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European Unemployment Revisited: Shocks, Institutions, Integration

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Abstract

This paper painstakingly restores a vintage empirical model of unemployment determination by interacting shocks and institutions, and runs it on recent data featuring dramatic shocks and controversial institutional change. Theoretical insights and empirical results suggest that reforms and capital flows contribute sensible and interrelated explanations for the recent twists and turns of unemployment rates in Europe and elsewhere.

JEL-Codes: E240.

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1 Introduction

Unemployment is a vast issue that this paper approaches from a particular perspective. Figure 1 displays unemployment rate paths over 5-year periods since 1960 for the countries in the sample studied by Blanchard and Wolfers (2000, henceforth BW). To improve legibility three panels plot the data separately and on different scales for current euro area countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain), other European countries (Denmark, Norway, Sweden, Switzerland, United Kingdom), and non-European countries (Australia, Canada, Japan, New Zealand, United States). BW's regressions could only analyze the first half or so of the currently available time span. In that sample, unemployment rates trended upwards in European (especially Continental) countries, but moved cyclically along fairly stable and ultimately lower levels in other (especially "Anglo-Saxon") countries. BW first assessed the empirical fit of a model that confronts institutionally different countries with common shocks, then explored the empirical relevance of three country-specific macroeconomic shock series and of their interactions with labor market institutions.

This paper revisits the BW empirical approach and applies it to recent data featuring controversial labor market reforms and uncommon (unprecedented, and with different implications for different countries) macroeconomic events. At just about the time when BW was being written the data began to look different. The previous high persistence or even hysteresis (Blanchard and Summers, 1986) of unemployment came to an end in Europe. Unemployment rates began to decline and converge during the run up to and early phases of Economic and Monetary Union, then surged and diverged as the Great Recession and the European debt crisis hit. These new data provide a useful testing ground for BW's insights as well as for those of Nickell, Nunziata, and Ochel (2005), Bertola, Blau, and Kahn (2002), and of the many other papers that extend and finesse its approach: even the dataset analyzed by Bassanini and Duval (2006), perhaps the most accomplished empirical exercise of this type, stops in 2003.

The empirical exercise also offers an opportunity to appreciate and discuss conceptual and methodological aspects of BW, of the related work in Blanchard (1997, 2006) and in those papers' references, and more generally of macro-level, policy-oriented empirical work on labor market institutions and outcomes. Country panel regressions are not as fashionable as they used to be. Because plausibly relevant variables and mechanisms are much more numerous than available obser-

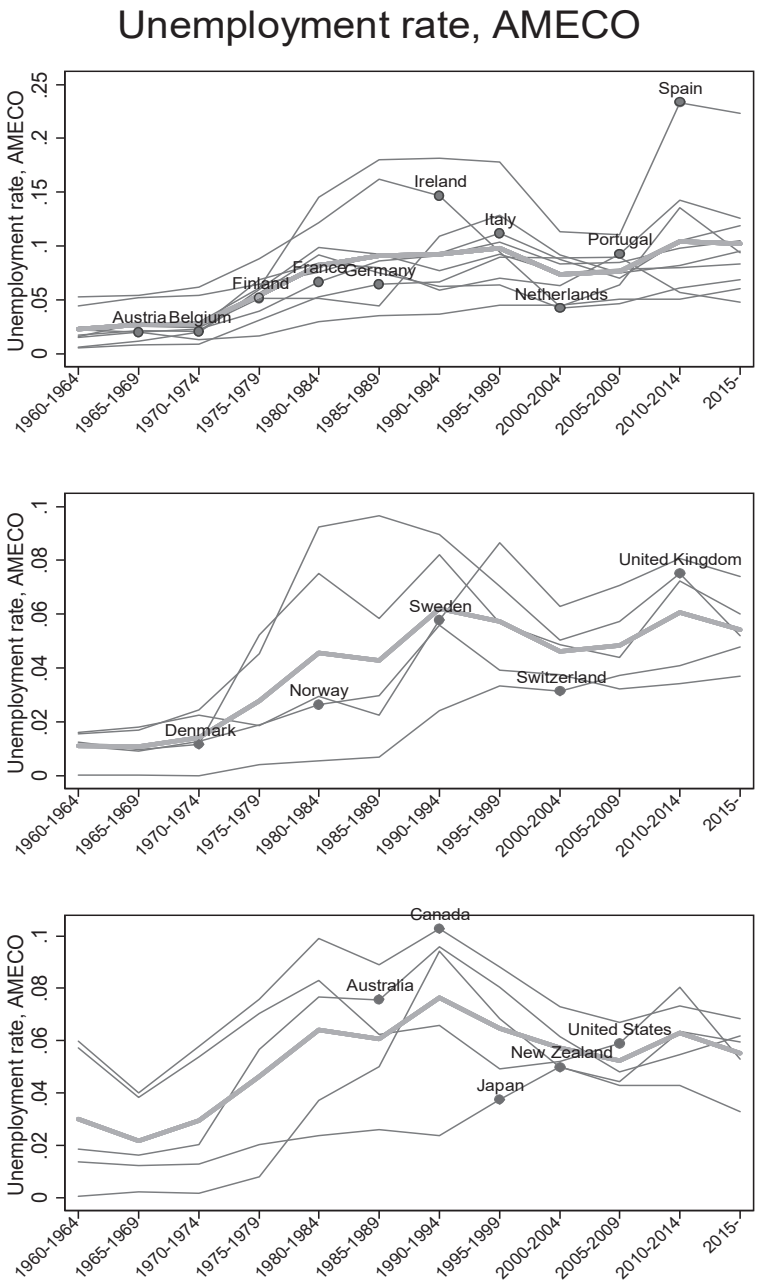


Figure 1: Unemployment rates by 5-year periods (source: AMECO). Thick lines plot unweighted averages.

vations, empirical models that seek aggregate evidence unavoidably oversimplify reality, and results can be confusing and misleading (Baccaro and Rei, 2007). As discussed in BW, the statistical significance of interesting coefficients is sometimes driven by inclusion or omission of a single country's observations, and variable definitions and regression specification choices can be suspicious just because the results confirm the authors' theoretical priors. Empirical work on limited data cannot on its own provide robust insights. But regressions, like paintings, can portray reality in an interesting way, and crisply outline sensible theoretical mechanisms. The BW empirical approach established that institutions do not suffice to explain unemployment experiences. The present paper suggests that a next step, focused on the international spillovers triggered by financial integration, may help interpret sharp unemployment swings within Europe, and shed some light on the determinants of the institutions that in turn determine unemployment.

Section 2 updates the original BW regressions. The exercise finds that a "shocks and institutions" approach still distills clear and intriguing messages from the extended country panel, but fits recent evidence less precisely and much less intuitively than the original sample. Section 3 revisits the theoretical underpinnings of the BW regressions and, extending the work of an earlier paper (Bertola, 2016), outlines the role of international capital mobility as a source of labor market shocks and a determinant of labor market institutions. Aiming to characterize the strengths and shortcomings of the BW approach, Section 4 obtains preliminary relevant evidence from the updated sample. Section 5 concludes with a brief summary and discussion of policy implications.

2 Restoration and update

In the following expressions U_{ct} is the unemployment rate in country c and period t. Explanatory variables I_{ict} and S_{jct} are institutions (indexed by i) and shocks (indexed by j) in country c and period t. All are measured as deviations from their mean within each regression's sample, which is a slightly unbalanced panel if data are not available (see the Data Appendix for a discussion of definitions and sources, and plots displaying available observations by variable, country, and period). The regressions may also include country fixed effects c_c and period fixed effects t_t.

Table 1: Replication and update of BW Table 1

	(1)	(2)	(3)
	u	u	u
	b/t	b/t	b/t
UI repl.rate	0.02***	0.02***	0.05***
	(4.7)	(4.3)	(2.7)
UI benef.length	0.21***	0.15***	0.02
	(5.3)	(3.3)	(0.1)
Active labor policy	0.02**	0.00	0.03
	(2.4)	(0.3)	(0.9)
Empl.protection	0.05***	0.05***	0.09
	(3.4)	(3.5)	(1.4)
Tax wedge	0.02***	0.01	-0.00
	(2.6)	(1.0)	(-0.1)
Union coverage	0.09	0.18	1.25
	(0.6)	(1.1)	(1.6)
Union density	0.01*	-0.00	0.03*
	(1.9)	(-0.1)	(1.7)
Coordination	0.30***	0.28***	1.52***
	(6.1)	(4.8)	(4.2)
r2	0.89	0.94	0.81
df_m	33	38	33
N	159	240	140

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: original BW dataset.
Column 2: AMECO unemployment, BW institutions.
Column 3: only recent sample.

2.1 Institutions and time

Table 1 estimates a regression that explains unemployment rates with period dummies, allowing this time effect to depend on time-invariant institutional characteristics of each country and country fixed effects: [1]

$$U_{ct} = \left(1 + \sum_i \beta_i I_{ic}\right) t_t + c_c + \varepsilon_{ct}. \tag{1}$$

The first column replicates BW. The regression asks the data whether institutions matter differently at different times. This was a natural question when observing unemployment fanning out between the 1970s and the 1990s. The answer is that observable institutional characteristics do significantly influence the amplitude of unemployment's variation over time. Institutions are measured in a way

[1] The Stata syntax for this equation is
`$DEPV = ( {i:$INST } )*( {tef:_Iperiod_*} ) + {tef:_Iperiod_*} + {c:_Icn_*}`
where `$DEPV` contains the name of the relevant unemployment series and `$INST` lists the relevant institutional variables.

that implies positive interaction coefficients if generous unemployment insurance, strong employment protection, large tax wedges, and pervasive unionization increase the persistence of unemployment through cycles that would generate unemployment fluctuations in less regulated economies, while active labor market policies and wage-setting coordination (both taken with negative sign) reduce unemployment persistence. The BW sample's data conform to expectations in that most interaction effects are significantly larger than zero.

The second column uses all currently available unemployment rates (shown in Figure 1). The sample includes one-and-a-half as many 5-year periods (the first, "1960-1964", and last, "2015-" are averages of fewer than 5 observations) for the 20 countries considered in BW; five degrees of freedom are consumed by the new period effects. Not surprisingly, some of the institutional indicators measured in the late 1980s and early 1990s lose significance. One is active labor market policy, which in BW's data (drawn from Nickell, 1997) was measured in a rather elaborate way that would be difficult to update and may be particularly subject to the data-mining suspicions voiced by BW. The other two are the tax wedge and union density, which updated series (see the Data Appendix) find to have changed rather differently in different countries. Other indicators do remain significantly related to unemployment variation even as it ceases to trend upwards in column 2, which runs the regression on the complete updated sample, and column 3, which uses only its more recent portion.

The regressions in Table 2 relate unemployment levels to time-invariant institutions rather than unrestricted country dummies,

$$U_{ct} = \left(1 + \sum_i \beta_i I_{ic}\right) t_t + \sum_i \gamma_i I_{ic} + \varepsilon_{ct}. \tag{2}$$

As in the original BW sample used in column 1, so in the updated and more recent samples of columns 2 and 3 the interaction coefficients are somewhat weaker than those estimated in Table 1.

Table 3 reports interaction coefficient estimates from the nonlinear regression[2]

$$U_{ct} = \left(1 + \sum_i \beta_i I_{ict}\right) \gamma t_t + c_c + \varepsilon_{ct}, \tag{3}$$

which lets period effects interact with time-varying indicators of country-specific labor market institutions. The results were not particularly strong in the original BW regressions replicated in columns 1 and 2. The remaining columns of the Table run the regression on the complete current sample, using some time-invariant BW institutional indicators and updated indicators of unemployment in-

[2]In Stata,
`$DEPV = ({i:$INSTtv})*({tef:_Iperiod_*}) + {tef:_Iperiod_*} + {c:_Icn_*}` .

Table 2: Replication and update of BW Table 2 col 1

	(1)	(2)	(3)
	u	u	u
	b/t	b/t	b/t
UI repl.rate	0.02***	0.01***	0.05**
	(3.6)	(3.7)	(2.4)
UI benef.length	0.22***	0.16***	0.02
	(4.9)	(3.5)	(0.1)
Active labor policy	0.01**	-0.00	0.03
	(2.0)	(-0.1)	(0.9)
Empl.protection	0.06***	0.06***	0.09
	(3.0)	(3.2)	(0.9)
Tax wedge	0.01	0.00	-0.00
	(1.6)	(0.1)	(-0.1)
Union coverage	-0.07	0.04	1.25
	(-0.4)	(0.2)	(1.2)
Union density	0.01*	-0.00	0.03
	(1.7)	(-0.2)	(1.3)
Coordination	0.27***	0.25***	1.52***
	(4.9)	(4.1)	(3.6)
r2	0.82	0.92	0.64
df_m	21	26	22
N	159	240	140

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: original BW dataset.
Column 2: AMECO unemployment, BW institutions.
Column 3: only recent sample.

surance generosity, employment protection, labor taxation, and union density. These, documented and shown in the Data Appendix, capture quantitatively some familiar trends (such as the secular decline of unionization) and swings (such as the US increase and German decline of unemployment insurance generosity in the 2000s). Regardless of whether only the originally available time-varying indicators are updated (in column 3), and of whether time-invariant indicators of active labor policy, union coverage, and wage setting coordination are included (in column 4) or excluded (in column 5), unemployment insurance generosity and labor taxation have significantly positive period-interaction coefficients, while employment protection's interaction coefficient is insignificant. Union density's interaction is mildly and negatively significant only when indicators of wage-bargaining coverage and coordination are omitted.

Table 3: Replication and update of BW Table 3

	(1)	(2)	(3)	(4)	(5)
	u	u	u	u	u
	b/t	b/t	b/t	b/t	b/t
UI repl rate, 1st year	0.01*				
	(1.7)				
UI repl.rate	0.02***	0.02***	0.02***	0.02***	0.01***
	(3.1)	(4.0)	(3.7)	(3.7)	(3.4)
Active labor policy	0.01	0.02**	-0.01	-0.00	
	(0.4)	(2.4)	(-1.0)	(-0.3)	
Empl.protection	0.03*	0.02	-0.03	0.01	-0.00
	(1.7)	(0.2)	(-0.4)	(0.2)	(-0.1)
Tax wedge	0.02	0.02***	0.01*	0.01**	0.02***
	(1.6)	(3.0)	(1.7)	(2.0)	(2.9)
Union coverage	0.39**	0.74***	0.61***	0.52***	
	(2.4)	(5.7)	(4.4)	(3.9)	
Union density	0.00	0.00	-0.01	-0.00	-0.00*
	(0.0)	(1.0)	(-1.6)	(-0.4)	(-1.7)
Coordination	0.32***	0.37***	0.25***	0.29***	
	(6.8)	(5.9)	(4.5)	(4.4)	
r2	0.87	0.87	0.81	0.81	0.78
df_m	33	32	35	35	32
N	159	159	220	220	220

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: original dataset, replicates BW col.2.
Column 2: original dataset, replicates BW col.4.
Column 3: extended data, time-varying UI repl.rate and EPL.
Column 4: time-varying UI repl.rate and EPL, tax, union density.
Column 5: no time-invariant institutions.

2.2 Institutions and shocks

Consider next the role in the more recent period of the country-specific labor market shocks defined by BW, and updated here as discussed in detail by the Data Appendix. These are the rate of total factor productivity (TFP) growth, which is negatively associated with unemployment if real wages fail to adjust to it, and measured with a negative sign to imply a positive expected coefficient; the real interest rate, which through capital accumulation is expected to reduce employment at given wage and productivity; and a dynamically adjusted log labor share which, under conditions discussed in Blanchard (1997) and in Section 3 below, can capture the unemployment implications of temporarily misaligned real wages.

Figure 2 plots these indicators, again separately on different scales for three groups of countries. After the end of the BW sample, TFP ceases to slow down and fluctuates widely in the run-up

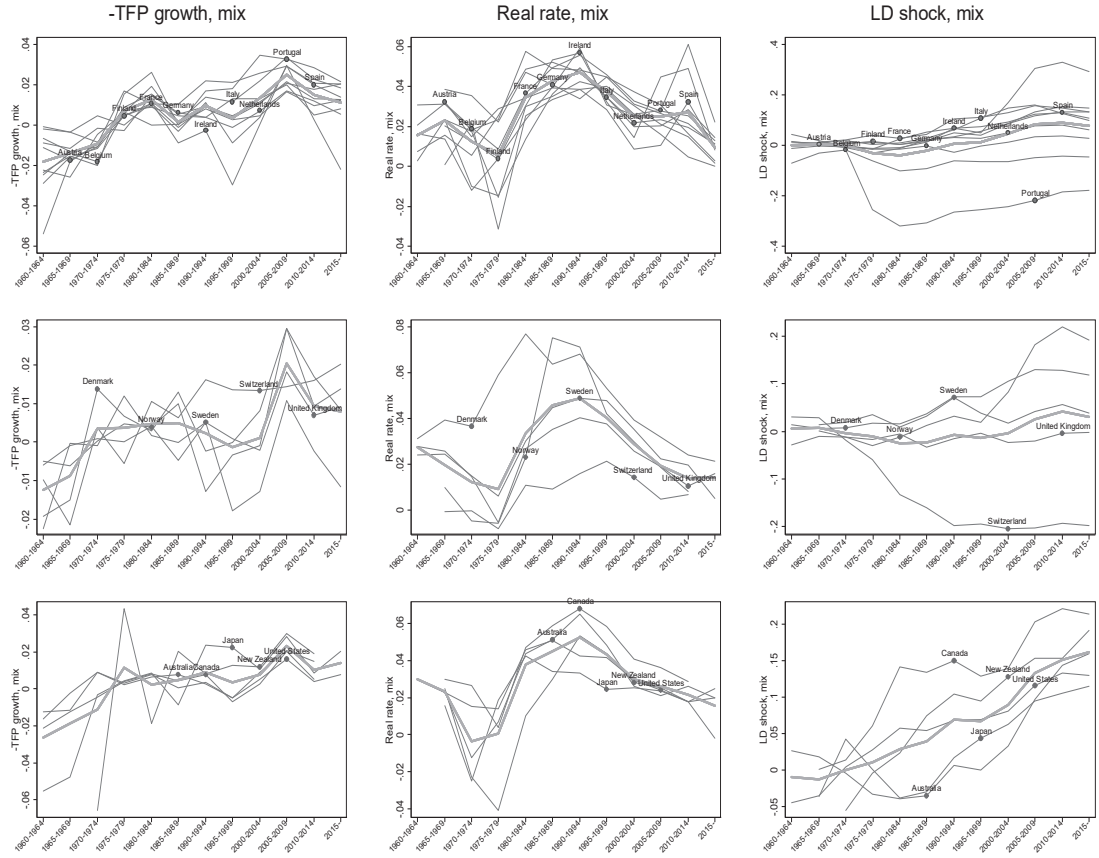


Figure 2: Time paths of 5-period average shocks indicators constructed on the basis of BW definitions using AMECO and OECD annual data (see the Data Appendix for definitions and sources). Thick lines plot unweighted averages.

Table 4: Replication and update of BW Table 4, column 1

	(1)	(2)	(3)
	u	u	u
	b/t	b/t	b/t
-TFP growth	0.43***	0.48***	-0.55**
	(2.8)	(3.4)	(-2.3)
Real rate	0.62***	0.72***	0.48***
	(5.2)	(7.5)	(3.3)
LD shock	0.18**	0.09***	0.11**
	(2.4)	(2.8)	(2.0)
r2	0.66	0.63	0.74
df_m	23	23	22
N	131	218	135

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: BW dataset (with Port.rev.dummy).
Column 2: AMECO unemployment, spliced shocks.
Column 3: only recent sample.

to the great recession and in its aftermath. The real rate, after a strong increase in the 1980s, declines sharply from the mid 1990s to the current "secular stagnation" phase, on time paths that are very similar across countries. The labor demand shock turns positive in European countries only after the end of the BW sample, and continues its previous upward trend in the control group of non-European countries.

Table 4 reports the slope coefficients of a linear regression of unemployment on these shocks, country fixed effects, and a P_{ct} dummy that equals unity only in Portugal for the period, coinciding with the country's revolution, when for that country the OECD Business Sector Database labor share data behave in a very peculiar way:[3]

$$U_{ct} = \sum_j \gamma_i S_{jct} \ + \pi P_{ct} + c_c + \varepsilon_{ct}. \tag{4}$$

The behavior of shocks is sufficiently diverse to disentangle their separate contributions to unemployment variation. All three have positive coefficients in column 1, which uses the original BW data and sample. The coefficients are still positive and significant in column 2, which uses the updated data set. Shockingly, however, the coefficient of TFP growth has the wrong sign when in column 3 the early portion of the sample is dropped.

Table 5 reports the shock and institution coefficients of a regression that allows institutions to

[3]BW's Table 4 did not control for this, and estimates a less significantly positive labor demand shock coefficient in than in the present paper's Table 4. These and other empirical results are only mildly affected by omitting the dummy, or indeed dropping all Portuguese observations.

Table 5: Replication and update of BW Table 5, column 1

	(1)	(2)	(3)
	u	u	u
	b/t	b/t	b/t
-TFP growth	0.72***	0.68***	-0.37***
	(5.0)	(4.0)	(-2.9)
Real rate	0.47***	0.69***	0.49***
	(5.2)	(8.4)	(4.2)
LD shock	0.19**	0.10***	0.04*
	(2.1)	(2.7)	(1.7)
UI repl.rate	0.03***	0.01***	0.03*
	(5.0)	(3.0)	(1.8)
UI benef.length	0.27***	0.23***	0.16
	(4.4)	(3.7)	(0.8)
Active labor policy	0.03	0.03**	0.00
	(1.7)	(2.0)	(0.1)
Empl.protection	0.09***	0.04	0.05
	(3.3)	(1.4)	(0.8)
Tax wedge	0.03***	0.03**	-0.04
	(2.9)	(2.3)	(-1.6)
Union coverage	-0.50	-0.15	1.15
	(-1.6)	(-0.4)	(1.6)
Union density	0.03***	-0.01	0.02
	(3.7)	(-0.7)	(1.0)
Coordination	0.41***	0.07	0.93***
	(4.3)	(0.5)	(3.7)
r2	0.91	0.91	0.80
df_m	32	32	30
N	131	218	135

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: BW dataset (with Port.rev.dummy).
Column 2: AMECO unemployment, spliced shocks.
Column 3: only recent sample.

matter for the unemployment impact of shocks:[4]

$$U_{ct} = \left(\sum_j \gamma_j S_{jct} \; + \pi P_{ct} \right) \left(1 + \sum_i \beta_i I_{ic} \right) + c_c + \varepsilon_{ct}. \tag{5}$$

The fit is very good in the original BW results of column 1, and not much worse in the updated extended sample of column 2 and in the recent sample of column 3. As shown in Figure 3, this empirical relationship fits well not only unemployment increases between the 1970s and the 1990s, but also the heterogenous and asymmetric developments of the following decades, when European countries took turns in leading unemployment swings. In the recent past, however, the fit and

[4]In Stata:
`$DEPV = ({s:$SHCK}+{PORTDUM}*portrev) * (1+{i:$INST }) + {c:_Icn_*} ).`

predictive power of these regressions is mostly due to shocks, insignificantly shaped by time-invariant institutions, and relies on a strangely signed TFP growth coefficient.

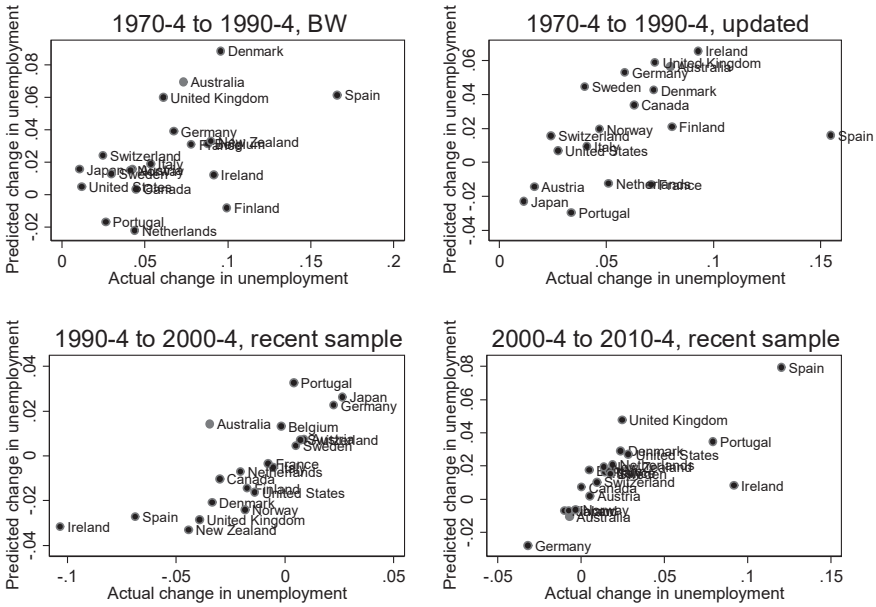


Figure 3: Actual unemployment changes and predictions of the regressions of Table 5 column 1 (top left panel), Table 5 column 2 (top right panel), and Table 5 column 3 (bottom panels).

The perverse association between unemployment and TFP growth in the periods when the latter did not simply trend downwards, but began to fluctuate and diverge, suggests that the BW empirical approach does not appropriately account for something that has become important only since the 1990s. One potentially relevant source of variation may be labor market reforms. Following BW, Table 6 inserts time-varying institutional indicators in regression (5). The results do not add much to previous ones. In the BW regressions replicated in columns 1 and 2 most interaction effects are insignificant and hard to interpret, and they remain so when using the complete updated sample in column 3. Results for the most recent sample are not reported, and even weaker and harder to interpret: the overall fit is similar to that of the time-invariant institutions regressions of Table 5, and the shock coefficients are not positive.

Table 6: Replication and update of BW Table 6

	(1)	(2)	(3)	(4)	(5)
	u	u	u	u	u
	b/t	b/t	b/t	b/t	b/t
- TFP growth	0.54***	0.66***	0.74***	0.74***	0.73***
	(3.6)	(4.0)	(4.3)	(4.4)	(4.6)
Real rate	0.51***	0.51***	0.90***	0.94***	0.94***
	(5.5)	(5.3)	(9.2)	(9.1)	(9.5)
LD shock	0.17*	0.18*	0.03	0.02	0.05*
	(1.9)	(1.9)	(1.0)	(0.9)	(1.9)
UI repl rate, 1st year	0.01				
	(1.1)				
UI repl.rate	0.01	0.02***	0.00	0.00	0.00
	(1.2)	(4.0)	(0.4)	(0.5)	(0.6)
Active labor policy	0.00	0.01	-0.00	0.00	
	(0.1)	(0.6)	(-0.2)	(0.1)	
Empl.protection	0.05	0.09*	-0.12	-0.08	-0.03
	(1.2)	(1.7)	(-1.5)	(-0.9)	(-0.6)
Tax wedge	0.02	0.03**	0.03*	0.03	0.03***
	(1.1)	(2.3)	(1.8)	(1.5)	(3.7)
Union coverage	0.21	0.53***	0.45	0.33	
	(0.6)	(2.7)	(1.5)	(1.1)	
Union density	0.01	0.02***	-0.02***	-0.02***	-0.02***
	(1.2)	(2.9)	(-3.1)	(-3.1)	(-3.7)
Coordination	0.29**	0.52***	0.06	0.08	
	(2.6)	(4.1)	(0.7)	(0.9)	
r2	0.90	0.90	0.92	0.92	0.92
df_m	32	31	31	31	28
N	131	131	203	203	203

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: original dataset, replicates BW col.2.
Column 2: original dataset, replicates BW col.4.
Column 3: extended data, time-varying UI repl.rate and EPL.
Column 4: time-varying UI repl.rate and EPL, tax, union density.
Column 5: no time-invariant institutions.

3 Some theory

The results of the previous section's restoration and update exercise confirm the original BW insights but qualify them, in that some new phenomena appear to be beyond reach of that paper's empirical approach. This is useful food for thought. What follows offers three thoughts that may help understand why the BW approach worked well on that paper's sample, and how it may be adapted to interpret new evidence.

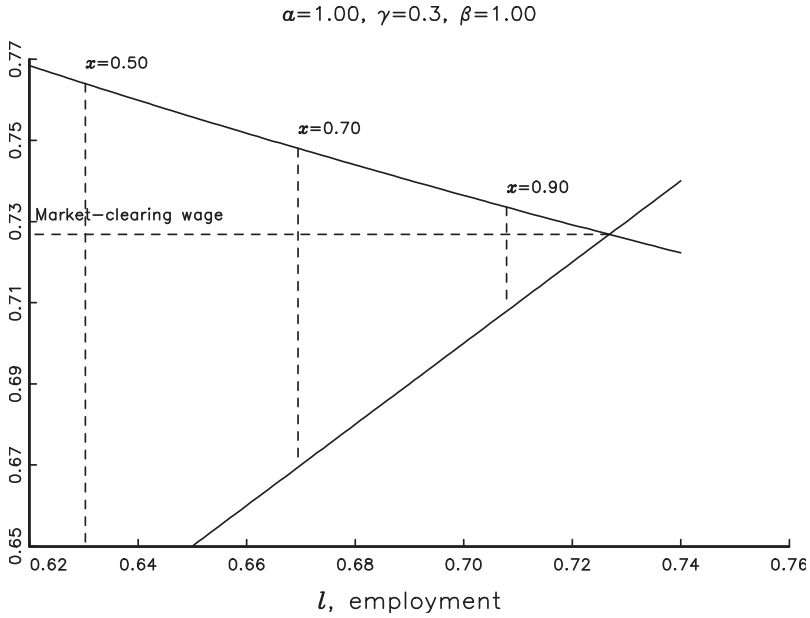


Figure 4: Politico-economic labor market wedges and unemployment for different values of the decisive agent's relative wealth.

3.1 Intentional unemployment

Let each country's per capita production depend on employment l with functional form $y(l) = (al)^{1-\gamma}$. Labor's marginal productivity,

$$y'(l) = (1-\gamma)\,(a)^{1-\gamma}\,l^{-\gamma}, \tag{6}$$

equals the wage w when employment is on a static competitive labor demand schedule.

As discussed below and in Blanchard (1997) it can be useful to relax the constant-elasticity assumption, which however is very convenient also on the supply side of the labor market. Supposing that the opportunity cost of employment l has the constant-elasticity functional form $(l)^{1+\beta}/(1+\beta)$, without considering explicitly the age, gender, and skill composition of the population and of the labor force, makes it simple to study the implications of another dimension of heterogeneity.

Let individuals draw different portions of income from labor and other factors of production, and let market institutions be chosen so as to maximize the welfare of an individual who earns the per-capita labor income, $wl = (1-\gamma)\,y$, and a proportion $x \neq 1$ of the economy's other per capita income, γy. Average employment l increases that individual's income by $(x\gamma + 1 - \gamma)\,y'(l)$, and

equating this to employment's marginal opportunity cost l^{β} yields the optimality condition

$$1+\gamma\left(x-1\right)w=l^{\beta}. \tag{7}$$

The wage is on the labor supply schedule $w=l^{\beta}$ if $x=1$: for an average representative individual, welfare is maximized at zero unemployment. Just like unions that disregarding employers' profits maximize the wage bill, however, so individuals who earn only a portion of the economy's non-labor income find it optimal to decrease employment.[5] If $x<1$ (the political majority is less wealthy than average), condition (7) drives a proportional wedge between the market wage and the non-market value of time and, as shown in Figure 4, reduces employment below the market-clearing level.

The median voter is capital-poorer than the average individual if wealth is more unequally distributed than labor income. In democratic countries, individuals who earn less than the average non-labor income do support employment taxes and non-employment subsidies, legal or collectively bargained minimum wages, limits on weekly work hours, minimum annual holidays, and age-related employability rules (Bertola, 2016). All of these policies and institutions reduce employment below the laissez-faire level. Some are measured by the BW institutional indicators, and imply unemployment[6]

$$u\approx\log l_{s}-\log l_{d}=\frac{\gamma}{\beta}\left(1-x\right) \tag{8}$$

when they prevent wages from falling to the market-clearing level in order to maximize the welfare of a decisive individual who earns a fraction $x<1$ of average non-labor income.

This simple expression clearly oversimplifies a reality where there is frictional unemployment even in *laissez faire*, and labor market institutions also address incomplete information and risk issues. It does show that unemployment, while involuntary at the individual level, at the politico-economic level that determines institutions can be an intentional side effect of policies meant to benefit relatively poor individuals. The model's simple index x of decisive political coalitions' labor orientation determines the extent to which each country's institutions target objectives that favor

[5]Empirical analysis of employment rates would need to account for educational policies and demographics (Bertola, Blau, and Kahn, 2007). These are also theoretically and empirically relevant for unemployment (Bertola, Blau, and Kahn 2002), but at a level of detail that is beyond the present paper's scope.

[6]Inserting (6) in (7) establishes that when $x\neq1$ the log level of optimal employment is lower by $\gamma\left(1-x\right)/\left(\beta+\gamma\right)$ relative to the laissez faire zero unemployment level. The log wage is $\gamma^{2}\left(1-x\right)/\left(\beta+\gamma\right)$ higher along the labor demand schedule, log labor supply grows by $\left(\gamma^{2}/\beta\right)\left(1-x\right)/\left(\beta+\gamma\right)$, and (8) follows.

lower employment. It is in turn determined by the distribution of political decision power, and by financial market imperfections and histories of shocks that it would be too ambitious to try and model here.

The politico-economic mechanism underlying (8) may help interpret country-level relationships between unemployment and the institutions that are empirically related to it. In its simplicity, however, that expression illustrates how complicated it can be to interpret the empirical variation of unemployment. Its intentional component may reflect different values of the decisive agent's labor intensity and political power (x in the model), or of the elasticities (γ and β) that shape the welfare implications of employment. Depending on administrative traditions, employment may be shaped by contributions and subsidies that leave measured unemployment constant, rather than by wage-setting constraints.

In empirical work, all this might be constant over time and absorbed by the country fixed effects included in the BW regressions. But variation over time of a country's institutions, driven by political and structural forces, influences unemployment directly and not just through interactions with period effects or observable shocks. The exclusion of institutional main effects from the regressions reported in Tables 3 and 6 was appropriate when trying to interpret different unemployment dynamics in countries with stable institutions and similar exposure to largely common shocks. The stronger time variation of institutions since the 1990s, when reforms began to be discussed and implemented at different paces in different countries, is not necessarily absorbed by country and period effects.

3.2 Shocks

If wages are preset, then shocks as well as politico-economic institutions explain the observed variation of unemployment across countries and over time It is simplest to suppose that as labor demand varies the real wage remains constant, and so does labor force participation along an unchanged supply schedule. As shown in Figure 5, if the wage is preset at w expecting $a = a_0$, then employment deviates from its intended level if in realization $a = a_1 \neq a_0$. (Real wages vary if nominal wages are preset and inflation is unexpected, with qualitatively similar implications.)

Combining $\log l = (\log(1-\gamma) + (1-\gamma)\log(a) - \log w)/\gamma$ from (6) and (8), realized unemployment

$$\tilde{u} \approx \frac{\gamma}{\beta}(1-x) + \frac{1-\gamma}{\gamma}(\log(a_0) - \log(a_1)) \tag{9}$$

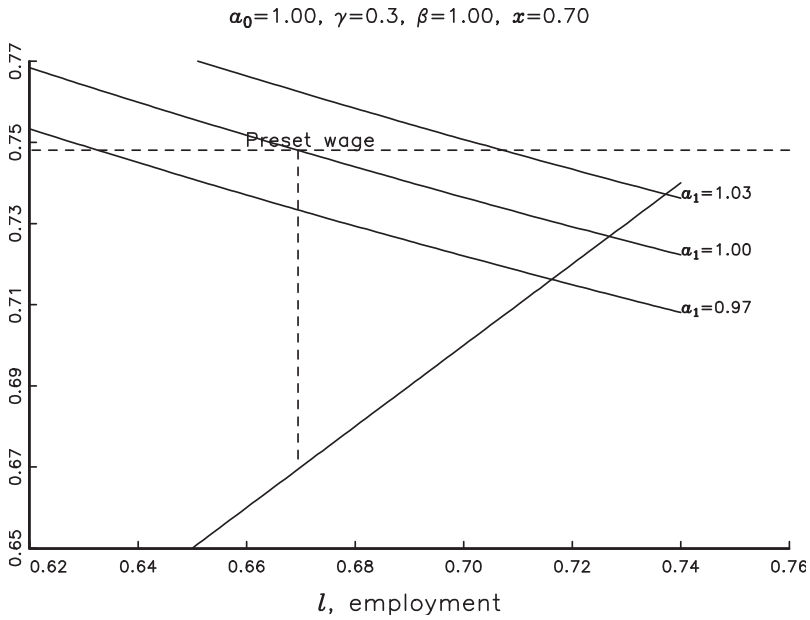


Figure 5: Implications of labor demand shocks at given real wage when employment is on labor demand.

varies across countries and periods for two related but distinct reasons. One is that politically determined institutions intentionally steer the wage away from the market-clearing level, as illustrated by (8) and captured by the first term on the right-hand side of (9). The other is that, at preset wages, forecast errors move employment away from the level that the politico-economic mechanism would choose after observing realized labor demand. The two mechanisms are related in that wages are naturally preset if they are bargained collectively, and negotiation outcomes giving more weight to labor income than to other income ($x < 1$ in terms of this simple formal framework) target a positive level of unemployment that may ex post be reduced or increased by labor demand shocks.[7]

In terms of empirically observable variables, the identity $l_d = (wl/y)\, y/w$ and $u \approx \beta \log w - \log l_d$ yield unemployment $u = (1+\beta)\log w - \log(wl/y) - \log y$, which deviates from zero if $l \neq \beta \log w$. If employment is on a constant-elasticity labor demand, then $wl/y = (1-\gamma)$, and

$$u = (1+\beta)\log w - \log(1-\gamma) - \log y.$$

[7] Wage-setting and other relevant institutions may only slowly adjust to changes in the relevant parameters, such as the γ and β elasticities of this simple model. Learning may then plausibly drive both realized unemployment and institutional variation (Blanchard and Philippon 2004, 2006). Expectational leads and lagged effects are difficult to disentangle in practice, and available data cannot provide even the suggestive support they grant to simpler theoretical mechanisms.

At given w, a constant γ implies a unitary coefficient for output growth as an explanatory variable of unemployment changes. In the data, that coefficient is much below unity (about one-half in Okun's original statement of his law) and varies considerably across countries and periods (Bertola, 2015).

One way to accommodate this is to allow the elasticity of labor demand, and the observed labor share, to vary over time. BW's empirical implementation of this idea, outlined and reproduced in the Data Appendix, constructs an empirical counterpart of the second right-hand side term of (9), using the observed labor share to proxy γ and TFP growth estimates to measure changes of a.

Another way is to relax the assumption that employment is on labor demand, which somewhat implausibly requires employment to adjust faster than wages. If marginal productivity $(1-\gamma)y/l$ exceeds the wage by a proportional amount zw in a given time and period, then $(1-\gamma)y/l = (1+z)\,w$, and at constant γ the labor share $wl/y = (1-\gamma)\,/\,(1+z)$ varies if z does. Adjustment costs do insert time-varying wedges between labor's marginal revenue product and wage. When employment is growing the labor share falls short of $1-\gamma$, because $z > 0$: marginal productivity equals the current period's wage flow plus the annuity value, along the employers' optimal path, of current hiring costs and expected future firing costs. Conversely, when employment declines then $z < 0$ and the observed labor share is larger than the technological elasticity. These effects are more pronounced when variation is perceived to be temporary (as explained for example in Bagliano and Bertola, 2007, chapter 3).

The BW regressions use the labor share as an indicator of labor demand changes at preset wages, supposing that the parameters governing its relationship to unemployment are constant across observations, or differ in ways captured by country effects and institutional indicators. In the original BW sample, the empirical role of labor share changes as determinants of unemployment is correctly signed, statistically significant, and distinct from that of TFP growth (which, in the presence of the wedges denoted by z, does not correspond to changes of the labor demand shifter a, but qualitatively captures the direction and intensity of temporary growth rate fluctuations). In more recent data, however, new sources of variation of adjustment costs and lags may call for different specifications.

3.3 Capital and financial integration

Labor demand can be shifted by available capital as well as by the productivity or product demand indicator denoted a in the expressions above. Formally, let the production function be

$y = (k_d)^{\gamma} (al)^{(1-\gamma)}$, and consider a country whose citizens own a stock k of capital, which differs from the domestic stock k_d used in production because capital can flow to or from the rest of the world.[8]

Because capital flows shift labor demand

$$l_d = \left(\frac{w}{(1-\gamma)a^{1-\gamma}} \right)^{-1/\gamma} k_d, \tag{10}$$

they shock observed unemployment at given wages. Capital mobility also influences labor market institutions. Suppose again that policy maximizes the welfare of a decisive agent who earns the per capita labor income and the unit return $r = \gamma y/k_d$ on a proportion x of the country's national k. Because domestic capital includes international flows, the income implications of employment for that welfare criterion differ from those discussed above for a closed economy (where the x proportion applies to a given stock of non-labor factors of production) through two conceptually different channels.

First, in a country that experiences capital inflows the decisive agent earns only a portion of domestic capital income, and is less inclined to adopt institutions that imply high employment and high returns to complementary capital. Symmetrically, in a country that exports capital the decisive agent finds employment-friendly institutions more appealing.

Second, not only the level but also the employment elasticity of production depend on whether k_d is endogenous. Lower employment decreases the marginal productivity of complementary capital, and if capital can decrease in response then institutions that decrease employment have less favorable implications for capital-poor decisive individuals.[9] This implies that institutions should become more employment-friendly, through a familiar "race-to-the-bottom" effect.

The balance of these effects when comparing financial autarky to full financial integration depends on countries' sizes and relative capital intensity (Bertola, 2016). Here, it is useful to outline how less extreme and ongoing changes of financial integration may influence institutionally determined

[8] It considerably simplifies derivations to suppose that there are constant returns to scale and only two factors: mobile capital, and immobile elastically supplied labor. It would be possible but is not necessary for the paper's purposes to account for other immobile factors of production, such as land, or for labor mobility, or for domestic capital accumulation.

[9] Formally, the politically decisive agent's income $y\left(l, k_d(l)\right) = \left((1-\gamma) + \gamma x k/k_d(l)\right) y$ responds to institutionally determined employment according to

$$\frac{dy\left(l, k_d(l)\right)}{dl} = \left((1-\gamma) + \gamma \frac{l}{k_d} \frac{dk_d}{dl} \right) \frac{y}{l}.$$

unemployment. Let the productivity of foreign-owned capital in domestic production be scaled by an "iceberg melt" parameter $\nu \leq 1$.[10] For a country with relatively scarce capital and positive capital inflows, the tighter financial integration represented by a larger ν increases domestic capital and increases labor demand (10). (Similar derivations and symmetric results are valid for a country that experiences capital outflows.) The elasticity of labor demand depends on the country's size at given financial integration, as a small country faces a more elastic capital supply, but also depends on financial integration: as ν increases towards unity, employment responds less elastically to the wage.[11]

The optimality condition for maximization of the non-representative agent's total welfare does not have a closed-form solution for employment, but is easily solved numerically. As shown in Figure 6, in a capital-poor country the tighter financial integration represented by a larger ν moves the politico-economic equilibrium towards lower employment and higher unemployment, for two reasons. The first is that the decisive agent becomes capital-poorer relative to the integrated area. The second is that financial integration (as modeled) decreases the elasticity of labor demand, and makes it easier for a capital-importing country's workers to appropriate a larger portion of the country's total producer surplus. So while integration tends to imply race-to-the-bottom deregulation, especially in small and capital-rich countries, it need not imply deregulation everywhere, and can plausibly lead to more regulation in capital-poor countries.

The role of interest rates and TFP as an explanatory variable in the BW unemployment regressions is based on a theoretical perspective (Blanchard, 1996) that approximates each country's labor productivity around the steady state of its closed-economy capital accumulation path, and models temporary fluctuations (reflecting lagged or costly adjustment) around a perfectly elastic wage-employment relationship. Because international finance has developed strongly over the last few decades, capital flows may help explain the relatively poor recent performance of that approach.

[10] Modeling the degree of integration in technological terms conveniently neglects the budget constraint implications of property rights or repudiation issues. It is possible but tedious to model such wedges on a bilateral basis among many countries, or indeed regions, sectors, and individuals within countries.

[11] Formally, when $k_d = k + \nu\Delta$ for Δ the capital inflow, its marginal productivity $\nu \left(al/\left(k+\nu\Delta\right)\right)^{(1-\gamma)}$ should under the same functional form assumptions equal $\left(AL/\left(K-\Delta\right)\right)^{(1-\gamma)}$ if K and AL denote capital and effective labor abroad. Solving for Δ yields the country's domestic capital, $k+\nu\Delta = k+\nu\left(Kal\nu^{\frac{1}{(1-\gamma)}} ALk\right) / \left(AL\nu + al\nu^{\frac{1}{(1-\gamma)}}\right)$, and makes it possible to compute the relevant elasticity.

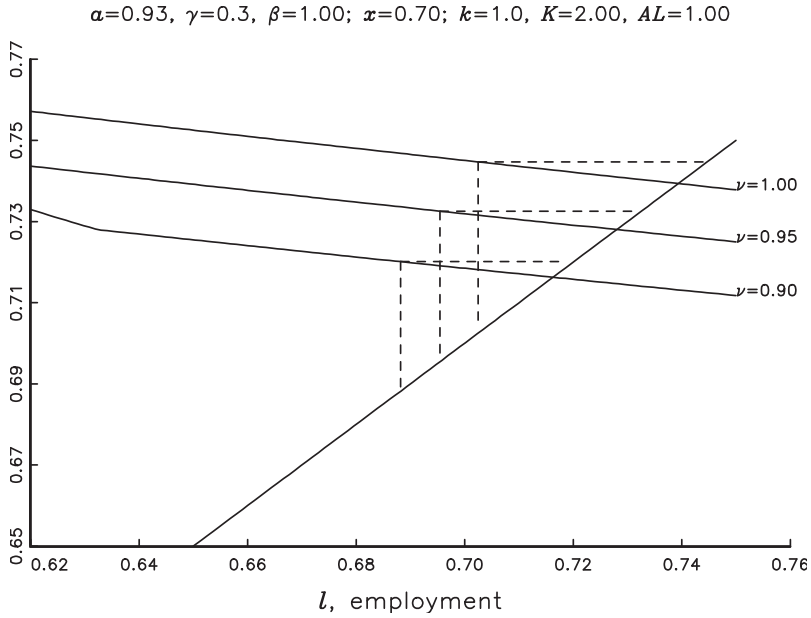


Figure 6: Politico-economic unemployment at different financial integration, in a capital-importing country.

4 Back to the data

Section 2's replication exercise finds that the BW approach does not capture some features of unemployment developments since that paper was written. The updated and extended data set, disciplined by independent definitions and earlier use, provides a useful testing ground for Section 3's theoretical thoughts. What follows proposes work-in-progress empirical exercises aimed at detecting reasons why the BW regressions fail to fit recent data, and explores simple modifications meant to capture new phenomena and insights.

4.1 Unemployment and capital flows

Consider first the last of the three thoughts offered in Section 3. The labor market role of capital flows was already apparent when Blanchard (1997, p.130) noted that the medium run labor demand model's predictions could be biased by the assumption "that each economy was on its steady-state growth path [;] if below, an increase in the ratio of capital to labor allows wages to grow faster than TFP without adverse effects on unemployment," and when Blanchard (2006) noted that in countries such as Spain unemployment was declining strongly in the absence of noticeable labor market deregulation or favorable productivity developments.

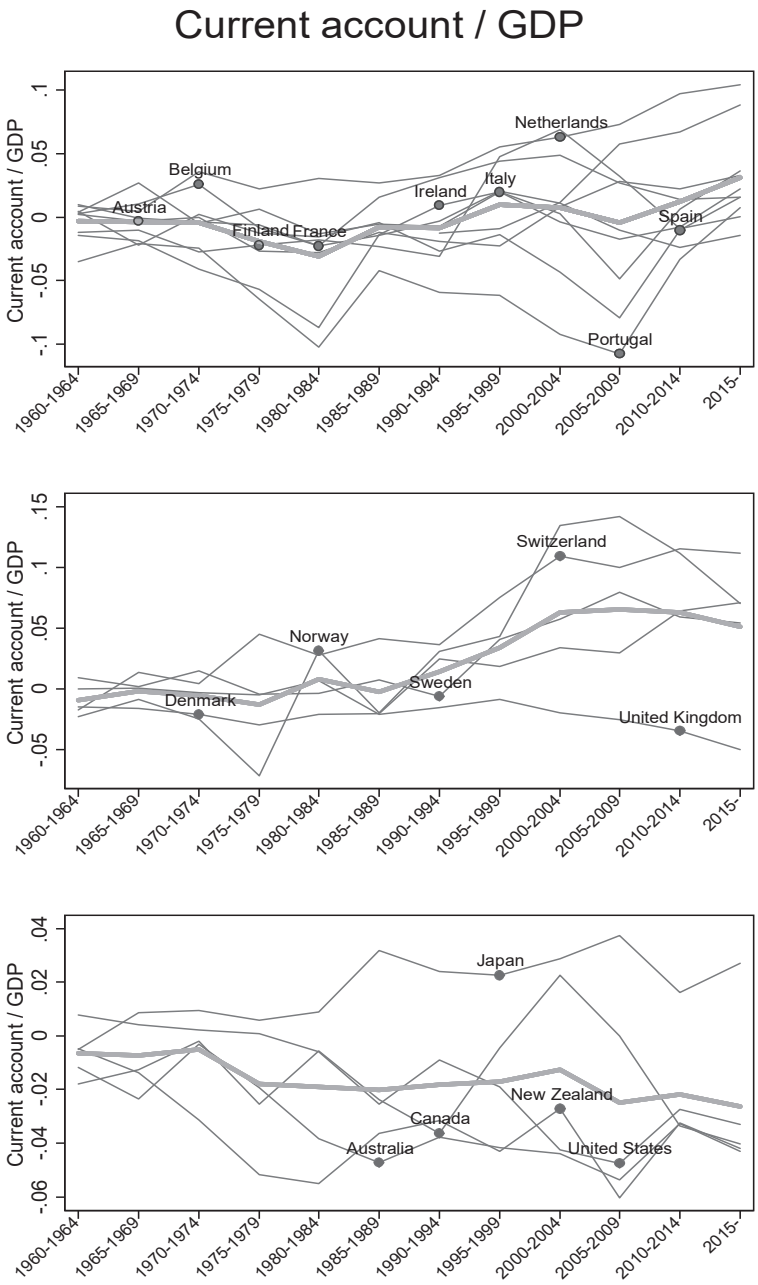


Figure 7: Current account / GDP ratios over 5-year periods (source: AMECO). Thick lines plot unweighted averages.

Financial integration lets international capital flows influence labor markets more strongly, and much more suddenly, than closed-economy capital accumulation dynamics.[12] The relative capital scarcity of countries need not be related to their position relative to their own conditional steady state, and slow savings-driven dynamics can be dwarfed by quick capital movements, as was the case in the initial phase of Europe's Economic and Monetary Union (Blanchard and Giavazzi, 2002). The BW shock series may therefore fail to capture country-specific phenomena that only became relevant as financial internationalization made it easier for capital to move internationally, and crises triggered large financial flows.

Figure 7 shows that current account / GDP ratios began around 1990 to fluctuate widely, and more asymmetrically than the BW shocks. This pattern was plausibly driven by easier international mobility of capital, and is a plausible driver of labor market conditions: domestic investment increases demand for complementary labor, and consumption-smoothing borrowing by previously liquidity-constrained countries has a similarly positive labor demand effect in their economies' non-tradable sectors.

If asymmetric current account developments are significantly related to unemployment, then labor market shocks are poorly represented by common period dummies. One way to assess the labor market relevance of financial integration is to control for its empirical manifestation in unemployment regressions. Inserting current account / GDP ratios in the BW flagship regressions that in Tables 4 and 5 recently cease to estimate sensible coefficients, Tables 7 and 8 find that they are insignificant in column 1's original BW sample, but positively and strongly associated with unemployment in column 2 (which includes the more recent data) and column 3 (which drops the earliest third of the time periods).

The positive covariation of current account surpluses and unemployment rates is qualitatively consistent with the role of capital flows as a shock to labor demand. The regression captures a causal relationship if capital flows are driven by changing financial integration of the type represented by ν in the previous section, and have the labor demand implications shown in expression (10). In theory, however, international capital mobility influences unemployment not only directly (associating deficits to higher employment at given institutions) but also through institutional reforms (which partly offset that effect, and tend to decrease employment in deficit countries). Moreover, current

[12] Capital stock estimates are somewhat sparsely available in the AMECO database, but it would be complicated and much beyond the scope of this paper to model domestic savings' contribution to capital accumulation.

Table 7: Controlling for current account in BW Table 4, column 1

	(1)	(2)	(3)
	u	u	u
	b/t	b/t	b/t
-TFP growth	0.44***	0.50***	-0.23
	(2.8)	(3.6)	(-1.0)
Real rate	0.59***	0.76***	0.72***
	(4.9)	(8.3)	(5.0)
LD shock	0.17**	0.06*	0.07
	(2.3)	(1.8)	(1.5)
Current account / GDP	0.19	0.22***	0.32***
	(1.3)	(3.7)	(4.6)
r2	0.67	0.67	0.79
df_m	24	24	23
N	126	213	134

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: BW dataset (with Port.rev.dummy).
Column 2: AMECO unemployment, spliced shocks.
Column 3: only recent sample.

accounts may be driven by heterogeneous productivity growth expectations and saving rates that also directly influence labor market outcomes.

Comparing Figures 3 and 8, the shocks of Table 8 do not predict unemployment changes much better than those of Table 5. It is also apparent that including the current account in the linear combination of shocks yields a regression fails to account for something that strongly and rather uniformly increased unemployment in Australia, Ireland, Portugal, and Spain in the run-up to the Great Depression. Interestingly, however, in regressions that control for current accounts the coefficient of TFP growth is insignificant (rather than strongly significant but wrongly signed), and so is the labor share-based demand shock. In line with Section 3's perspective, tighter financial integration does appear to imply that current accounts capture labor market conditions better than indicators meant to measure closed-economy mechanisms.

4.2 Capital flows and reforms

Theory also suggests that exogenously more intense capital flows should be relevant to labor market institutions. For a capital-importing country, the politico-economic optimal employment is lower (relative to the higher laissez-faire level implied by capital inflows) in more integrated financial market; conversely, capital-exporting countries not only experience lower labor demand, but also

Table 8: Controlling for current account in BW Table 5, column 1

	(1)	(2)	(3)
	u	u	u
	b/t	b/t	b/t
-TFP growth	0.74***	0.77***	-0.07
	(4.9)	(4.6)	(-0.7)
Real rate	0.45***	0.77***	0.57***
	(5.0)	(9.0)	(5.1)
LD shock	0.17*	0.06*	0.02
	(1.7)	(1.8)	(0.8)
Current account / GDP	0.14	0.26***	0.26***
	(1.3)	(4.3)	(3.4)
UI repl.rate	0.03***	0.02***	0.03*
	(5.3)	(3.6)	(1.9)
UI benef.length	0.26***	0.22***	0.02
	(4.1)	(3.6)	(0.1)
Active labor policy	0.03**	0.01	-0.01
	(2.0)	(0.4)	(-0.4)
Empl.protection	0.10***	0.05*	0.01
	(3.5)	(1.8)	(0.1)
Tax wedge	0.03***	0.02**	-0.02
	(3.0)	(2.2)	(-1.0)
Union coverage	-0.63*	-0.23	1.27
	(-1.8)	(-0.6)	(1.6)
Union density	0.04***	-0.01	0.01
	(4.1)	(-0.7)	(1.0)
Coordination	0.42***	0.17	0.88***
	(4.6)	(1.7)	(2.7)
r2	0.92	0.93	0.83
df_m	32	33	31
N	126	213	134

p-value *.1 **.05 ***.01 (robust t stats).
Column 1: BW dataset (with Port.rev.dummy).
Column 2: AMECO unemployment, spliced shocks.
Column 3: only recent sample.

have stronger incentives to deregulate their labor markets. This mechanism, illustrated in Figure 6, can explain the divergent reforms of European core and periphery countries (Bertola, 2016).

Anticipations and lags make it difficult to disentangle labor demand and reform effects in the data. Seeking suggestive evidence Table 9 asks the updated BW dataset whether labor market deregulation is associated with current account surpluses. The answer is a qualified "yes". Columns 1 and 2 regress 5-period changes of labor tax wedges and unemployment replacement rates on 5-year average current account/GDP ratios, with country and period fixed effects (the coefficients estimated without fixed effects are similar in sign and significance). Significantly negative coefficients detect

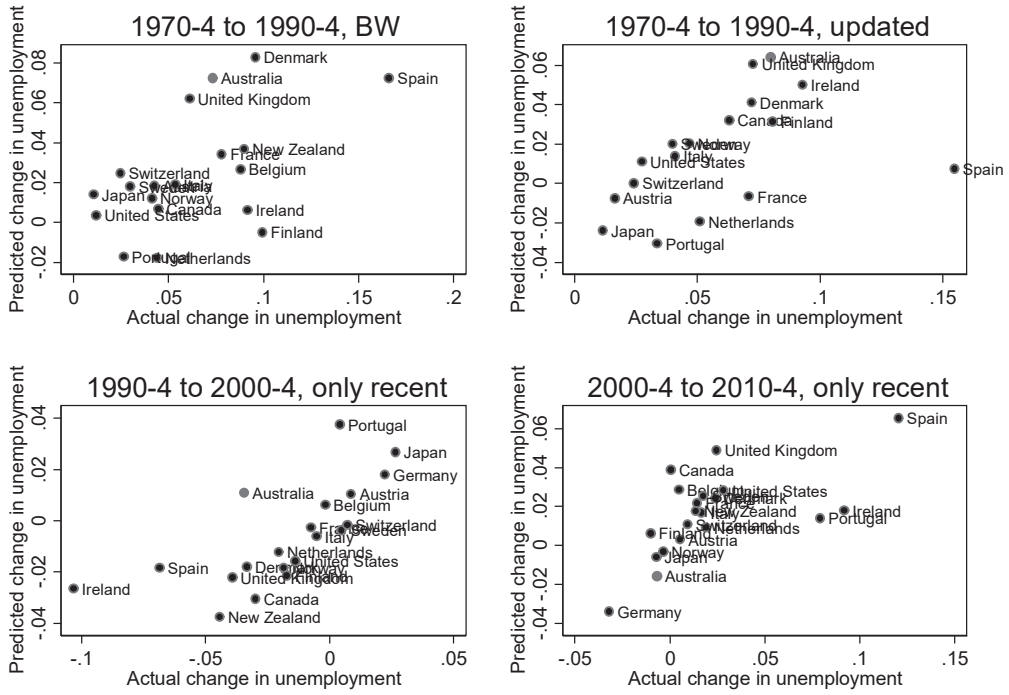


Figure 8: Actual unemployment changes and predictions of the regressions of Table 8 column 1 (top left panel), Table 8 column 2 (top right panel), and Table 8 column 3 (bottom panels).

a tendency for deficit countries to regulate their labor markets more stringently, and support to the idea that, given other political and structural factors, easier capital mobility associates current account surpluses with labor market deregulation when, as in Section 3's models, distributional motives shape labor market institutions.

The estimated relationships could be spuriously driven by unobservable factors, such as political shifts that trigger labor market deregulation and improve competitiveness. The regressions in columns 3 and 4 of Table 9 attempt to isolate the role of financial integration instrumenting the current account with indicators of gross financial integration (Broner and others., 2013) and dummies indicating adoption of the euro by 10 countries, starting in the 2000-04 period (without accounting for the financial integration impact of the subsequent crises). These instruments are meant to amplify the portion of current account variation that reflects easier international investment. They cannot disentangle the effects of positive and negative capital flows, however, and their exclusion from the second stage may be invalid if political factors drive both labor market reforms and international

Table 9: Capital flows and labor policy reforms

	(1)	(2)	(3)	(4)
	D TaxWedge	D UI repl.rate	D TaxWedge	D UI repl.rate
	b/t	b/t	b/t	b/t
Current account / GDP	-0.08**	-0.60***	-0.99**	-0.51
	(-2.1)	(-3.9)	(-2.0)	(-0.8)
Country fe	Yes	Yes	No	No
Period fe	Yes	Yes	No	No
df_m	30	29	1	1
N	215	195	140	140

p-value *.1 **.05 ***.01 (robust t stats).
Columns 3, 4: current account instrumented with gross capital flows and EMU dummy.

financial deregulation. The estimated slope coefficients are negative, consistently with Section 3's simple model. But the instruments are weak, and the coefficients are statistically significant only when fixed effects are omitted and only for the labor tax wedge (which may suggest that the portion of current account variation due to financial integration is more relevant to government budgets than to labor market deregulation).

4.3 Unemployment, shocks, and institutions

Table 10 explores the explanatory power of institutions and shocks for unemployment in the extended BW dataset. Many unobservable source of variation certainly matter for unemployment. Those that are constant over time can be controlled by the country fixed effects included in the regressions along with the four institutions measured on a time-varying basis and shocks (and the Portuguese revolution dummy).

These data and simple theory do not disagree with each other: all slope coefficients have the expected positive sign when they are significant. Insignificance of employment protection is not theoretically surprising because higher turnover costs reduce both unemployment inflows and outflows, and have small and ambiguous average effects. Labor taxation should (all else equal) reduce both labor supply and labor demand without increasing unemployment, but its significantly positive coefficient suggests that large tax wedges are positively correlated with institutional constraints on wage flexibility. Time-varying union density might in principle capture some of those factors. In practice, its insignificant coefficient in column 1 suggests that it poorly captures the relevant institutional features, which may be more appropriately (but also more imprecisely and subjectively) measured by "coverage" and "coordination" indices. All three BW shocks are significant and correctly signed

Table 10: Linear regressions on the extended and updated BW sample

	(1)	(2)	(3)	(4)
	u	u	u	u
	b/t	b/t	b/t	b/t
UI repl.rate	0.0005***	-0.0001	0.0004**	-0.0000
	(2.7)	(-0.3)	(2.1)	(-0.1)
Empl.protection	-0.0024	-0.0045	-0.0006	-0.0039
	(-0.6)	(-1.3)	(-0.2)	(-1.0)
Tax wedge	0.0016***	0.0013***	0.0013**	0.0012**
	(2.6)	(2.6)	(2.2)	(2.4)
Union density	0.0003*	0.0006***	0.0005**	0.0006***
	(1.8)	(2.9)	(2.6)	(2.8)
- TFP growth	0.3991***	-0.0140	0.4138***	0.0226
	(3.0)	(-0.1)	(3.3)	(0.2)
Real rate	0.6871***	0.6518***	0.7328***	0.6989***
	(6.8)	(3.2)	(7.0)	(3.3)
LD shock	0.0732**	-0.0222	0.0642**	-0.0137
	(2.2)	(-0.7)	(2.1)	(-0.4)
Current account / GDP			0.1703**	0.0871
			(2.5)	(1.5)
Country fe	Yes	Yes	Yes	Yes
Period fe	No	Yes	No	Yes
r2	0.69	0.80	0.72	0.80
df_m	27	37	28	38
N	203	203	198	198

*=0.1, **=0.05, ***=0.01 p-value, robust standard errors.
Portugal revolution dummy included in all columns.

in column 1, but only the real interest rate is robust to controlling for period effects in column 2: the empirical time variation of TFP growth and labor shares is empirically hard to distinguish from that of other unobservable unemployment determinants, and the same is the case for unemployment insurance generosity. Columns 3 and 4 include the current account to GDP ratio, which is positive but insignificant when period effects are included; controlling for the variation captured by period effects or the current account yields a positive and significant coefficient estimate for union density.

A causal interpretation of these regressions is only warranted if time-variation of institutions (and shocks) is driven by exogenous political and economic factors. In accounting terms, excluding institutions would lower the R^2 of the regressions in Table 10 by about 0.05 (without period effects) or 0.03 (with period effects); excluding shocks instead, the R^2 declines by 0.12 or 0.04, respectively. Along with the broadly sensible pattern of coefficients, this suggest that over the longer time span of the extended sample unemployment variation is explained by institutions directly and not just by their interaction with shocks.

Table 11: Linear regressions with EPL interaction on the updated BW sample

	(1)	(2)	(3)	(4)
	u	u	u	u
	b/t	b/t	b/t	b/t
Real rate	0.6693***	0.6907***	0.4279***	0.6387***
	(6.2)	(3.2)	(3.6)	(3.5)
Current account / GDP	0.1710**	0.1127*	0.0664	0.0679
	(2.6)	(1.7)	(1.0)	(1.2)
D Lab.dem. shock	0.0690	0.0163	0.1157	0.0961
	(0.5)	(0.1)	(0.9)	(1.0)
D Lab.dem. shock X Empl.protection	-0.0711	-0.0208	-0.0844**	-0.0498
	(-1.5)	(-0.5)	(-2.1)	(-1.4)
Empl.protection	-0.0063	-0.0069	-0.0020	-0.0023
	(-1.3)	(-1.5)	(-0.5)	(-0.7)
UI repl.rate	0.0008***	0.0001	0.0005**	0.0001
	(3.2)	(0.4)	(2.5)	(0.6)
Tax wedge	0.0016***	0.0014**	0.0010*	0.0010**
	(2.8)	(2.5)	(1.9)	(2.0)
Union density	-0.0000	0.0004*	0.0002	0.0003
	(-0.3)	(1.7)	(1.1)	(1.6)
L.u			0.4736***	0.4960***
			(4.6)	(5.3)
Country fe	Yes	Yes	Yes	Yes
Period fe	No	Yes	No	Yes
r2	0.71	0.80	0.78	0.85
df_m	28	37	29	38
N	185	185	185	185

*=0.1, **=0.05, ***=0.01 p-value, robust standard errors.
Portugal revolution dummy included in all columns.

Theoretically plausible interactions may also be empirically relevant, however. A moderate dose of theory-inspired specification searching allows regressions to detect some sensible patterns believably (at least for readers who have seen other country-panel regressions and endured this paper so far). As discussed in Section 3.2, for example, the strength of the empirical relationship between unemployment and the labor-share-based indicator of the size and direction of labor demand shocks depends on a variety of technological and institutional factors, of which one is at least imprecisely observable and of policy interest: in countries and periods where employment protection is more stringent, not only wages but also and especially employment react sluggishly to shocks. Hence, the labor share can fluctuate widely without much employment variation, and unemployment should be less sensitive to variation of the BW labor demand shocks. Aiming to detect this in the data, the regressions of Table 11 include the real rate and current account/GDP, the more significant and robust shocks in Table 10, along with the first difference rather than the level of the labor demand

shock, its interaction with time-varying employment protection, other time-varying institutions, and country fixed effects. The interaction term is estimated to be negative, in line with theoretical expectations, and significantly so when the regressions control for lagged unemployment. The large and very significant coefficient of the lagged dependent variable might call for further refinements. These could doubtlessly yield results that adhere more closely to theoretical expectations, but would be difficult to compare to the BW results.

5 Concluding comments

Macroeconomists "had entered the 1970s without a model of the natural rate, and had not anticipated stagflation" and around the turn of the millennium found it fruitful to explain unemployment with "adverse shocks interacting with country-specific collective bargaining structures" (Blanchard, 2006). In recent experience that approach does not work as well as it used to, possibly as a consequence of institutional reforms. These may perhaps have been triggered by persuasive research results, but the politico-economic mechanisms that jointly shape unemployment and policies are only beginning to be understood.

This paper's theoretical thoughts suggest that unemployment can be a natural side effect of institutions meant to redistribute welfare across individuals. Its empirical results indicate that macroeconomic shocks, institutional change, and international integration account for a large portion of unemployment's variation. The most robust and policy-relevant empirical driver of unemployment is the real interest rate, driven in turn not only by exogenous shocks but also by fiscal and monetary policies. In theory, integration of capital markets plays a role both as a shock determining unemployment at given institutions, and as a driver of institutional change. In the data, the changing intensity of capital flows helps empirically to identify some determinants of unemployment and of labor market institutions.

Macroeconomic empirical evidence can at most be suggestive. Still, the paper's perspective and findings can be informative for those who need to formulate and express policy advice. All institutions and policies have pros and cons, and these differ not only across countries and over time (Blanchard, Jaumotte and Loungani, 2014) but also across individuals. It would be strange if economists knew better about institutions than policy-makers and than the citizens who elect them. It is equally implausible to presume that the observed policy is always and unambiguously

the most appropriate one. In an imperfect world, labor policy has distributional as well as efficiency-oriented objectives. Thus, its appeal is a politically charged subject, and its configuration depends on the decisive political coalition's objectives as well as on the conditions in which it is implemented. Research economists can plausibly claim to have better information than the public about the varying intensity of institutions' pros and cons. When recommending and studying reforms, however, we should be aware of their distributional motivation and effects, and recognize that whether institutions should or do change depends importantly on the conditions in which policy choices are made.

Data appendix

The BW dataset covered 8 time periods, 1960-4 to 1990-4, and 1995+ (typically 1995-6), for 20 OECD countries. The BW data, a sample program, and an appendix outlining data definitions are available at

http://web.mit.edu/blanchar/www/articles.html .

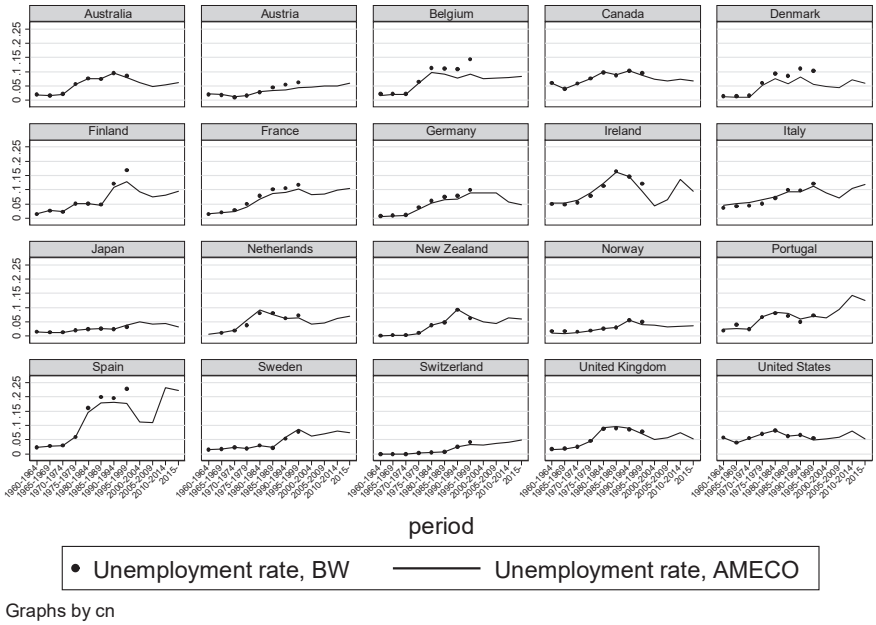
The BW macroeconomic data were drawn from the OECD Quarterly Business Sector Database (BSDB) diskette, which was discontinued soon afterwards. A file found at http://fmwww.bc.edu/ec-p/data/oecd/bsdb.dta makes it possible to check whether the BW indicator construction and time aggregation was performed correctly (it was, on a somewhat different release of the data).

The Annual Macroeconomic (AMECO) database maintained by the European Commission's Economics and Finance Directorate General,

http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm , includes on a consistently defined basis and since the early 1960s the variables needed to update the BW shock indicators (this version of the present paper uses the February 2016 AMECO update). For the pre-unification period a "linked Germany" observation is often available, otherwise data for West Germany are used here. For a few non-EU countries some data are missing in AMECO. As noted below, they are replaced by the BW observation or reconstructed from OECD data.

Dependent variable

The updated sample simply includes the AMECO **unemployment rate** series, available since the very early 1960s. As shown in the figure below it is very similar to that used by BW, but subsequent data revisions do make a substantial difference for some countries in the 5-year periods that were the most recent at the time BW was drafted.

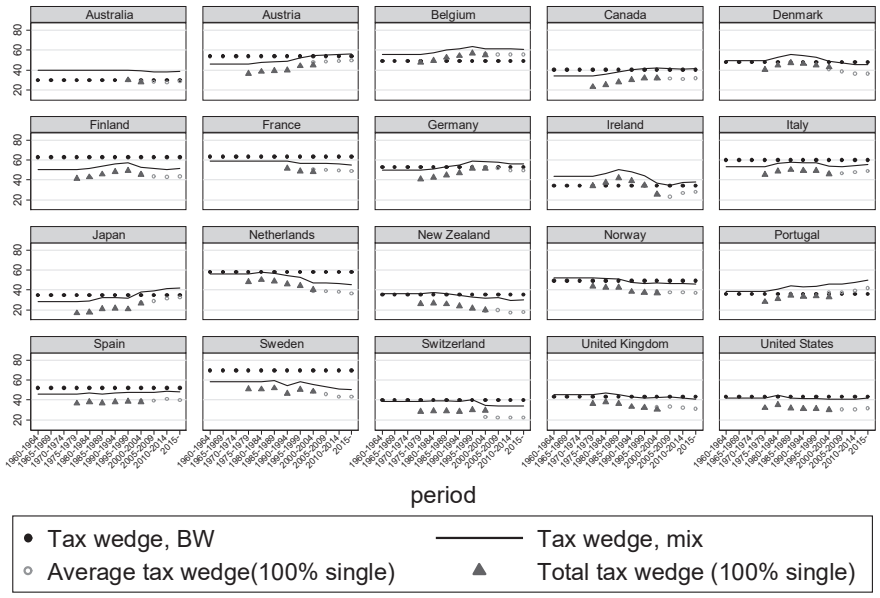


For other indicators, shown and documented below, whenever the samples overlap sufficiently the AMECO data are used as explanatory variables for the BW variables in linear regressions, including country dummies to try and control for possible definition differences and data revisions. Using the estimated

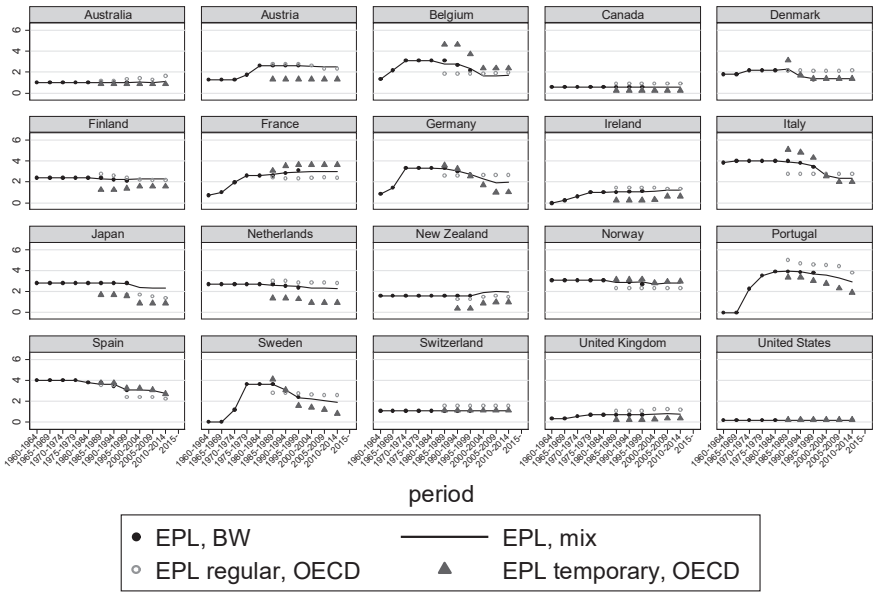
coefficients to predict the indicators results in series that are always driven by the most recent data and weigh them in a way meant to replicate and extend the BW variables. The resulting series is not as precisely defined as the ready-made series available for shorter periods in AMECO and/or in the BSDB, but these and especially the latter do not always appear as believable as one would like in the figures below.

Time-varying institutions

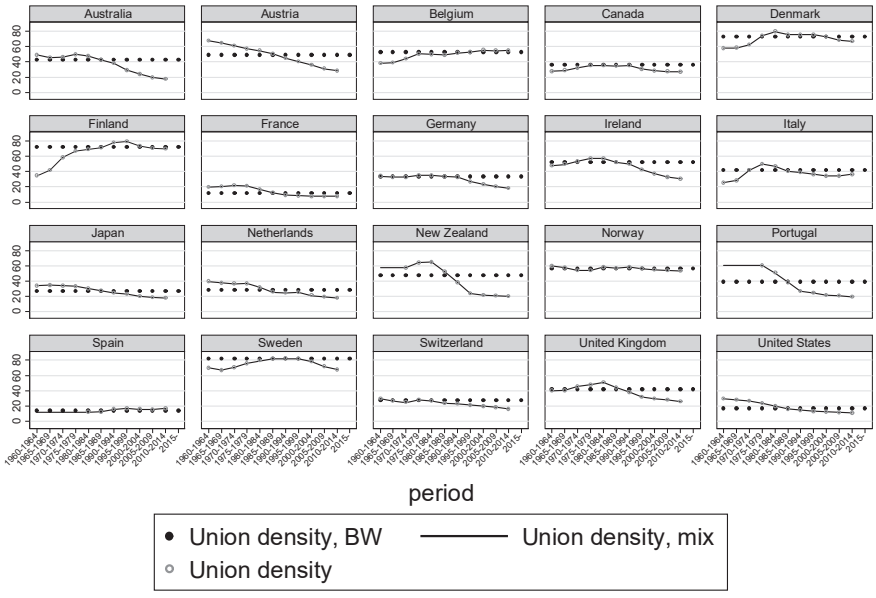
The BW **labor tax wedge** is the average of 1983-88 and 1989-94 values from the Nickell (1997) database, which include consumption taxes. The first imputation step regresses the BW series on that available for 1979-2004 from OECD Taxing Wages 2007 (odd years 1979-93, not for Australia; annually 1993-2004), defined in terms of income taxes and contributions for manual workers in manufacturing at average full-time wages. The second imputation step uses a current OECD labor tax wedge series, which starts in 2000 and refers to both manual and non-manual workers in a range of industries, for "Single person at 100% of average earnings, no child" .



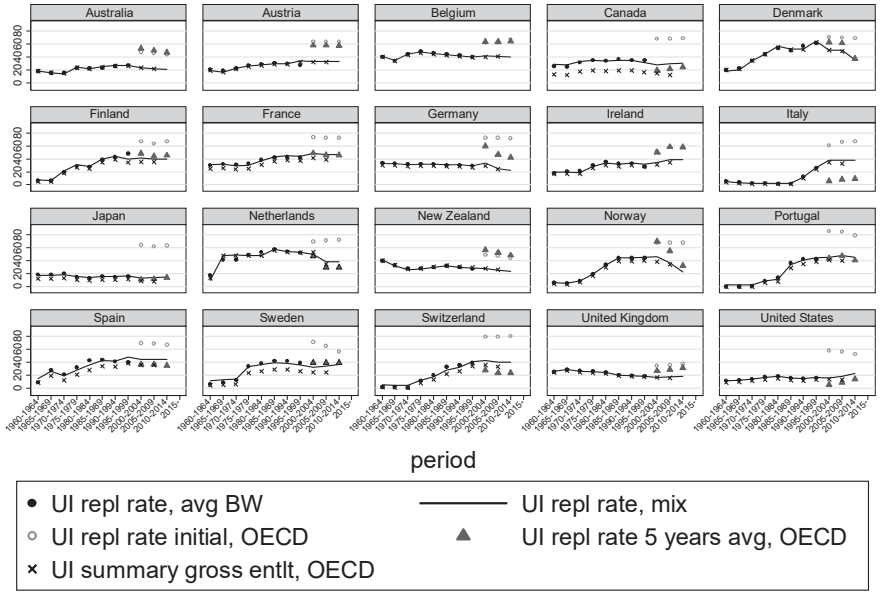
For **employment protection legislation,** the predicted indicator is the BW `newep` time-varying index, and the recent predictors are the OECD Version 1 (1985-2013) indicators of regular and temporary employment protection stringency.



Union density data are available from the OECD, from 1960 to 2014 for most countries. Around 1990 the observations are very close to the constant value drawn by BW from the Nickell (1997) database. Missing observations for New Zealand (before 1970), Portugal (before 1978), Spain (before 1980) are filled-in with the earliest available data point.

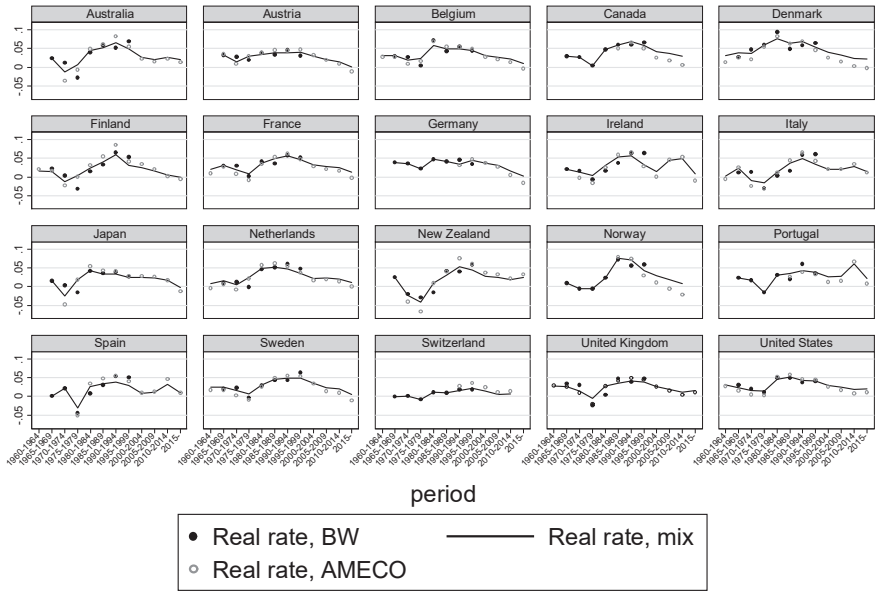


For **unemployment insurance replacement rates**, imputation needs to proceed in two steps. In the first, the average of the two BW time-varying replacement rate measures (for the initial year and for the ensuing 4 years) is predicted by linear regression on the OECD summary measure of gross benefit entitlements (available for odd-numbered years in 1961-2005) and country dummies. The fit is excellent. The second step regresses the predicted value of the first regression on two series of net unemployment insurance replacement rate series made available since 2001 by the OECD: the unweighted averages across earning levels and family types of initial replacement rates and of the average replacement rates over 5 years. Since the raw gross and net series data series are both available only for 2001, 2003, and 2005, this regression can be run over only two of the estimation sample's 5-year periods. Extrapolating its predictions beyond 2005 makes it possible to exploit the time variation detected by the currently available series over the most recent crisis periods.

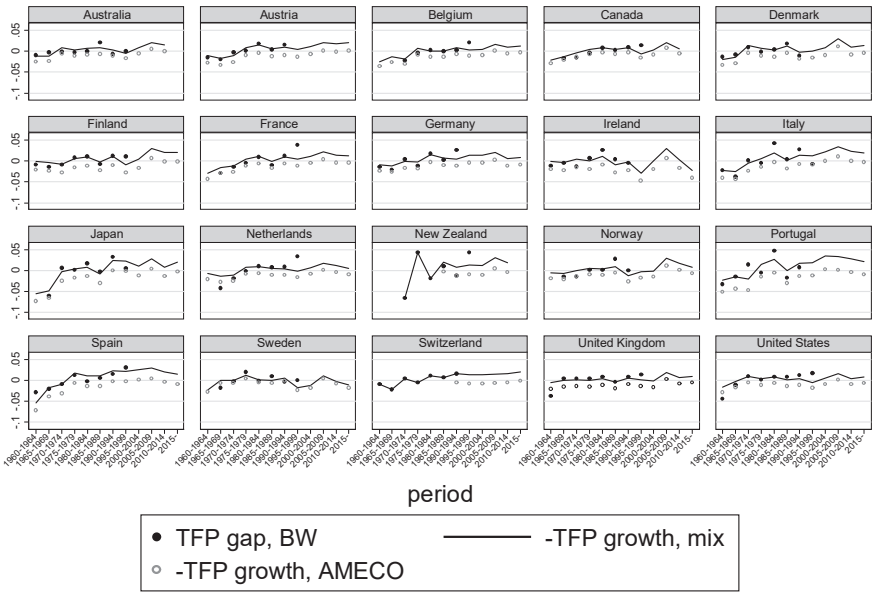


Shocks

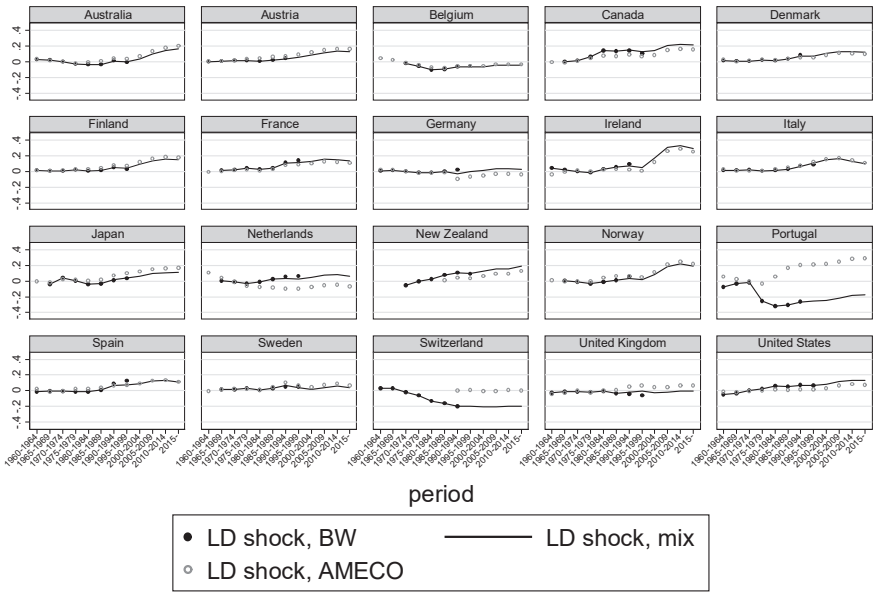
The **real interest rate** is from AMECO, where it is not available for Australia and New Zealand: for these countries the long-term interest rates available from the OECD from 1970 is deflated with the yearly log growth of the AMECO GDP deflator.



BW define the **TFP gap** as the deviation from country averages of total factor productivity growth, computed from the BSDB output, capital, employment and wage data, normalized by the labor share to express it in labor-augmenting terms. The updated dataset's spliced or "mix "series is the prediction of that BW variable by country dummies and the logarithmic first difference of the AMECO databases total economy factor productivity series. The latter is in most cases available since the early 1960s (with only 3 or 4 observations in the 1960-65 period). Normalizing it by the AMECO labor share measure has no effect on the prediction. Before 1987 for New Zealand and before 1992 for Switzerland total factor productivity is not available in AMECO: the missing observations for these countries are replaced by the corresponding BW data (which appear very noisy in New Zealand).



Updating the BW **labor demand shock** requires a more intricate set of computations on AMECO data. Subtracting from the log of "Real compensation per employee, deflator GDP: total economy" (missing for New Zealand and Switzerland before 1991) the log of the ratio of "Total factor productivity: total economy" to "Adjusted wage share: total economy: as percentage of GDP at current prices" (also missing for the same countries and periods) yields BW's adjusted (by labor efficiency) log wage indicator, `wadj`. Adding labor efficiency to the log of "Employment, persons: all domestic industries (National accounts)" proxies BW's adjusted employment indicator, `nadj`. The negative of the log of the adjusted labor share, `-wadj-nadj` plus the log of real GDP (not mentioned in BW's data appendix but correctly included when preparing the data available on the internet), corresponds to BW's `ld0` variable. Using AMECO data this is identical, or very close in some countries, to the negative log of the AMECO adjusted wage share of GDP. Following BW the AMECO updated labor demand shock uses yearly moving averages of adjusted wages, with weight 0.8 on the current year and 0.2 on the previous year (this makes no difference to the results, which are essentially identical when the contemporaneous labor share), takes 5-year averages, and normalizes the result to zero in 1970 (or the later period when data become available for New Zealand and Switzerland). The "mix" series shown in the figure here and used in the regressions simply splices the BW data to the AMECO series, normalizing the latter to have the same mean over the last two (just one for New Zealand and Switzerland) 5-year periods of the BW data set. The OECD Business Sector indicator behaves very differently from its AMECO total economy counterpart in some countries (such as Portugal, where the "revolution" has completely different and much less drastic implications in AMECO data). However using AMECO observations for the earlier period does not make much of a difference in regressions.


Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Ireland
Italy
Japan
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States
-4 -2 0 2 4
1960-1964
1965-1969
1970-1974
1975-1979
1980-1984
1985-1989
1990-1994
1995-1999
2000-2004
2005-2009
2010-2014
2015-
period
LD shock, BW
LD shock, AMECO
LD shock, mix

Graphs by cn

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