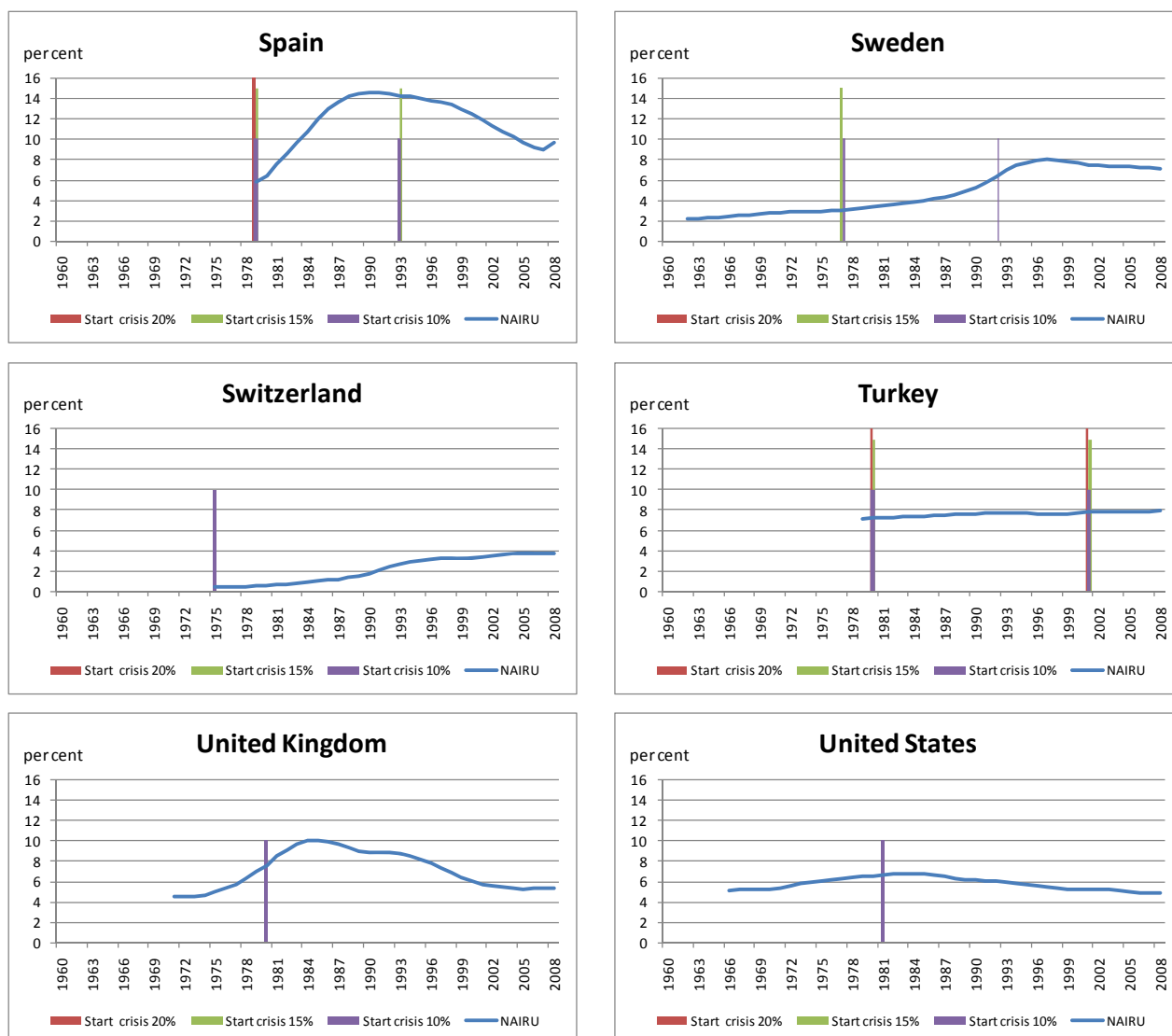


Figure 1. Structural unemployment and past economic downturns (contd)



19. As a robustness check, a crisis dummy based on financial crises dates taken from Laeven and Valencia (2008) has also been tested. Dummy codes the starting dates of currency and banking crises which occurred over the period 1960 to 2006.⁵ The idea is to investigate whether financial and banking crises would have a different impact on structural unemployment than economic downturns in general.

20. Data for structural unemployment is taken for the OECD Economic Outlook database. They are derived from a Kalman filter approach using a price Phillips curve (Richardson *et al.*, 2000). The method combines the use of a price Phillips curve, an autoregressive process of order two for the unemployment gap and a random walk process for structural unemployment.

21. As for other economic research dealing with institutional data, this analysis has to cope with serious data limitations, in particular their lack of reliability and of variability over time. For this reason, the analysis has been restricted to some institutions. Data for employment protection are taken from the OECD Employment Protection Database, for which the employment protection legislation index is available for most OECD countries over a relatively long time span.⁶ The index is a composite indicator ranging from 0 (less restrictive) to 6 (more restrictive). In practise, however, all OECD countries exhibit EPL indices below 4. In our sample, a downward trend in EPL values is observed over time (Figure 2), with in particular a move toward more flexible labour markets in Europe particularly after 1995. This has reflected reforms for atypical contracts, while permanent contract legislation has remained unchanged.⁷ Despite the convergence in aggregate EPL, EPL has remained on average lower in Anglo-saxon economies than in continental European countries (Figure 3).⁸ Most recent data point to a stabilisation or a fall in EPL from 2006 to 2008 in most OECD countries.⁹

22. The average replacement ratios are gross replacement rates and are taken from the OECD Benefit and Wages Statistics. Data are available for uneven years from 1961 to 2007 and have been interpolated for even years. In general, countries experienced declines in the replacement rates over the years, one notable exception was Italy which increased unemployment replacement rate by half in 2005 (Boeri and Garibaldi, 2009). Indicators of product market regulations are constructed for the network industries. Like EPL, these have been derived from a bottom-up approach, by aggregation of several institutional features. The indices range from 0 (more flexible markets) to 6 (less flexible markets). Their construction is detailed in Wölf *et al.* (2009).

5. Systemic banking crises are defined as a situation when a country's corporate and financial sector experience a large number of defaults and institutions faces great difficulties repaying the contract on time. Their identification combines the use of quantitative data with subjective assessment of the situation. Currency crises correspond to a nominal depreciation of the currency of at least 30% that is also at least a 10% increase in the rate of depreciation compared to the year before.

6. The data starts in 1985 for most OECD countries.

7. See Boeri and Garibaldi (2009), for an overview of EPL reforms in Europe in the period 1986-2005.

8. The average level of EPL over time and across countries is around 2. The minimum value is 0.21 (for the United States) and the maximum is 4.2 (for Turkey).

9. Exceptions are Hungary, Italy and Slovakia which exhibited a rise.

Figure 2. Change in EPL (1985-2006)

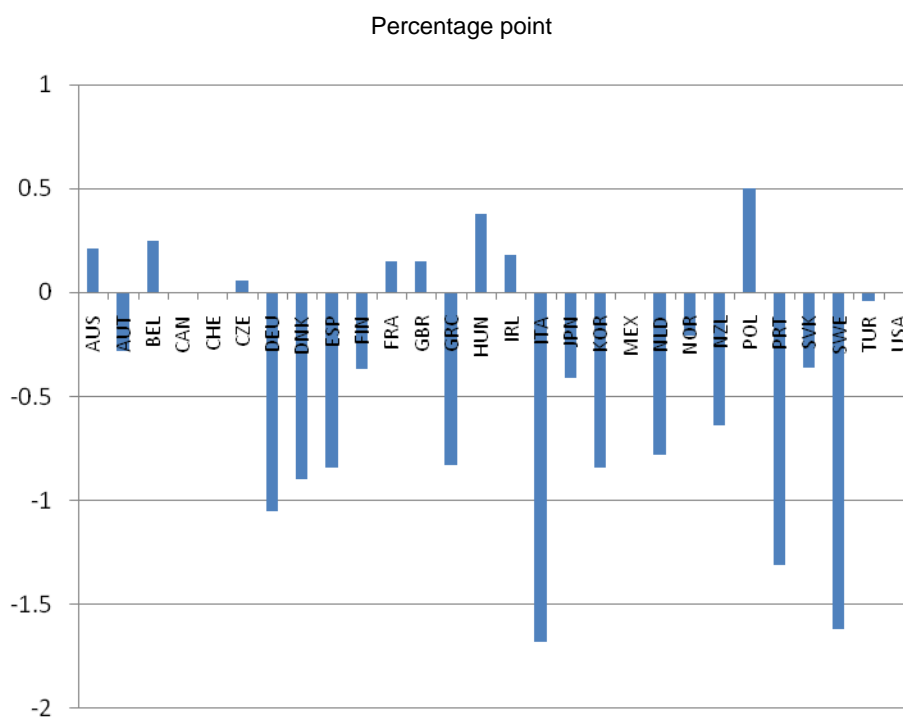
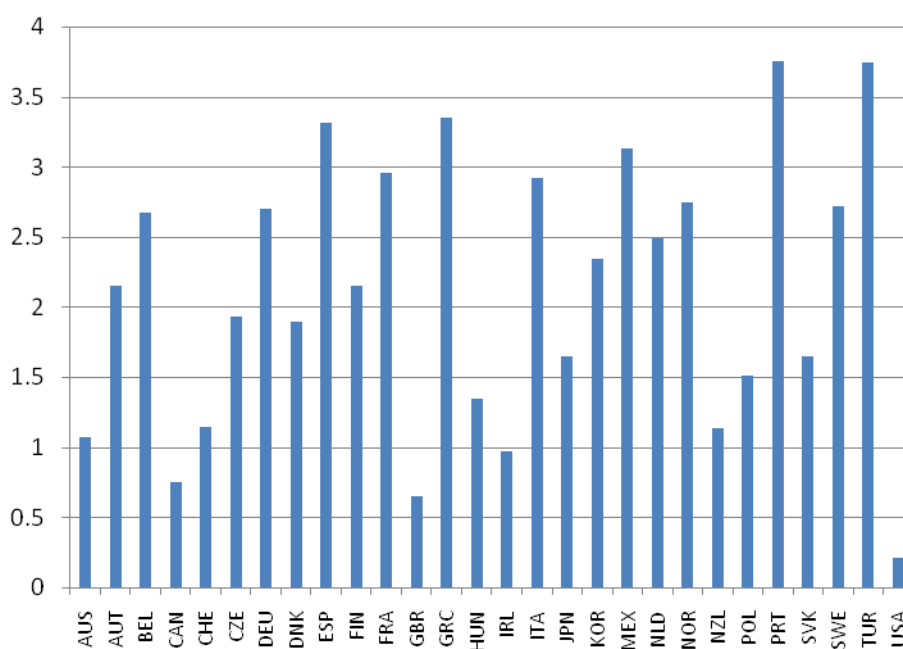


Figure 3. Average EPL (1985-2006)



Source: Employment Protection database.

5. Evidence of a significant effect of crises on structural unemployment

23. Descriptive analysis suggests that past economic downturns have impacted on structural unemployment developments. Two points are worth noting.

- First, although two-thirds of the episodes were characterised by a rise in structural unemployment, the remaining one-third were surprisingly followed by a fall in structural unemployment. This could be explained either by measurement error in the structural unemployment rate,¹⁰ or lagged effects of reforms implemented before the start of the economic crisis. In the latter case, the downturn would have resulted in a less marked decline than would have happened otherwise. Another explanation could be that the crisis triggered an impetus for structural reforms which succeeded to lower structural unemployment (Duval and Elmeskov, 2005).¹¹
- Second, steep increases in structural unemployment have been observed in the majority of episodes during which structural unemployment rose. In particular structural unemployment rose by 4.7 percentage points in Finland following the 1991 crisis and by 3.9 percentage points in Spain after the 1979 downturn (Table 1).¹²

Table 1. Rise in structural unemployment during severe downturns

		Percentage point change after		
		1 year	4 years	10 years
CAN	1991	0.0	0.1	-1.3
FIN	1991	1.8	4.7	1.5
KOR	1980	-0.1	-0.4	-1.3
LUX	1981	0.1	0.4	0.8
NOR	1978	0.1	0.6	1.6
PRT	1983	-0.1	-0.4	-1.1
ESP	1979	0.6	3.9	8.7
TUR	1980	0.0	0.1	0.4

24. Moving to inferential analysis, OLS on an unbalanced panel of OECD countries over the period 1960-2006 was used to estimate equation (1). Time fixed effects which capture shocks that are common to countries have been introduced and are found to be significant.¹³ The results point to a positive and significant average impact of economic downturns on structural unemployment (Table 2). The impulse reaction function derived from a one-period shock to the downturn dummy suggests the effect would be

10. As structural unemployment is non-observable, its measurement is usually surrounded by large uncertainties. Richardson *et al.* (2000) suggested the confidence band around structural unemployment estimates are large, close to 1 percentage point in all G7 countries except in Japan where it is found to be much lower.

11. A typical example is the 1993 Canadian downturn which led to reform of the unemployment benefit system and subsequently to a fall in structural unemployment.

12. These results should be interpreted with caution. Indeed, the dynamic pattern of structural unemployment may reflect to some extent some of the assumptions underlying its estimation methodology. In addition the use of a two-sided filter may also influence the dynamics.

13. Removing time fixed effects from the estimations would not significantly alter the results (see Table A1).

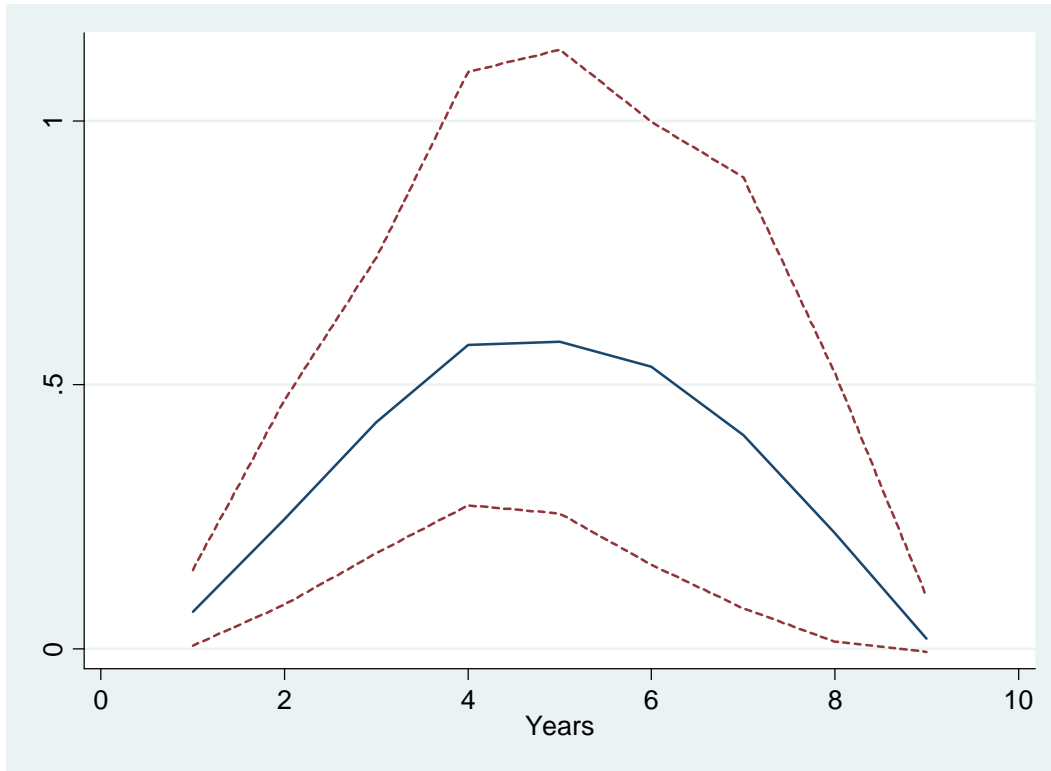
maximal four to five years after the start of the crisis (Figure 4). The estimates are statistically significant at a 90% confidence level for most periods. The amplitude of the effects depends on the severity of the downturns ranging from a peak of 0.4 to 0.6 percentage points to 1.5 percentage points in cases of extremely severe downturns with output loss greater than 20 percentage points. In the latter case, economic crises are estimated to increase structural unemployment by about 1 percentage point in the long run, after accounting for the autoregressive structure of structural unemployment. Another interesting result is that the crisis contemporaneous effect is statistically significant at a 5% level only for extremely severe crises. This suggests that changes in structural unemployment will only be visible after some period of time in the event of mild crises.

Table 2. Average impact of economic downturns on structural unemployment

	s = 10	s = 15	s = 20
$\Delta u^*(-1)$	1.026 (26.69)***	1.037 (27.13)***	1.028 (26.87)***
$\Delta u^*(-2)$	-0.300 (-5.47)***	-0.299 (-5.45)***	-0.287 (-5.25)***
$\Delta u^*(-3)$	0.125 (2.30)**	0.106 (1.95)*	0.105 (1.94)*
$\Delta u^*(-4)$	-0.276 (-5.20)***	-0.269 (-5.05)***	-0.269 (-5.06)***
$\Delta u^*(-5)$	0.310 (6.06)***	0.298 (5.80)***	0.291 (5.67)***
$\Delta u^*(-6)$	-0.132 (-2.80)***	-0.129 (-2.74)***	-0.129 (-1.61)***
$\Delta u^*(-7)$	-0.071 (-1.64)*	-0.068 (-1.56)	-0.070 (-1.61)
$\Delta u^*(-8)$	0.031 (1.04)	0.030 (0.95)	0.038 (1.21)
DOWNTURN	0.046 (1.46)	0.070 (1.57)	0.222 (2.79)***
DOWNTURN(-1)	0.119 (3.74)***	0.104 (2.33)**	0.214 (2.67)***
DOWNTURN(-2)	-0.025 (-0.82)	0.020 (0.49)	0.010 (0.14)
DOWNTURN(-3)	-0.0105 (-0.35)	0.002 (0.05)	-0.003 (-0.04)
DOWNTURN(-4)	-0.073 (-2.55)**	-0.090 (-2.38)**	-0.076 (-1.36)
DOWNTURN(-5)	-0.072 (-2.54)**	-0.003 (-0.07)	-0.072 (-1.29)
DOWNTURN(-6)	-0.060 (-2.24)**	-0.090 (-2.63)***	-0.059 (-1.15)
DOWNTURN(-7)	-0.040 (-1.52)	-0.053 (-1.47)	-0.073 (-1.42)
DOWNTURN(-8)	-0.016 (-0.60)	-0.049 (-1.36)	-0.031 (-0.60)
R ²	0.87	0.87	0.87
N	731	731	731
F- test country	3.63***	3.60***	3.57***
F- test time	2.77***	2.82***	2.91***

Note: T-statistics in parenthesis. *, **, *** denote significant at 10%, 5% and 1%, respectively.

Figure 4. **The effects of economic downturns on structural unemployment**
percentage points (s=15)



25. Endogeneity could be a potential serious issue, biasing OLS estimates. Indeed the causality between structural unemployment and the occurrence of an economic downturn could go in both directions. Weak labour market performance, reflecting high structural unemployment, could trigger or be the outcome of an economic downturn. A linear probability model linking structural unemployment to the probability of a crisis has been estimated to investigate whether the explanatory variable was indeed endogenous:

$$Prob(DOWNTURN_{it}) = F(constant + \sum_{j=1}^8 \rho_j DOWNTURN_{it-j} + \sum_{j=0}^8 \theta_j \Delta u_{it-j} + \omega_{it}) \quad (3)$$

Table 3. **Structural unemployment effect on the downturn occurrence probability**

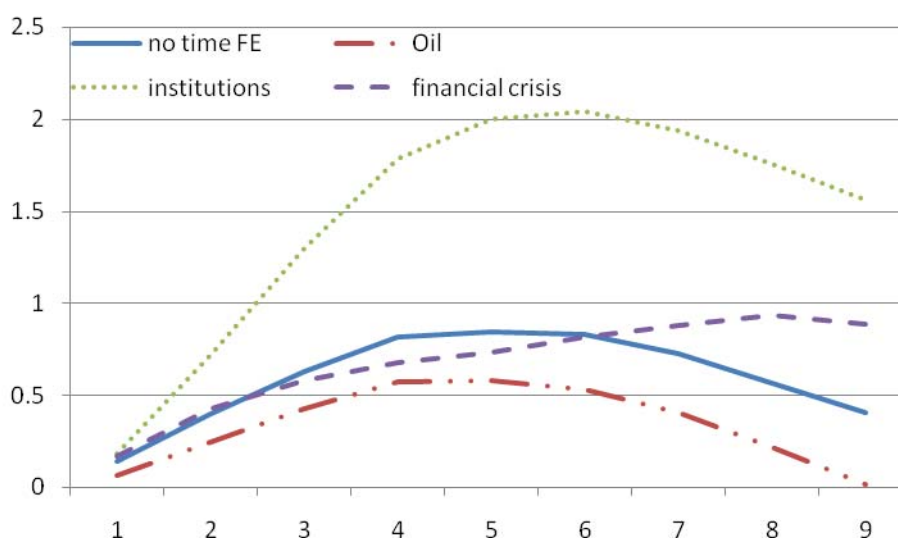
DOWNTURN-1	DOWNTURN-2	DOWNTURN-3	DOWNTURN-4	DOWNTURN-5	DOWNTURN-6	DOWNTURN-7	DOWNTURN-8	
-0.074	-0.079	-0.058	-0.054	-0.056	-0.039	-0.031	-0.050	
(-2.54)**	(-2.41)**	(-2.63)***	(-2.21)**	(-2.46)**	(-2.31)**	(-2.01)**	(-2.48)**	
Δu	$\Delta u^*(-1)$	$\Delta u^*(-2)$	$\Delta u^*(-3)$	$\Delta u^*(-4)$	$\Delta u^*(-5)$	$\Delta u^*(-6)$	$\Delta u^*(-7)$	$\Delta u^*(-8)$
0.054	-0.012	-0.035	0.029	-0.062	0.094	-0.015	-0.031	0.020
(0.80)	(-0.21)	(-0.77)	(0.73)	(-1.25)	(1.59)	(-0.47)	(-0.78)	(0.71)

Note: the downturn dummy corresponds to a degree of severity of 15%. T-statistics in parenthesis. *, **, *** denote significant at 10%, 5% and 1%, respectively.

26. Past values of the changes in structural unemployment are found not to affect the occurrence probability of a downturn (Table 3). The exogeneity assumption of the downturn dummy to changes in structural unemployment thus appears to be warranted.

27. Another possible source of bias in the estimation of equation 1 is the omission of non-related crisis shocks which could impinge on structural unemployment. To tackle this issue, equation (1) has been re-estimated accounting for oil prices¹⁴ (Figure 5 and Table A1, column 2). The results seem to be robust both in terms of the point estimates magnitude and in terms of significance. The inclusion of different institutions, namely EPL, product market regulation and the average replacement ratio has also been examined. The impact of downturns on structural unemployment remains significant, but none of the examined institutions are. Nevertheless, this does not mean that institutions do not matter. Indeed, accounting for institutions augments the amplitude of the crisis impact on structural unemployment. In addition, institutions have been found to matter through interaction terms in the economic literature (Bassanini and Duval, 2006). Finally, some institutions can play a significant role in structural unemployment developments but the lack of reliable data precludes their inclusion in empirical work.

Figure 5. **Robustness tests**
percentage points



Note: No time FE=no time fixed effects; institutions=time and country FE + changes in institutions; oil= time dummies, country FE + oil prices; financial crisis= time and country FE and financial crisis dummy. In all cases, the downturn dummy corresponds to s=15.

28. A final test has been to check whether the result still holds when crisis episodes are restricted to banking and currency crises, as proxied by the financial dummy constructed by Laeven and Valencia (2008). The immediate impact of banking crises on structural unemployment is found to be significant (Figure 5 and Table A1, column 4). Its amplitude is stronger than the effect of mild crises but smaller than the impact of deep economic downturns. Overall, although some differences are visible, the effect of financial crisis on structural unemployment is not significantly different from those of economic downturns in general.

14. When oil prices are included in addition to time dummies, one time dummy is dropped out from the estimation.

6. Effects of institutions on structural unemployment's adjustment to an economic downturn

29. The influence of institutional settings is introduced in the framework by allowing the dynamics and the direct impact of the economic downturn to be different whether institutions are more or less rigid than in the average of OECD countries. The chosen threshold corresponds to the observed average of institutions across countries and time.¹⁵ The use of different thresholds of the same order of magnitude does not markedly change the results.

Table 4. Influence of institutions

	EPL	Product market regulation	Average replacement ratio
HIGH			
$\Delta u^*(-1)$	1.128 (17.38)***	1.241 (21.27)***	1.118 (22.04)***
$\Delta u^*(-2)$	-0.506 (-5.19)***	-0.602 (-7.33)***	-0.371 (-5.13)***
$\Delta u^*(-3)$	0.187 (1.93)*	0.278 (3.37)***	0.055 (0.79)
$\Delta u^*(-4)$	-0.259 (-2.86)***	-0.308 (-3.80)***	-0.231 (-3.51)***
$\Delta u^*(-5)$	0.228 (2.52)**	0.284 (3.65)***	0.341 (5.62)***
$\Delta u^*(-6)$	-0.047 (-0.51)	-0.116 (-1.72)*	-0.143 (-2.54)**
$\Delta u^*(-7)$	-0.047 (-0.52)	-0.048 (-0.81)	-0.072 (-1.38)
$\Delta u^*(-8)$	-0.040 (-0.65)	0.025 (0.56)	0.008 (0.21)
DOWNTURN	0.295 (3.36)***	0.098 (1.41)	0.177 (2.60)***
DOWNTURN(-1)	0.262 (2.95)***	0.214 (3.08)***	0.238 (3.45)***
DOWNTURN(-2)	0.071 (0.81)	0.043 (0.61)	0.001 (0.02)
DOWNTURN(-3)	0.174 (1.99)**	-0.021 (-0.31)	-0.014 (-0.17)
DOWNTURN(-4)	-0.085 (-0.97)	-0.071 (-1.00)	-0.091 (-1.32)
DOWNTURN(-5)	0.224 (2.58)***	-0.091 (-1.28)	0.033 (0.47)
DOWNTURN(-6)	-0.148 (-1.70)*	-0.112 (-1.79)*	-0.160 (-2.34)**
DOWNTURN(-7)	-0.028 (-0.32)	-0.067 (-1.08)	-0.091 (-1.32)
DOWNTURN(-8)	-0.051 (-0.59)	-0.090 (-1.45)	-0.042 (-0.61)

30. The impact of the economic downturn varies depending on institutional settings (Table 4). Institutions are found to affect both the direct impact of the downturn on the crisis and the structural unemployment's persistence in the aftermath of the shock¹⁶. In particular, economic downturns appear to increase structural unemployment significantly in countries and in periods with rigid (above the OECD

15. This corresponds to a value of 30% for the average replacement ratio and 2 for the product market regulation indicator and EPL.

16. In contrast, we did not find any significant effect for the dummy capturing the extent of institutional rigidity.

average) institutions. By contrast, no significant effect of economic downturns on structural unemployment is found in flexible economies.¹⁷

Table 4. **Influence of institutions** (*contd*)

	EPL	Product market regulation	Average replacement ratio
LOW			
$\Delta u^*(-1)$	0.708 (9.26)***	0.964 (22.78)***	0.892 (16.87)***
$\Delta u^*(-2)$	-0.189 (-2.24)**	-0.216 (-3.82)***	-0.173 (-2.43)**
$\Delta u^*(-3)$	0.211 (2.66)***	0.117 (2.10)**	0.170 (2.42)**
$\Delta u^*(-4)$	-0.250 (-3.20)***	-0.267 (-4.91)***	-0.273 (-4.06)***
$\Delta u^*(-5)$	0.175 (2.30)**	0.257 (4.81)***	0.194 (2.96)***
$\Delta u^*(-6)$	-0.032 (-0.45)	-0.141 (-2.93)***	-0.101 (-1.65)
$\Delta u^*(-7)$	0.059 (0.90)	-0.045 (-0.99)	-0.107 (-1.83)*
$\Delta u^*(-8)$	-0.055 (-1.04)	0.014 (0.41)	0.082 (1.83)*
DOWNTURN	0.027 (0.43)	0.064 (1.05)	0.002 (0.03)
DOWNTURN(-1)	-0.005 (-0.08)	0.014 (0.24)	-0.001 (-0.02)
DOWNTURN(-2)	0.030 (0.59)	-0.021 (-0.41)	0.031 (0.58)
DOWNTURN(-3)	-0.045 (-0.77)	0.031 (0.60)	0.008 (0.16)
DOWNTURN(-4)	-0.158 (-3.09)***	-0.075 (-1.68)*	-0.089 (-1.93)*
DOWNTURN(-5)	-0.056 (-1.09)	0.008 (0.18)	-0.028 (-0.60)
DOWNTURN(-6)	-0.131 (-2.74)***	-0.077 (-1.68)*	-0.089 (-1.93)**
DOWNTURN(-7)	-0.119 (-2.54)**	-0.053 (-1.18)	-0.048 (-1.12)
DOWNTURN(-8)	-0.094 (-2.20)**	-0.032 (-0.75)	-0.059 (-1.42)
R ²	0.84	0.88	0.87
N	731	731	731
F- test country	1.22	3.65***	3.35***
F- test time	1.75***	2.84***	2.75***

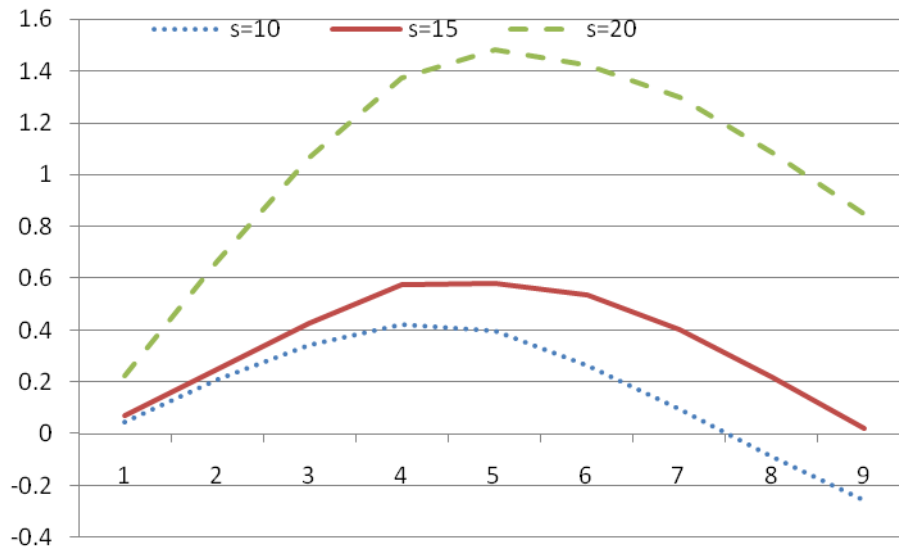
T-statistics in parenthesis. *, **, *** denote significant at 10%, 5% and 1%, respectively.

Note: the DOWNTURN dummy corresponds to s=15. Dummy for institutions have been included in the analysis, but they are not reported since they turned out not to be significant.

31. The influence of market institutions is particularly important in situation of extreme severe downturns (Figure 6 and Table A2). While the rise in structural unemployment after a deep recession (corresponding to output losses of at least 20%) is on average at around 1.5 percentage points at the peak, such a rise could amount to the double in countries displaying high EPL.

17. This is consistent with other analysis on the resilience of economies after an exogenous shock (Duval *et al.*, 2007)

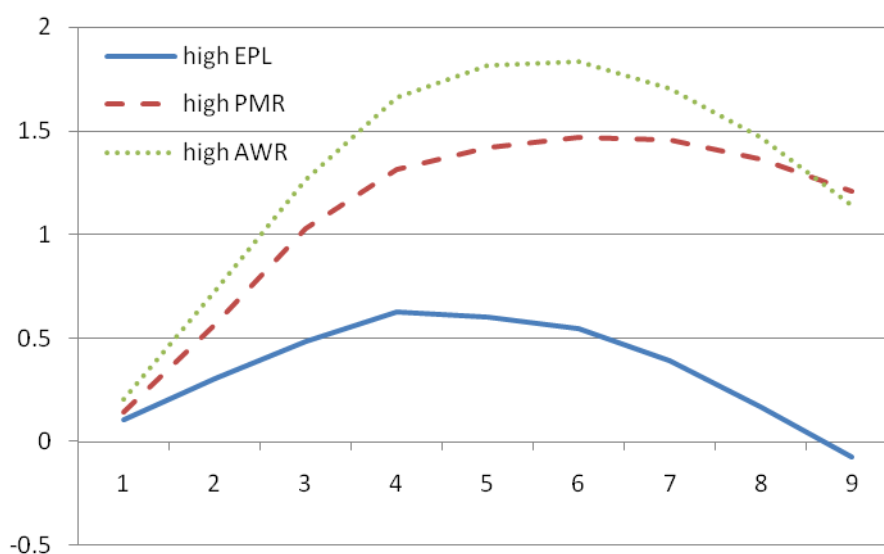
Figure 6. **The effects of economic downturns on structural unemployment depending on the severity of the downturn**
percentage points



32. Although all the institutions tested in the analysis appear to affect the impact of the downturn on structural unemployment, some differences between institutions are visible (Figure 7). While the shape of the response to economic downturn is similar in all the three cases, the magnitude differs, with a high (above the average) level of average replacement ratio generating the higher increase in structural unemployment.¹⁸

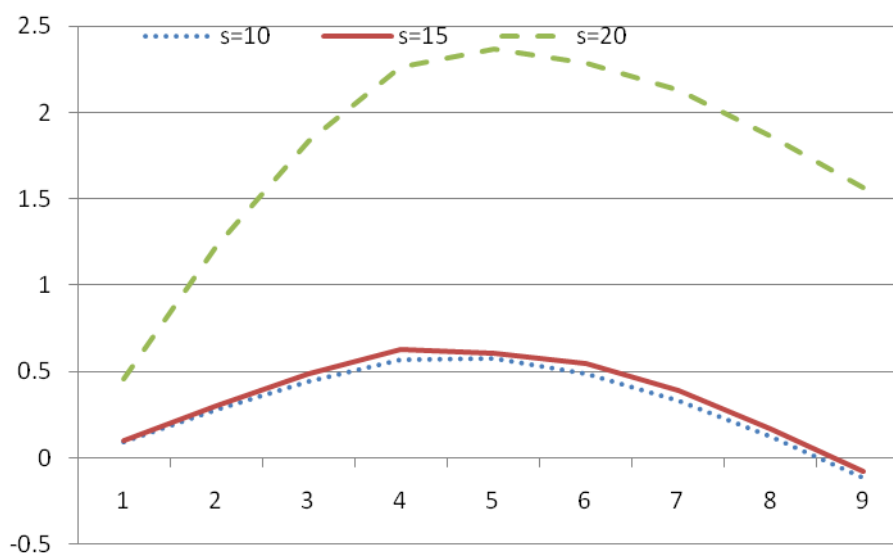
18. Charts relative to flexible institution settings are not presented as that the associated impulse response is not statistically significant.

Figure 7. **Effect on structural unemployment, accounting for institutions**
percentage points



Note: EPL: Employment Protection Legislation; PMR: Product Market Regulation; AWR: Average Replacement ratio. The downturn dummy corresponds to $s=15$.

Figure 8. **The effects of economic downturns on structural unemployment, when EPL is above average**
percentage points



33. By contrast, the rise in structural unemployment in high EPL countries would be less pronounced. Looking at EPL by type of contracts, the preceding findings appear to be driven by EPL for permanent contracts (Table 5). Indeed, when EPL for regular contracts is substituted to aggregate EPL in equation 2, an economic downturn is also found to have a positive and marked effect on structural unemployment only when EPL is above the country average (Table 5, column 1), and the extent of the crisis impact is found of the same order. Opposite effects are surprisingly found when EPL for temporary

contracts is substituted in the equation. This could reflect labour market features in OECD countries. Economies which display low EPL for temporary contracts are usually also characterised by stronger protection for regular than for temporary contracts (Figure 9). When a crisis hits the economy, workers on a permanent contract who lose their job will either stay unemployed for a while or be offered temporary contracts which are associated with lower firing costs. This is likely to increase structural unemployment.

Table 5. EPL for permanent contracts and EPL for temporary contracts

	EPL for permanent contracts	EPL for temporary contracts	EPL
	HIGH		
$\Delta u^*(-1)$	1.112 (17.35)***	1.182 (14.87)***	1.128 (17.38)***
$\Delta u^*(-2)$	-0.442 (-4.59)***	-0.441 (-3.91)***	-0.506 (-5.19)***
$\Delta u^*(-3)$	0.182 (1.94)*	0.242 (2.31)**	0.187 (1.93)*
$\Delta u^*(-4)$	-0.297 (-3.47)***	-0.364 (-3.81)***	-0.259 (-2.86)***
$\Delta u^*(-5)$	0.289 (3.37)***	0.302 (3.14)***	0.228 (2.52)**
$\Delta u^*(-6)$	-0.088 (-1.01)	-0.181 (-1.88)*	-0.047 (-0.51)
$\Delta u^*(-7)$	-0.059 (-0.70)	0.028 (0.30)	-0.047 (-0.52)
$\Delta u^*(-8)$	-0.040 (-0.65)	0.037 (0.51)	-0.040 (-0.65)
DOWNTURN	0.267 (3.13)***	-0.092 (-0.87)	0.295 (3.36)***
DOWNTURN(-1)	0.324 (3.77)***	0.158 (1.54)	0.262 (2.95)***
DOWNTURN(-2)	0.057 (0.66)	-0.045 (-0.45)	0.071 (0.81)
DOWNTURN(-3)	0.171 (2.03)**	0.093 (0.91)	0.174 (1.99)**
DOWNTURN(-4)	-0.121 (-1.44)	-0.031 (-0.31)	-0.085 (-0.97)
DOWNTURN(-5)	0.185 (2.23)**	0.161 (1.62)	0.224 (2.58)***
DOWNTURN(-6)	-0.192 (-2.31)**	-0.183 (-1.82)*	-0.148 (-1.70)*
DOWNTURN(-7)	-0.044 (-0.53)	-0.013 (-0.13)	-0.028 (-0.32)
DOWNTURN(-8)	-0.074 (-0.89)	-0.129 (-1.30)	-0.051 (-0.59)

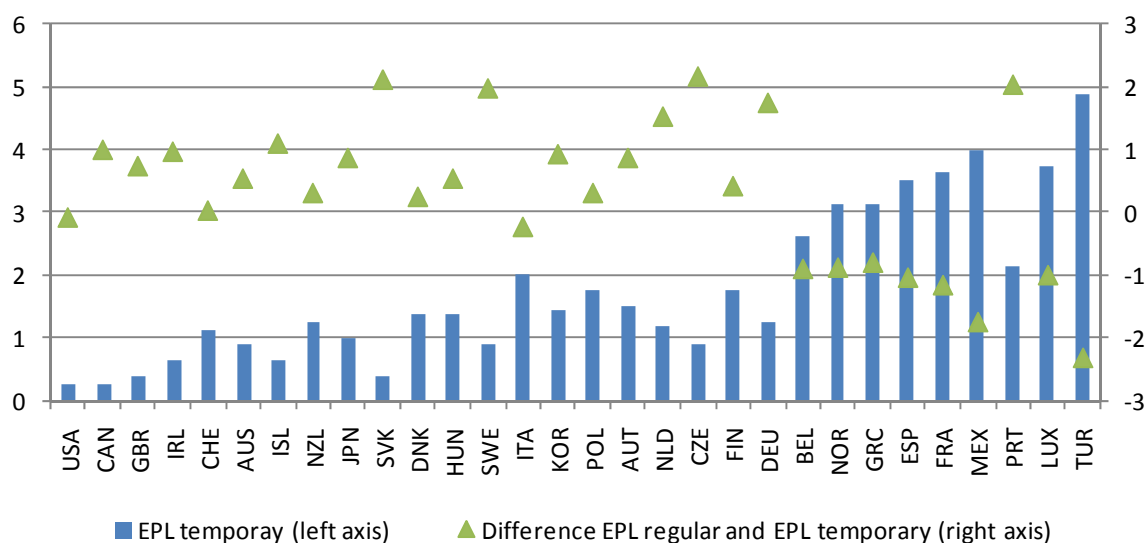
Table 5. EPL for permanent contracts and EPL for temporary contracts (*contd*)

	EPL for permanent contracts	EPL for temporary contracts	EPL
LOW			
$\Delta u^*(-1)$	0.956 (20.31) ^{***}	1.006 (24.88) ^{***}	0.708 (9.26) ^{***}
$\Delta u^*(-2)$	-0.219 (-3.44) ^{***}	-0.280 (-4.96) ^{***}	-0.189 (-2.24) ^{**}
$\Delta u^*(-3)$	0.142 (2.32) ^{**}	0.103 (1.84) [*]	0.211 (2.66) ^{***}
$\Delta u^*(-4)$	-0.294 (-4.96) ^{***}	-0.265 (-4.85) ^{***}	-0.250 (-3.20) ^{***}
$\Delta u^*(-5)$	0.264 (4.65) ^{***}	0.307 (5.85) ^{***}	0.175 (2.30) ^{**}
$\Delta u^*(-6)$	-0.142 (-2.81) ^{***}	-0.124 (-2.58) ^{***}	-0.032 (-0.45)
$\Delta u^*(-7)$	-0.047 (-1.00)	-0.083 (-1.86) [*]	0.059 (0.90)
$\Delta u^*(-8)$	-0.074 (-0.89)	0.0258 (0.79)	-0.055 (-1.04)
DOWNTURN	-0.001 (-0.02)	0.115 (2.15) ^{**}	0.027 (0.43)
DOWNTURN(-1)	0.009 (0.16)	0.113 (2.09) ^{**}	-0.005 (-0.08)
DOWNTURN(-2)	0.031 (0.62)	0.036 (0.75)	0.030 (0.59)
DOWNTURN(-3)	-0.028 (-0.56)	-0.014 (-0.29)	-0.045 (-0.77)
DOWNTURN(-4)	-0.088 (-1.98) ^{**}	-0.123 (-2.86) ^{***}	-0.158 (-3.09) ^{***}
DOWNTURN(-5)	-0.043 (-0.53)	-0.035 (-0.81)	-0.056 (-1.09)
DOWNTURN(-6)	-0.078 (-1.86) [*]	-0.093 (-2.26) ^{**}	-0.131 (-2.74) ^{***}
DOWNTURN(-7)	-0.054 (-1.30)	-0.054 (-1.32)	-0.119 (-2.54) ^{**}
DOWNTURN(-8)	-0.041 (-1.02)	-0.038 (-0.98)	-0.094 (-2.20) ^{**}
R ²	0.87	0.87	0.84
N	491	491	491
F- test country	268 ^{***}	3.69 ^{***}	1.22
F- test time	3.77 ^{***}	2.79 ^{***}	1.75 ^{***}

T-statistics in parenthesis. *, **, *** denote significant at 10%, 5% and 1%, respectively.

Note: the DOWNTURN dummy corresponds to $s = 15$. Dummy for institutions have been included in the analysis, but they are not reported since they resulted to not be significant.

Figure 9. EPL for temporary contracts



7. Conclusions and policy implications

34. The empirical investigations undertaken in this paper suggest that economic downturns usually materialise into a marked rise in the level of structural unemployment and this effect is likely to be magnified by stringent institutional settings.

35. These findings have direct policy implications in the current economic environment. The ongoing crisis is severely hitting OECD economies, with a dramatic deterioration in labour market performance. According to the last Employment Outlook, unemployment in the OECD area is projected to rise by over 25 million from 2007 to 2010, by far the largest and the most rapid increase in the post-war period (OECD, 2009). In this context, governments should adopt measures that aim to limit hysteresis-type effects. This could be done through appropriate employment and social policies that support long-term unemployed and vulnerable workers to avoid a rise in the structural unemployment. Moreover, reforms in product and labor markets could also prepare the economy to cope with future crises. This would include revisiting employment protection rules by softening too stringent laws, especially for permanent contracts, lowering the average replacement ratio and injecting more flexibility on product markets.

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APPENDIX

Table A1. Robustness checks

	S=15 and no time FE	S= 15, time dummies, country FE +oil shocks	S= 15, time & country FE introduction of institutions (Δ EPL , Δ PMR, Δ AWR)	Financial DOWNTURN dummy time & country FE
$\Delta u^*(-1)$	1.079 (28.74)***	1.037 (27.13)***	1.071 (17.19)***	1.042 (27.36)***
$\Delta u^*(-2)$	-0.308 (-5.64)***	-0.299 (-5.45)***	-0.332 (-3.67)***	-0.304 (-5.59)***
$\Delta u^*(-3)$	0.101 (1.86)*	0.106 (1.95)**	-0.022 (-0.23)	0.100 (1.84)*
$\Delta u^*(-4)$	-0.267 (-5.07)***	-0.269 (-5.05)***	-0.113 (-1.21)	-0.269 (-5.11)***
$\Delta u^*(-5)$	0.333 (6.56)***	0.298 (5.80)***	0.223 (2.62)***	0.289 (5.70)***
$\Delta u^*(-6)$	-0.146 (-3.12)***	-0.129 (-2.74)***	-0.125 (-1.69)***	-0.127 (-2.73)***
$\Delta u^*(-7)$	-0.068 (-1.56)	-0.068 (-1.56)	-0.041 (-0.63)	-0.065 (-1.51)
$\Delta u^*(-8)$	0.058 (1.87)*	0.030 (0.95)	0.016 (0.34)	0.042 (1.37)
DOWNTURN	0.142 (3.19)***	0.070 (1.57)	0.187 (2.19)**	0.171 (4.27)***
DOWNTURN(-1)	0.102 (2.29)**	0.104 (2.33)***	0.333 (3.79)***	0.077 (1.89)*
DOWNTURN(-2)	0.003 (0.08)	0.020 (0.49)	0.069 (0.79)	-0.058 (-1.43)
DOWNTURN(-3)	-0.005 (-0.12)	0.002 (0.05)	0.044 (0.51)	-0.003 (-0.08)
DOWNTURN(-4)	-0.083 (-2.19)**	-0.090 (-2.38)***	-0.076 (-1.11)	0.017 (0.40)
DOWNTURN(-5)	0.005 (0.14)	-0.003 (-0.19)	0.002 (0.03)	0.066 (1.80)*
DOWNTURN(-6)	-0.095 (-2.60)***	-0.090 (-2.47)***	-0.099 (-1.73)*	-0.030 (-0.94)
DOWNTURN(-7)	-0.045 (-1.23)	-0.053 (-1.47)	-0.047 (-0.83)	0.036 (1.17)
DOWNTURN(-8)	-0.021 (-0.57)	-0.049 (-1.36)	-0.030 (-0.58)	-0.080 (-2.54)**
R ²	0.84	0.87	0.85	0.87
N	731	731	306	731

T-statistics in parenthesis. *, **, *** denote significant at 10%, 5% and 1%, respectively.

Table A2. Effect of economic downturns on structural unemployment and severity of crises

	s= 10	s =15	s= 20
HIGH EPL			
$\Delta u^*(-1)$	1.131 (18.02)***	1.128 (17.38)***	1.008 (14.79)***
$\Delta u^*(-2)$	-0.481 (-5.08)***	-0.506 (-5.19)***	-0.345 (-3.54)***
$\Delta u^*(-3)$	0.145 (1.53)	0.187 (1.93)*	0.171 (1.81)*
$\Delta u^*(-4)$	-0.218 (-2.47)**	-0.259 (-2.86)***	-0.186 (-2.09)**
$\Delta u^*(-5)$	0.229 (2.59)**	0.228 (2.52)**	0.101 (1.15)
$\Delta u^*(-6)$	-0.041 (-0.46)	-0.047 (-0.51)	-0.005 (-0.06)
$\Delta u^*(-7)$	-0.081 (-0.93)	-0.047 (-0.52)	-0.088 (-1.00)
$\Delta u^*(-8)$	-0.003 (-0.04)	-0.040 (-0.65)	0.053 (0.88)
DOWNTURN	0.182 (3.01)***	0.295 (3.36)***	0.977 (6.70)***
DOWNTURN(-1)	0.161 (2.62)***	0.262 (2.95)***	0.642 (3.99)***
DOWNTURN(-2)	0.042 (0.68)	0.071 (0.81)	0.193 (1.20)
DOWNTURN(-3)	0.095 (1.53)	0.174 (1.99)**	0.062 (0.40)
DOWNTURN(-4)	-0.044 (-0.70)	-0.085 (-0.97)	-0.494 (-3.22)***
DOWNTURN(-5)	0.068 (1.10)	0.224 (2.58)***	-0.097 (0.62)
DOWNTURN(-6)	-0.095 (-1.53)	-0.148 (-1.70)*	-0.165 (-1.04)
DOWNTURN(-7)	0.002 (0.03)	-0.028 (-0.32)	-0.073 (-0.46)
DOWNTURN(-8)	-0.020 (-0.33)	-0.051 (-0.59)	0.076 (0.50)

Table A2. **Effect of economic downturns on structural unemployment and severity of crises** (*contd*)

	s= 10	s =15	s= 20
LOW EPL			
$\Delta u^*(-1)$	0.659 (8.43) ^{***}	0.708 (9.26) ^{***}	0.744 (10.27) ^{***}
$\Delta u^*(-2)$	-0.177 (-2.06) ^{**}	-0.189 (-2.24) ^{**}	-0.219 (-2.69) ^{***}
$\Delta u^*(-3)$	0.238 (2.99) ^{***}	0.211 (2.66) ^{***}	0.194 (2.52) ^{**}
$\Delta u^*(-4)$	-0.253 (-3.25) ^{***}	-0.250 (-3.20) ^{***}	-0.291 (-3.89) ^{***}
$\Delta u^*(-5)$	0.172 (2.22)	0.175 (2.30) ^{**}	0.175 (2.38) ^{**}
$\Delta u^*(-6)$	-0.032 (-0.44)	-0.032 (-0.45)	-0.104 (-1.52)
$\Delta u^*(-7)$	0.056 (0.82)	0.059 (0.90)	0.072 (1.12)
$\Delta u^*(-8)$	-0.070 (-1.29)	-0.055 (-1.04)	-0.052 (-1.01)
DOWNTURN	0.029 (0.58)	0.027 (0.43)	0.166 (1.37)
DOWNTURN(-1)	0.055 (1.10)	-0.005 (-0.08)	0.041 (1.16)
DOWNTURN(-2)	0.006 (0.13)	0.030 (0.59)	-0.091 (-0.68)
DOWNTURN(-3)	-0.046 (-0.96)	-0.045 (-0.77)	-0.120 (-0.91)
DOWNTURN(-4)	-0.143 (-3.15) ^{***}	-0.158 (-3.09) ^{***}	-0.108 (-1.36)
DOWNTURN(-5)	-0.123 (-2.67) ^{***}	-0.056 (-1.09)	-0.123 (-1.52)
DOWNTURN(-6)	-0.095 (-1.53) ^{**}	-0.131 (-2.74) ^{***}	-0.087 (-1.26)
DOWNTURN(-7)	-0.133 (-3.14) ^{***}	-0.119 (-2.54) ^{**}	-0.150 (-2.19) ^{**}
DOWNTURN(-8)	-0.124 (-3.03) ^{***}	-0.094 (-2.20) ^{**}	-0.086 (-1.34)
R ²	0.83	0.84	0.85
N	491	491	491
F- test country	1.39*	1.22	1.29
F- test time	1.92 ^{***}	1.75 ^{***}	2.06 ^{***}

T-statistics in parenthesis. *, **, *** denote significant at 10%, 5% and 1%, respectively.

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