Babetskii, Ian

Working Paper

Aggregate wage flexibility in selected new EU member states

CESifo Working Paper, No. 1916

Provided in Cooperation with:
Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Babetskii, Ian (2007) : Aggregate wage flexibility in selected new EU member states, CESifo Working Paper, No. 1916, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:
https://hdl.handle.net/10419/25961

AGGREGATE WAGE FLEXIBILITY IN SELECTED NEW EU MEMBER STATES

IAN BABETSKII

CESIFO WORKING PAPER NO. 1916
CATEGORY 4: LABOUR MARKETS
FEBRUARY 2007

CESifo *Working Paper No. 1916*

AGGREGATE WAGE FLEXIBILITY IN SELECTED NEW EU MEMBER STATES

Abstract

A fixed exchange rate regime eliminates one degree of freedom in absorbing macroeconomic shocks. Therefore, there is a call for higher labor market flexibility in countries which are members of the monetary union or those which intend to join the monetary union. Focusing on the cross-country analysis of labor markets in the enlarged European Union over 1995-2004, this paper aims to assess empirically the role of aggregate wages as a correction mechanism for dealing with economic disturbances. We apply classical time series/panel, Bayesian, and cointegration techniques to determine the extent to which aggregate wages can accommodate shocks in the economy.

JEL Code: E24, E52, C22, C33, P20.

Keywords: ERM-II, euro adoption, labor market, wage flexibility.

Ian Babetskii
External Economic Relations Division
Czech National Bank
Na prikope 28, 115 03 Praha-1
Czech Republic
Ian.Babetskii@cnb.cz

December 2007
The author is grateful to Nicoletta Batini, Vladislav Flek, Kamil Galuscak, Thomas Helbling, Mathilde Maurel, Luc Moers, Daniel Munich, Pape N'Diaye, Miroslav Singer, Emil Stavrev, Iulia Traistaru-Siedschlag, and seminar participants at CESifo Area Meeting, EALE, Euroframe, the CNB and the IMF for discussion and helpful comments. An earlier version of this paper was published as the *Czech National Bank Working Paper,* No. 1/2006. This work was supported by Czech National Bank Research Project No. E2/2005. Some parts of the paper were prepared when the author was the IMF–GDN visiting scholar in the International Monetary Fund Research Department during February–March 2005. Support from the Global Development Network program is acknowledged. This paper represents the author's own views and should not be construed as representing those of the Czech National Bank or the International Monetary Fund. However, all errors and omissions remain entirely the responsibility of the author.

Nontechnical Summary

A fixed exchange rate regime eliminates one degree of freedom in absorbing macroeconomic shocks. Therefore, there is a call for higher labor market flexibility in countries which are members of the monetary union or those which intend to join the monetary union. Focusing on the cross-country analysis of labor markets in the enlarged European Union, this paper aims to assess empirically whether steps towards the European Monetary Union (EMU) indeed go hand in hand with higher wage flexibility in reality.

Due to limited and even declining mobility of workers within the new member states, and given the formal restrictions on the free movement of labor for new EU members, it is unlikely that migration can be considered an efficient tool for coping with adverse shocks. This paper, therefore, focuses on aggregate wage adjustment. A comparable quarterly data-set is constructed covering 1995–2004 for four central European states (CE-4), four new EU members already participating in the Exchange Rate Mechanism-II (ERM-II participants), and three peripheral members of the euro area (EMU-3).

We apply alternative econometric techniques to determine the extent to which aggregate wages can accommodate shocks in the economy. The macroeconomic data does not seem to support the argument that the degree of wage adjustment is significantly higher for countries which already participate in the ERM-II. Nor is wage flexibility higher in the three EMU members selected. In addition, a complementary comparison of wage flexibility across countries is done based on institutional characteristics of labor markets. The pattern of rigidities at the micro level does not differ much from the estimated macroeconomic indicators of wage flexibility.

Several policy implications follow from the analysis. First, a lack of wage flexibility is considered to be one of the costs of euro adoption. However, the costs should be assessed against the potential benefits of joining the euro area. Second, joining the euro area is not likely to lead automatically to higher wage flexibility. Therefore, there is a call for adopting more flexible labor market policies in the monetary union in order to be better able to address asymmetric shocks. Third, the observed decrease in real wage flexibility in several countries, or the absence of such, could be at least partially linked to a decline in inflation in the new member states over the past decade. Last but not least, if the central bank sets its inflation target at too low a level, there might not be enough room for real wage adjustments.

1. Introduction

After the enlargement of the European Union (EU) in May 2004, joining the European Monetary Union (EMU) is the next challenging step on the agenda of the ten new member states (NMS). Six of them – Cyprus, Estonia, Latvia, Lithuania, Malta, and Slovenia – are already participating in the Exchange Rate Mechanism (ERM) II and have ambitions to adopt the euro by 2007. The remaining four new EU members – the Czech Republic, Hungary, Poland, and Slovakia (henceforth the CE-4) – plan to be ready to join the euro area by 2010–2014.

Various studies suggest that there is a need for higher labor market flexibility in the context of the EMU (e.g. Hallett, 2000, Obstfeld, 1997, Pissarides, 1997), of a currency board arrangement (e.g. Gulde *et al.*, 2000), or of a less rigid exchange rate peg such as the European Exchange Rate Mechanism (e.g. Kopits, 1999). Indeed, it is commonly argued that a fixed exchange rate regime eliminates one degree of freedom in absorbing macroeconomic shocks. Since independent exchange rate policy is no longer available under fixed exchange rate arrangements, adjustment through the labor market should be of higher magnitude in countries with fixed exchange rates than with flexible ones. Membership in the monetary union imposes further requirements on factor market flexibility, since neither the exchange rate nor monetary policies can be used to deal with country-specific shocks. Therefore, there is a call for higher labor market flexibility in countries which are members of the monetary union or those which intend to join the monetary union.

This paper aims to verify econometrically whether steps towards the EMU indeed go hand in hand with higher wage flexibility in reality. This is done in two main dimensions: across countries and over time. First, we compare the adjustment of aggregate wages (nominal, real) across three groups of countries: four central European member states (CE-4), four member states already participating in the Exchange Rate Mechanism-II (ERM-II participants), and three peripheral members of the euro area (EMU-3). The representatives of the latter group – Austria, Greece, and Portugal – serve as a benchmark for judging the degree of wage flexibility in the new member states. Second, we analyze whether wage adjustment in the new member states changes over time. A comparable quarterly data-set of wages, prices, unemployment rates, and productivity is constructed for 1995–2004.

The paper is organized as follows. After this introduction, Section 2 outlines the concept of labor market flexibility and provides further motivation for our focus on wage flexibility. Section 3 proposes the research methodology and formulates the research hypothesis. Section 4 describes our data-set and gives the stylized evolution of unemployment, wages, prices, and productivity in eight selected new member states and three EMU members. The estimation results are presented in Section 5. These macro-economic outcomes are compared with micro-based measures of labor market flexibility. Section 6 discusses policy implications and concludes.

2. The Concept of Flexibility

The notion of labor market flexibility is of course a very broad one. In principle, the labor market can accommodate shocks *via* two main channels: either quantities (adjustment in workers and in working time), or prices (wages), or a combination of both. Due to limited and even declining mobility of workers within the new member states, and given the formal restrictions on the free movement of labor for new EU members, it is unlikely that migration can be considered an efficient tool for coping with adverse shocks[1]. Hence, more interest is focused on wage flexibility.

Hyclak and Johnes (1992), Boeri *et al.* (1998), and Blanchflower (2001) argue that wage flexibility is a key determinant of labor market flexibility. Besides, adjustment in prices might seem quicker and less costly than adjustment in quantities. The European Commission (2003, p. 155) stresses the importance of wage flexibility in the following paragraph:

> "Obviously, wages as the price of labour have a key role to play in determining the overall balance of supply and demand on the labour market. Furthermore, the formation of economic and monetary union (EMU) is often taken to put further demands on the flexibility of wages to compensate for the lack of (national) instruments to deal with economic disturbances. If wages are too rigid, the necessary adjustment will come slowly and with considerable economic and social costs."

Wage flexibility can be expressed in nominal or real terms. Nominal wage flexibility is the responsiveness of nominal wages to changes in the price level or inflation. Real wage flexibility can, in turn, be defined as the responsiveness of real wages to various shocks (e.g. shocks in productivity, unemployment, past wages, etc.). Wage flexibility characterizes different aspects if measured using aggregate or micro data. Due to a lack of available data across countries, this paper does not attempt to perform econometric estimates of wage flexibility at the micro level. Nevertheless, micro-foundations can be introduced by looking at institutional characteristics of labor markets.

This paper, therefore, focuses on aggregate labor market adjustments, and the analysis is conducted in a cross-country comparative framework. From the macroeconomic point of view, "aggregate real wage flexibility determines the overall balance of supply and demand in the labor market and is a key substitute for the adjustment roles of the nominal exchange rate and an independent monetary policy." (HM Treasury, 2003, p. 2) Since the difference between real and nominal wage growth is given by inflation, real and nominal wage adjustment approach each other in a low inflation environment.

In spite of the common argument that a fixed exchange rate regime requires higher wage flexibility, theoretical frameworks and empirical evidence are both lacking. The same goes for studies focusing on the labor market in transition/accession countries (e.g. Schiff *et al*., 2001). This is the primary novel aspect of this project. Other novel aspects lie in constructing a comparable quarterly data-set for the new member states over the past decade, performing time-

[1] See Fidrmuc (2004) for recent evidence on labor migration in the Czech Republic, Hungary, Poland, and Slovakia, in comparison with Italy, Spain, and Portugal. A detailed analysis of the Czech case is available in Flek (2004). The reasons for the restrictions on migration within the EU are discussed in Boeri and Brucker (2005). One explanation is that when the labor market is rigid, immigration may increase unemployment among the native population.

varying estimations of wage flexibility (using the Kalman filter methodology), and analyzing the effect of steps towards EMU membership on wage flexibility in a panel and cointegration framework.

3. The Relationships Tested

In this paper, the issue of wage flexibility is addressed using three alternative methods: (i) classical time series and panel estimates; (ii) the Bayesian approach; and (iii) cointegration and error correction. The main hypothesis is stated as follows: *How different is wage flexibility/aggregate labor market adjustment in the following three groups of countries: (a) those with autonomous exchange rate policy (the CE-4); (b) the ERM-II participants (three of them having "hard pegs"); and (c) peripheral members of the euro area (the EMU-3)?*

Notice that the causality between the exchange rate regime and wage flexibility (labor market flexibility in general) can go in both directions. One way to address this issue is to base the empirical results on a solid theoretical framework, which implies one direction of causality. For example, wage-setting (WS) models could be used to study the impact of the exchange rate change on wage adjustment. Next, the direction of causality can be tested empirically (for example, in the sense of the Granger causality). Alternatively, there are methods (e.g. the third method in the above list) which do not impose any *a priori* assumptions on the direction of causality. Even if the precise assessment of causality is disputable, the estimation of aggregate wage/labor market adjustment may be still informative. For example, a lack of adjustment may motivate a need for deeper institutional reforms.

Each of the three methods has its own *pros* and *cons*. The first two methods focus on short-run wage adjustment by estimating the basic Phillips curve specification. The second method explicitly addresses the issue of structural changes. Using the same variables as in the first method, the second method relaxes the assumption that the model's coefficients are constant. This is achieved by applying the Kalman filtering technique. So, institutional changes are detected. Both methods, however, work with variables in differences (to render the series stationary). Hence, the long-run dynamics are neglected. Alternatively, the third method is designed to assess the long-term relationships between the variables in levels and also the short-run adjustment (the error correction term). There is a risk, however, of there being no long-term significant and stable relationship for some of the countries. In such a case, this suggests a potential problem on the labor market (long-lasting shocks, absence of equilibrium).

(i) ***The classical estimation framework*** relies on the assumption that the regression parameters are unknown constants. Following Alogoskoufis and Smith (1991), we estimate the basic Phillips curve specification and test the stability of the coefficient on unemployment under fixed *versus* floating exchange rate arrangements[2].

[2] The wage-unemployment trade-off can also be modeled within the broader framework of the open economy, as described, for example, in Layard *et al.* (1991, p. 389). In such a model, which includes wage setting, price setting, trade balance, and output gap-unemployment equations, the nominal exchange rate affects wages and prices *via* import prices. In other words, price-setting behavior in the open economy depends on international competitiveness (Carlin and Soskice, 1990, p. 255, and Layard *et al.,* 1991, p. 385). Our choice of the parsimonious Phillips curve (1) is driven by the data availability for Eastern European countries.

$$\Delta w_t = c_1 + c_2(u_t - u_{t-1}) + c_3 \Delta p_{t-1} + c_4 \Delta q_t + \varepsilon_t \quad (1)$$

where $\Delta w_t = \ln(w_t) - \ln(w_{t-1})$, $\Delta p_{t-1} = \ln(p_{t-1}) - \ln(p_{t-2})$, u_t is the natural logarithm of the unemployment rate, and the last term $\Delta q_t = \ln(q_t) - \ln(q_{t-1})$ is productivity growth. Coefficient c_2 represents the responsiveness of the rate of change of wage rates to the unemployment rate and thus characterizes wage flexibility. Negative and significant values of c_2 suggest that wages are flexible (growth in unemployment suppresses growth in wage costs). By contrast, positive or insignificant values of wage elasticity point to the absence of wage flexibility (a phenomenon known as hysteresis). Although nominal wages are present on the left-hand side, the coefficient c_2 measures, in fact, real wage flexibility, as price inflation is on the right-hand side as well. The remaining part of wage growth (e.g. due to growth in import prices, etc.) is captured by the constant term c_1. The hypothesis that real wage flexibility is different under various degrees of exchange rate autonomy can be written as:

$$c_2 = c_2' + c_2'' ERM \quad (2)$$

where ERM is a dummy taking one for ERM-II participants and zero otherwise. Substituting (2) into (1) gives

$$\Delta w_t = c_1 + c_2'(u_t - u_{t-1}) + c_2'' ERM\,(u_t - u_{t-1}) + c_3 \Delta p_{t-1} + c_4 \Delta q_t + \varepsilon_t \quad (3)$$

If wage flexibility is affected by the exchange rate regime, then the coefficient c_2'' should be statistically different from zero. In order to increase the power of the test, we estimate (3) for a panel of eight NMS. Selected EMU peripheral countries such as Austria, Greece, and Portugal serve as a benchmark. Notice that we do not include these countries in the panel estimations, in order to keep some homogeneity. Beside an unequal degree of economic development, the NMS and the EMU countries are characterized by different macroeconomic policies. In particular, an autonomous (at least formally) monetary policy is a common feature of the NMS, while four NMS are participants in the ERM-II and the other four are not. Thus, differences in wage adjustment on the macro level could be linked with diverse exchange rate policies[3]. As alternative benchmarks, we compare wage adjustment with the selected developed countries, which are deprived of national autonomy in monetary and exchange rate policies (the EMU-3).

(ii) Under the ***Bayesian approach***, the coefficients of regression are assumed to be random variables. The question is which other parameters in the basic Phillips curve equation (1), except the coefficient c_2, should be time-varying. Intuitively, if the slope of the Phillips curve can change, the intercept should be allowed to be time-varying as well.

$$\Delta w_t = c_{1t} + c_{2t}(u_t - u_{t-1}) + c_3 \Delta p_{t-1} + c_4 \Delta q_t + \varepsilon_t \quad (4)$$

[3] Labor market policies and institutions such as unemployment benefits, employment protection legislation, union coverage, the level of bargaining (sectoral versus nation-wide) etc. may affect the degree of wage flexibility as well. Due to the main focus of this paper on macroeconomic cross-country comparison, an assessment of these institutional effects, which typically requires microeconomic data, is beyond the scope of this study.

One popular econometric tool for the estimation of time-varying parameters is the Kalman filter. Note that the focus on short-run adjustment (thus ignoring long-run relationships), multiple causalities among the variables, and endogeneity bias (especially in the panel estimates) could be serious drawbacks of the above methods.

(iii) The third method, the ***Johansen cointegration and vector error correction approach***, explicitly accounts for non-stationarity of the series and incorporates both short-run and long-run dynamics[4]. The method identifies whether there exists such a linear combination of non-stationary variables which turns out to be stable over time.

$$c_0 + c_w wr_t + c_q q_t + c_u u_t = \varepsilon_t \tag{5}$$

where wr_t is the aggregate real wage (CPI-deflated), q_t is average productivity, and u_t is the unemployment rate.

Moreover, the cointegration method reflects potential multiple causalities between the variables. The vector error correction mechanism allows joint determination of real wage, productivity and unemployment adjustment:

$$Y_t = (m_0 + m_1 t + (1 + \alpha\beta')Y_{t-1}) - \sum_{i=1}^{p-1} \Phi_i \Delta Y_{t-i} + e_t \tag{6}$$

where Y_t is the vector containing real wages, productivity and unemployment, t is the time trend, α, β, Φ are matrices, and $p = 3$ is the number of variables; the lag structure of the model is determined using the information criteria and by an analysis of the residuals, which should be white noise. A link to the exchange rate policies can be established by comparing the process of short- and long-run wage adjustment for countries participating in the ERM-II versus those with a flexible exchange rate arrangement (the CE-4). Selected EMU members will be used as benchmarks. As for the drawbacks, the cointegration method is more demanding with respect to data length (ten years of quarterly data may not be sufficient for robust testing of long-term relationships). Also, the issue of the parameters' stability may impose estimation problems.

Our empirical strategy can be summarized as "from simple to more complex models". In the first step, a country-by-country analysis is performed. Univariate time-series estimates could give an idea of the (dis)similarities of wage/labor market adjustment. A potential drawback is that the typical sample length (ten years of quarterly data) may not be sufficient to provide robust econometric testing. To achieve higher power, panel estimates are typically used. However, it is crucial to have some homogeneity in the panel. Otherwise, the interpretation of common slopes loses economic meaning. Hence, in the second step we focus on panel estimates, conditional on homogeneity tests. The robustness of the results is assessed by confronting the time-series and panel estimates.

Finally, the measures of aggregate wage flexibility obtained are confronted with institutional micro-foundations of labor market flexibility, with the objective of assessing whether any common pattern emerges from the micro- and macro-based points of view.

[4] See, for example, Enders and Dibooğlu (2001), Marcellino and Mizon (2000), and Tyrväinen (1995a,b) for applications of the cointegration method to the analysis of aggregate labor market adjustment.

4. Data

Data issues in the new member states require extra attention, in particular if the objective is cross-country comparison. Despite the apparent simplicity of the data needed, which are basic macroeconomic indicators, no single source provides either sufficient coverage or a sufficient length of quarterly time series. Therefore, a novel contribution of this paper is the construction of a data-set of quarterly macroeconomic indicators for the eight NMS, namely the Czech Republic (CZ), Estonia (ES), Hungary (HU), Latvia (LA), Lithuania (LI), Poland (PL), Slovakia (SK), and Slovenia (SL). To have a benchmark, we also collect data for Austria (AT), Greece (GR), and Portugal (PT). The following sources are used (in order of priority):

- *Eurostat* New Cronos Database;
- *IMF* International Financial Statistics;
- *OECD* Statistical Compendium and Analytical Database;
- National Statistics.

Priority was given to Eurostat data, because they have the broadest coverage of the new member states. The data from the other sources were checked for consistency and selected so as to provide maximum compatibility with Eurostat. There is a question as to which form of data, original or deseasonalized, should be used in the estimations. We opted for seasonally adjusted data, since some of the series were available only in deseasonalized form[5]. At the final stage of the construction of our data-set we removed, where necessary, the seasonal component by applying the U.S. Census Bureau's X12 procedure, a method commonly used for seasonal adjustment[6].

In short, our data-set contains nominal wages (average monthly earnings, economy wide), consumer prices (CPI), gross domestic product (GDP) at constant prices, overall employment, and the standardized unemployment rate (OECD measure, comparable to the labor force survey concept). Figure 1 illustrates the development of unemployment rates in the NMS-8 and the EMU-3 over the past decade. Period-averages are reported in Table 1. One can observe high variation in unemployment rates across countries as well as over time. Wage and price inflation are reported in Figure 2 and Table 2. The two variables tend to follow similar trends. Overall, there is an apparent moderation in price and wage growth rates in the NMS, with gradual convergence towards the EMU-3 levels being observed[7]. The development of real wages (CPI-deflated) and average productivity (the ratio of real GDP to overall employment) is shown in Figure 3. A situation where real wages grow faster than productivity suggests potential problems on the labor markets (e.g. rising unemployment).

[5] Seasonally unadjusted data are available for the Czech Republic and Poland. The use of seasonal dummies in univariate static and time-varying estimates gives qualitatively similar results as in the case of seasonally adjusted series. We also experimented with four lag differences, but in this case price inflation and wage inflation become non-stationary and we cannot make an inference from the resulting estimates.

In the vector error correction specification – a method which is designed to deal with non-stationary series – the application of seasonally unadjusted data does not affect the long-term relationships; however, the impulse responses are more clear-cut. Overall, seasonal adjustment tends to smooth the short-term dynamics.

[6] X12 is a sort of moving-average filtering procedure with time-evolving seasonal factors.

[7] Notice the temporary shock to wages in Greece in the aftermath of euro adoption.

Figure 1: Unemployment Rates (% of labor force), 1995–2004, quarterly

CE-4 ERM-II EMU

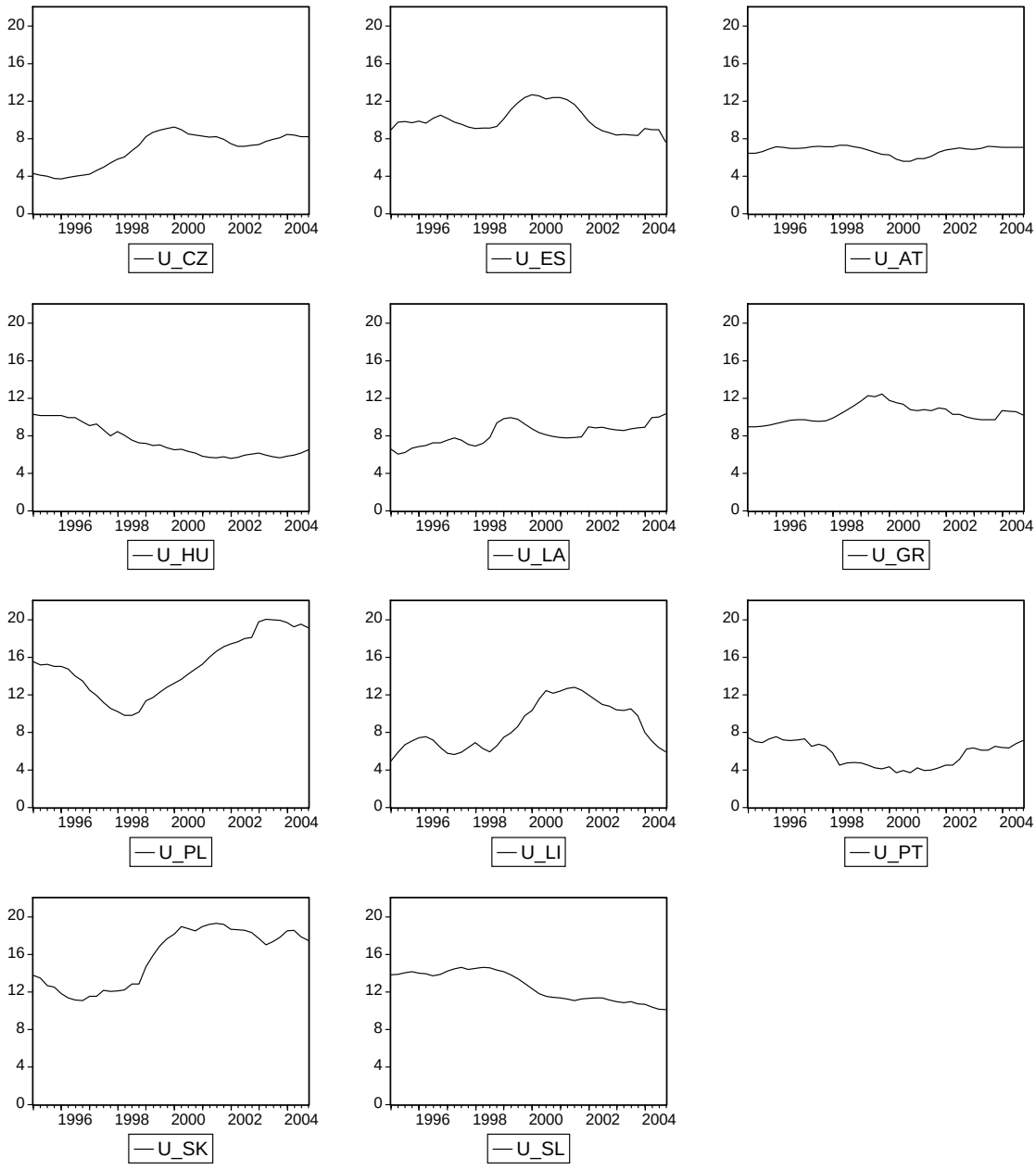


Table 1: Unemployment Rates (% of labor force), 1995–2004 averages

CE-4		**ERM-II**		**EMU**	
CZ	6.8	ES	10.0	AT	6.7
HU	7.3	LA	8.2	GR	10.3
PO	15.0	LI	8.7	PT	5.6
SK	15.7	SL	12.6		
Mean	*11.2*	*Mean*	*9.8*	*Mean*	*7.6*

Figure 2: Price Inflation and Wage Inflation, yearly changes, 1995–2004, quarterly*

CE-4 ERM-II EU

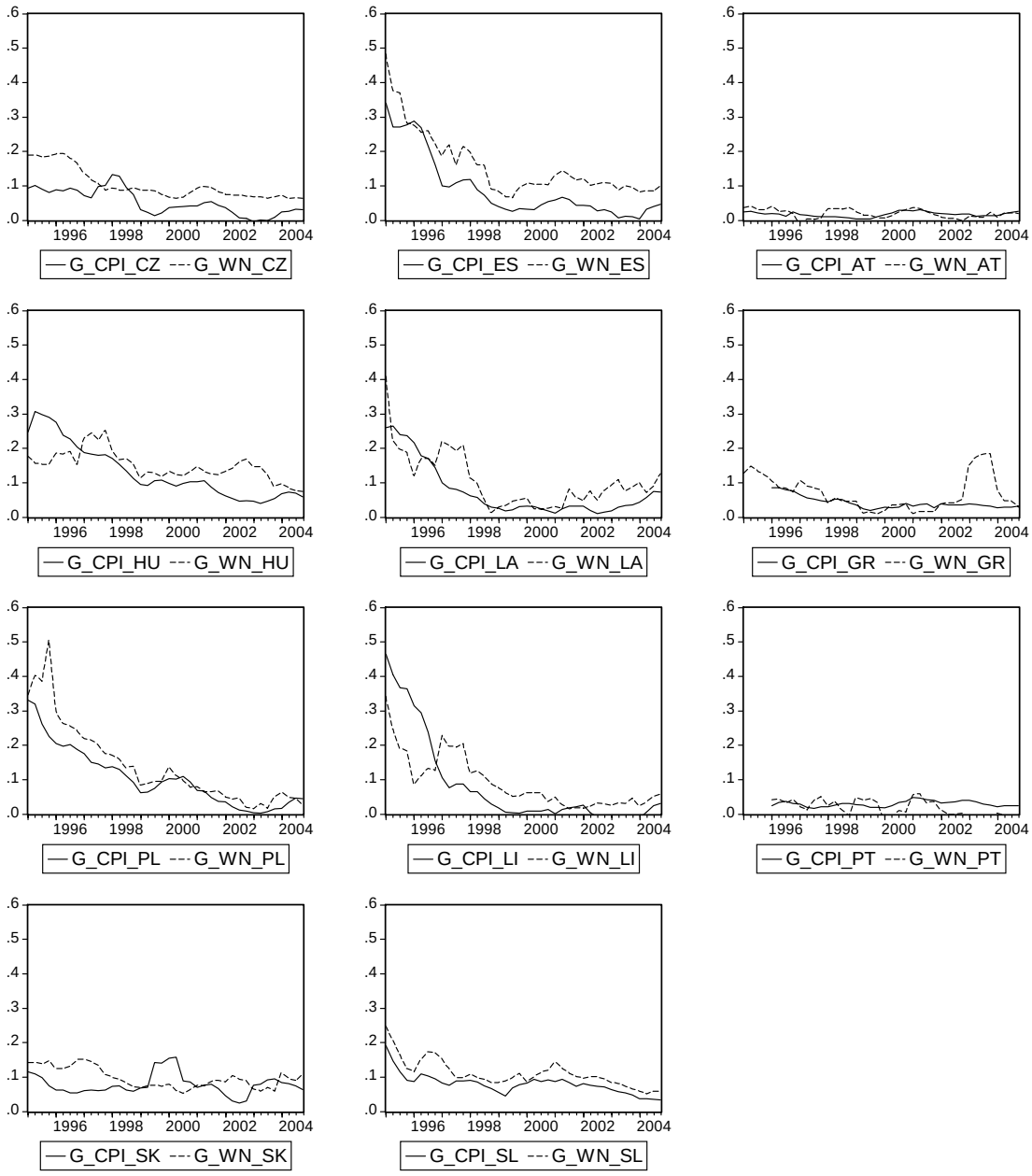
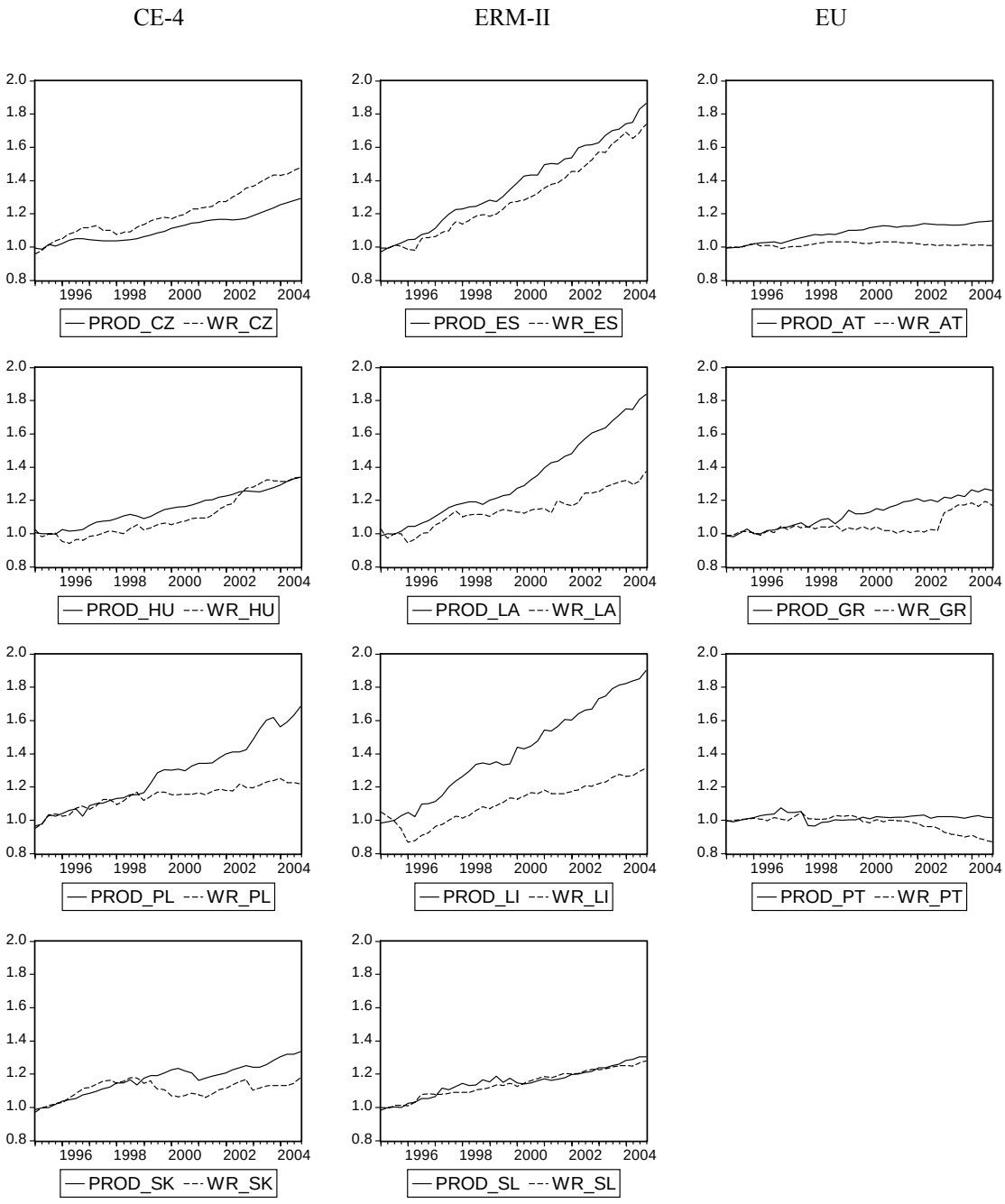


Table 2: Price Inflation and Wage Inflation, yearly changes, 1995–2004, quarterly*

CE-4			**ERM-II**			**EMU-3**		
	G_CPI	*G_WN*		*G_CPI*	*G_WN*		*G_CPI*	*G_WN*
CZ	5.3	10.2	ES	9.2	15.8	AT	1.7	1.9
HU	13.0	14.9	LA	7.4	10.5	GR	4.2	6.9
PL	10.4	14.1	LI	8.2	9.1	PT	3.0	1.6
SK	7.8	9.7	SL	8.0	11.0			

Note: *Price inflation $G\_CPI_t = (CPI_t/CPI_{t-4} - 1)$; wage inflation $G\_WN_t = (WN_t/WN_{t-4} - 1)$.

Figure 3: Real Wages and Productivity, 1995–2004, quarterly



Note: Real wages *WR* = *WN/CPI*; productivity *PROD* = *GDP/Employment*.

To assess the stationarity properties of the data, we apply standard techniques: the augmented Dickey–Fuller (ADF), Phillips–Perron (PP), and Kwiatowski–Phillips–Schmidt–Shin (KPSS) unit root tests[8]. Overall, the series of price inflation, wage inflation, unemployment, real wages and productivity in the NMS-8 and EMU-3 can be characterized as integrated of order one.

Concerning the exchange rate arrangements, we construct a dummy variable for ERM-II membership. One reason for introducing this dummy is to characterize fixed exchange rate regimes: three of the four countries from our sample which participate in the ERM-II (Estonia, Latvia, and Lithuania) have more than a decade of "hard peg" history. Another meaning of the ERM-II dummy is a proxy for readiness for euro adoption. Although Slovenia has formally followed a policy of managed floating since 1992, its participation in the ERM-II together with the three Baltic States indicates a serious intention to join the EMU (after the mandatory two years in the mechanism) and, hence, abandon its autonomous exchange rate and monetary policies.

On the other hand, the countries of the CE-4 group, apart from having postponed euro adoption for at least several years, are also characterized by more flexible exchange rate arrangements. Since the beginning of the 1990s, the exchange rate development in three of these countries can be characterized as a move "from fixed to floating": the Czech Republic abandoned its fixed peg in 1997, Slovakia did so in 1998, and Poland switched from a crawling peg to free floating in 2000. Finally, Hungary maintained a crawling band till 2001 (then adopted a fixed band with ±15% fluctuation margins).

Based on exchange rate considerations, we intend to test whether there are significant differences in labor market/wage adjustment across these two groups of countries as well as within these groups. We will also verify whether wages are more responsive to shocks in countries deprived of exchange rate and monetary autonomy (the EMU-3 group)

5. Results

5.1 Time Series/Panel Methods

Table 3 presents time series estimates of the Phillips curve (1) for the CE-4, ERM-II participants, and the EMU-3 countries. The elasticity of wages with respect to unemployment (the coefficient C_2) may take positive or negative values. Negative values suggest wage flexibility, i.e., an increase in unemployment depresses wage growth. On the other hand, positive or insignificant values of wage elasticity indicate an absence of wage flexibility (a phenomenon known in the literature as *hysteresis*. Estimations are performed on two equal sub-periods, 1995–1999 and 2000–2004. The results suggest that several countries (the Czech Republic, Hungary, Lithuania, and Greece) experienced a decrease in wage flexibility (the elasticity changed from negative values for 1995–1999 to insignificant numbers for 2000–2004). Interestingly, for the last period wage flexibility is insignificant in all the countries listed.

[8] For a popular description of the identification strategy, see, for example, Enders (2004). Due to space limitations, the results of the unit root tests are not reported here, but are available upon request.

A finding of limited aggregate wage flexibility in the new member states is not new in the literature. For example, Radziwiłł and Walewski (2003) analyze labor market adjustment in six Eastern European countries, using quarterly data over 1995–2002. The episodes of real wage adjustment to unemployment are identified as being 1997–1998 for the Czech Republic, 1999 for Slovakia, and the pre-2000 period for Lithuania. No significant periods of real wage adjustment are reported for Hungary, Latvia, and Poland. This is also a pattern we can see from the estimates for the two sub-periods shown in Table 3.

Table 3: Elasticity of Wages to the Unemployment Rate, time-series estimates

CE-4			**ERM-II**			**EMU-3**		
	95–99	00–04		95–99	00–04		95–99	00–04
CZ	-0.154***	-0.017	ES	0.001	-0.042	AT	0.002	-0.017
HU	0.11	-0.43	LA	0.049	-0.038	GR	-0.302*	-0.278
PL	-0.129	0.047	LI	-0.113*	-0.004	PT	-0.001	-0.015
SK	-0.117**	0.116	SL	-0.097	-0.053			

Note: OLS estimates of eq. (1) with White heteroscedasticity consistent standard errors. ***, **, * denote 1%, 5% and 10% significance levels.

Table 4a: Elasticity of Wages to the Unemployment Rate, panel estimates

Dependent variable: growth rate of nominal wages
Regressors:

	95–99		**00–04**	
dU	-0.136	***	0.015	
ERM*dU	0.067	*	-0.020	
gCPI(-1)	0.239	***	0.031	
gPROD	0.116		-0.066	
Country Fixed Effects***				
_CZ--C	0.028		0.018	
_HU--C	0.026		0.028	
_PL--C	0.031		0.012	
_SK--C	0.021		0.020	
_ES--C	0.033		0.026	
_LA--C	0.022		0.019	
_LI--C	0.021		0.010	
_SL--C	0.021		0.021	
N obs.	157		160	
Adj. R-sq.	0.24		0.16	
F-stat	5.54	***	3.75	***
Durbin-Watson stat	2.19		2.23	

Note: Fixed effects estimates of eq. (3) with White heteroscedasticity consistent standard errors. ***, **, * denote 1%, 5% and 10% significance levels.

Table 4b: Test of Similarity of Wage Elasticity across Country Groups

	1995–1999			2000–2004		
	Chi-square	Df	Probability	Chi-square	Df	Probability
NMS-8	31.05	7	0.0001	7.42	7	0.3872
CE-4	18.45	3	0.0004	3.16	3	0.3681
ERM-II	9.72	3	0.0211	2.17	3	0.5389

Note: Wald coefficient test, seemingly unrelated regression (SUR) estimates of eq. (1). The null hypothesis is that wage elasticity is the same for a given country group. No other restrictions are imposed.

Next, the panel estimates (Table 4) performed for the group of eight new member states show similar pattern of a decrease in wage flexibility (the elasticity changed from -0.136 for 1994–1999 to an insignificant 0.015 for 2000–2004). The effect of the ERM-II dummy has a positive sign, meaning that wage flexibility was higher in the CE-4 compared to the ERM-II group for 1994–1999; no significant differences are found for the recent period. Another way to test the effect of the ERM-II group on wage elasticity is to assume that the coefficient on unemployment C_2 is the same across the eight NMS, without imposing any restrictions on the other parameters. To do so, a system of eight country-specific equations (1) is jointly estimated. The results of the Wald test for wage elasticity C_2 are reported in Table 4b. For 1994–1999, the hypothesis of common wage elasticity within the group of eight NMS, as well as within the CE-4 or ERM-II groups, is rejected. On the other hand, for 2000–2004 the wage elasticity is not statistically different across all the country-blocks. These results are in line with the time-series estimates. Indeed, during the late 1990s, the wage elasticity in the CE-4 was higher than in the ERM-II group; in the recent period, the wage elasticity turns out to be insignificant in all eight new member states.

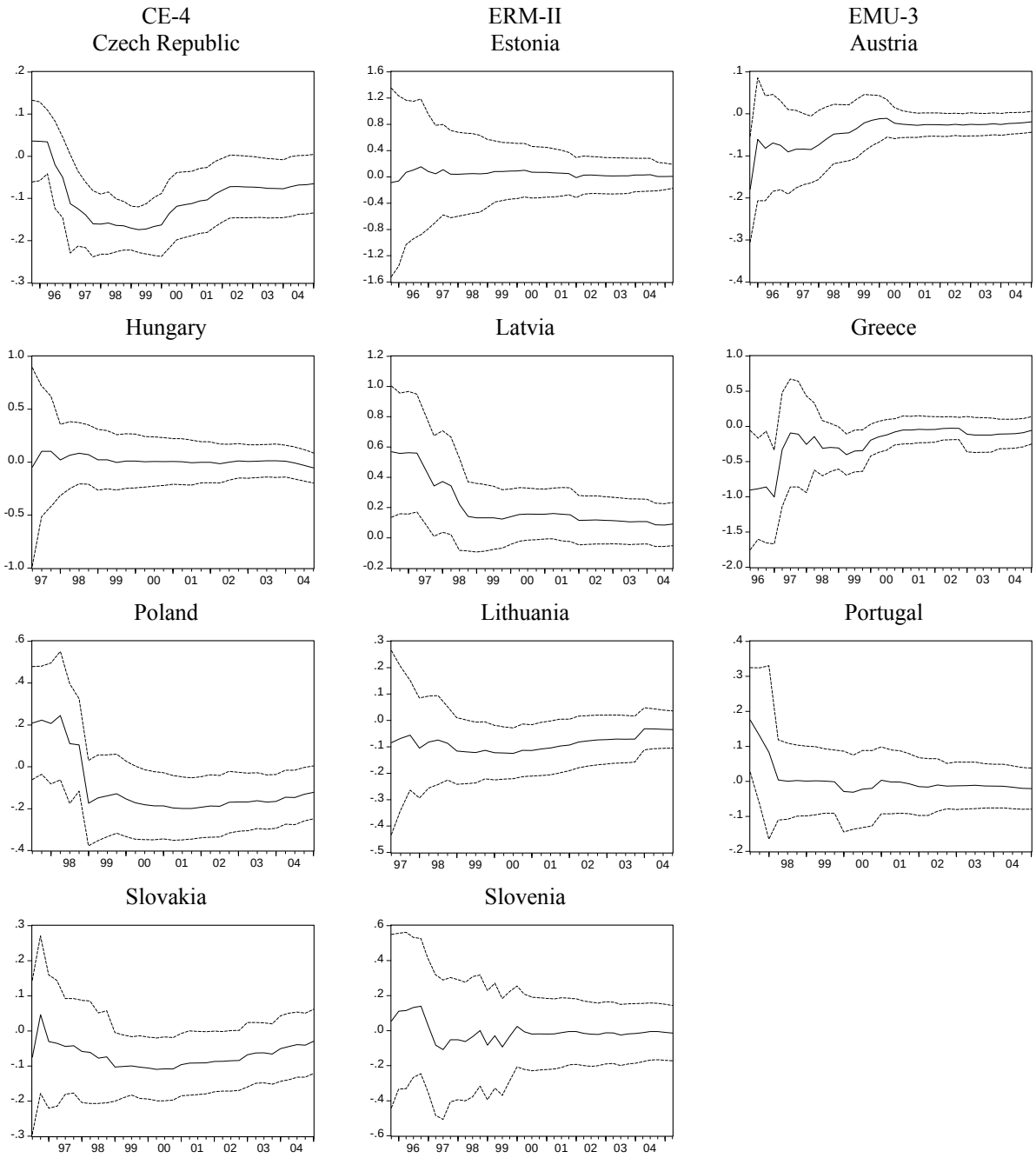
5.2 Kalman Filter Estimates

Figure 4 illustrates the time-varying estimates of the slope of the Phillips curve. Wage flexibility is indeed not constant, and there are cases of both positive and negative reactions of wages to increases in unemployment. Positive values correspond to a sort of hysteresis, i.e., an absence of wage flexibility. The more negative is C_{2t}, the more flexible are real wages. Downward-sloping patterns of wage flexibility are observed for the Czech Republic, Latvia, and Poland. However, in the Czech case, wage flexibility was increasing only till 1998, and one can observe a decline in flexibility from 1999 onwards. In Latvia, despite a declining trend, the wage elasticity is still positive at the end of 2004, meaning that growth in unemployment is accompanied by growth in wage costs. This indicates an absence of wage flexibility. Similarly in Poland, there are some signs of wage flexibility during 2001–2003, but overall the wage elasticity is not significantly different from zero.

For some CE-4 countries, we can tentatively observe a very weak link between the fixing of the exchange rate and wage flexibility. For example, in the Czech Republic the exchange rate regime changed from a fix to a float in the middle of 1997. This corresponds to an observed decrease in real wage flexibility two years later. Similarly, the relaxation of the exchange rate peg in Slovakia in the second half of 1998 is followed by a decrease in real wage flexibility from 2000 onwards.

For the rest of the sample the estimates of wage flexibility are not significantly different from zero[9].

Figure 4: Time-Varying Estimates of Real Wage Flexibility, 1995–2004



Note: Kalman filter estimates of $C_{2,t}$ in eq. (4). Two standard error bands are plotted. Negative and significant values of $C_{2,t}$ mean wage flexibility.

[9] Belke and Setzer (2004) find that exchange rate volatility has a significant negative impact on employment growth in Central and Eastern European countries, thus contributing to growth in unemployment. In what follows, euro adoption, by eliminating exchange rate risk, can be viewed as a sort of active labor market policy, a substitute for the removal of employment protection legislation.

The ERM-II participants do not demonstrate higher wage flexibility compared to the CE-4 group. The estimates are insignificant for most of the period. Similar results apply to the EMU-3. Overall, the time-varying estimates do not support the view that wage flexibility is higher in countries participating in the ERM-II or in the EMU members compared to the CE-4. Also, for the few cases where estimates are significant, there is evidence of a decrease rather than an improvement in flexibility in recent years.

5.3 Cointegration/Error Correction

First we determine the optimal lag length in the vector autoregressive representation (6). Using the Akaike and Schwarz information criteria, the number of lags is mostly found to be one, and in a few cases two or three. To preserve homogeneity and parsimony, we set the number of lags to one for all countries[10]. Next, we test for the presence of a long-run relationship between real wages, productivity, and the unemployment rate. According to the Johansen cointegration test, there is one stable vector (significant at the 10% level) in the case of Estonia, the Czech Republic, Hungary, and Lithuania. No long-run relationships between the three variables are detected for the EMU-3 members. The absence of cointegration suggests that there is disequilibrium on the aggregate labor market, or that there are structural changes. The cases of cointegration are reported in Table 5.

The cointegrating vectors are normalized so that the coefficient on real wages is equal to one. Inspection of the long-term relationships indicates that real wages closely follow productivity in Estonia. In the Czech Republic and Hungary, real wages grow faster than productivity, while in Lithuania productivity growth is stronger than that of real wages. Notice that the long-run coefficients cannot be interpreted as elasticities in the strict sense, since each of the coefficients incorporates the effect of shocks to all variables (see Lutkepohl, 1994). The long-run coefficient on unemployment does not have any particular meaning, since equation (6) is not a structural representation and unemployment may enter with either positive or negative sign depending on the cycle.

Next, the error correction representation provides information about the adjustment channels. Two contrasting examples are the Czech and Estonian cases. In Estonia, adjustment to long-run equilibrium occurs via real wages and productivity. The unemployment channel is insignificant. On the other hand, the real wage and productivity channels do not play a significant role in the Czech case, and it is unemployment which closes the gap. In Hungary and Lithuania, real wages react to deviations from equilibrium, while the productivity and unemployment channels are insignificant. The speed of short-run wage adjustment, measured by the coefficient on the error correction term, is the highest in Lithuania (-0.394), followed by Estonia (-0.347) and Hungary (-0.271). Negative values mean a return towards equilibrium, i.e., the error correction mechanism is at work. Summarizing, there is an indication of a higher magnitude of short-run wage adjustment in Lithuania. However, real wages do not react to changes in unemployment in any of the four countries considered.

[10] Estimations with two and three lags produce little difference in the long-run elasticities, but the error correction part becomes less clear-cut because of a substantial reduction in the number of freedoms. The results are available upon request.

Table 5: Cointegration and Error Correction

	Czech Republic			**Estonia**		
Cointegrating Eq.	CointEq1			CointEq1		
WR(-1)	1			1		
PROD(-1)	-1.576 ***			-0.953 ***		
	-(0.104)			-(0.024)		
UR_STD(-1)	-0.014			0.127 ***		
	-(0.024)			-(0.031)		
C	0.011			-0.249		
Error Correction	D(WR)	D(PROD)	D(UR)	D(WR)	D(PROD)	D(UR)
CointEq1	-0.061	0.063	0.733 ***	-0.347 ***	0.283 ***	0.049
	-(0.116)	-(0.079)	-(0.240)	-(0.129)	-(0.097)	-(0.338)
D(WR(-1))	0.022	-0.002	-0.254	-0.032	-0.167	0.043
	-(0.185)	-(0.126)	-(0.385)	-(0.151)	-(0.114)	-(0.396)
D(PROD(-1))	0.247	0.176	-0.508	-0.054	0.049	-0.622
	-(0.290)	-(0.197)	-(0.602)	-(0.181)	-(0.137)	-(0.476)
D(UR(-1))	-0.076	-0.031	0.542 ***	0.016	-0.087	0.667 ***
	-(0.059)	-(0.040)	-(0.122)	-(0.070)	-(0.053)	-(0.184)
C	0.010 ***	0.006 ***	0.014 ***	0.015 ***	0.019 ***	0.006
	-(0.003)	-(0.002)	-(0.006)	-(0.004)	-(0.003)	-(0.011)
Sample:	1995:1 - 2004:4			1995:1 - 2004:4		
Nobs:	40			40		
R-squared	0.186	0.039	0.750	0.248	0.201	0.367
Adj. R-squared	0.093	-0.070	0.721	0.162	0.110	0.294

	Hungary			**Lithuania**		
Cointegrating Eq.	CointEq1			CointEq1		
WR(-1)	1			1		
PROD(-1)	-1.967 ***			-0.618 ***		
	-(0.347)			-(0.051)		
UR_STD(-1)	-0.254			0.005		
	-(0.132)			-(0.031)		
C	0.674			0.102		
Error Correction	D(WR)	D(PROD)	D(UR)	D(WR)	D(PROD)	D(UR)
CointEq1	-0.271 ***	0.057	0.122	-0.394 ***	0.092	0.405
	-(0.089)	-(0.049)	-(0.192)	-(0.102)	-(0.107)	-(0.324)
D(WR(-1))	0.040	0.005	0.194	0.352 ***	0.221	0.223
	-(0.140)	-(0.077)	-(0.302)	-(0.128)	-(0.135)	-(0.408)
D(PROD(-1))	-0.407	0.220	-0.019	-0.229	-0.301 *	0.362
	-(0.348)	-(0.192)	-(0.751)	-(0.152)	-(0.160)	-(0.484)
D(UR(-1))	0.008	0.018	0.191	0.029	-0.009	0.583 ***
	-(0.083)	-(0.046)	-(0.180)	-(0.047)	-(0.050)	-(0.151)
C	0.011 ***	0.006 ***	-0.010 ***	0.008 **	0.021 ***	-0.011
	-(0.004)	-(0.002)	-(0.009)	-(0.004)	-(0.004)	-(0.013)
Sample:	1995:1 - 2004:4			1995:1 - 2004:4		
Nobs:	40			40		
R-squared	0.228	0.056	0.053	0.479	0.182	0.530
Adj. R-squared	0.134	-0.059	-0.062	0.416	0.083	0.473

Note: Estimates of eq. (5), respectively (6), linking real wages (*WR*), productivity (*PROD*), and unemployment (standardized rate of, *UR_STD*).

Bringing together the long-run and short-run outcomes, the following pattern emerges. In the Czech Republic, a stable linear relationship between productivity, real wages (which grow faster than productivity) and unemployment is possible basically due to rising unemployment. This is rather an example of an undesired equilibrium. In Estonia, unemployment turns out to be exogenous to the short-run adjustment, in the sense that deviations from long-run equilibrium are closed by real wages and productivity. Moreover, unemployment is insignificant in the wage and productivity equations, meaning that real wages and productivity move together, independently of the unemployment situation. One cannot characterize such a labor market as flexible either, since the variation in unemployment has no impact on real wages. The adjustment in Hungary and Lithuania resembles the case of Estonia, except that productivity is no longer significant (i.e., the short-run adjustment occurs via real wages, which, in turn, are not sensitive to unemployment).

5.4 Comparison with Micro-Foundations

The three alternative methods considered so far commonly suggest that real wages are inflexible in the eight NMS. The same results apply to the three EMU members selected. While the time series and panel methods detect several cases of wage flexibility during 1995–1999 (e.g. for the Czech Republic, Slovakia, Lithuania, and Greece), the elasticity of wages to unemployment becomes insignificant when considered for 2000–2004. Similarly, the time-varying estimates indicate a deterioration of wage flexibility over time rather than an improvement. Cointegration and error correction representations shed some light on the mechanism of labor market adjustment: in three of the four cases where a long-run equilibrium was detected, real wages do not react to changes in the unemployment rate; the adjustment to shocks goes rather via real wages and productivity, the unemployment channel being insignificant. To complement the macroeconomic analysis, let us look at the micro-based measures of wage flexibility.

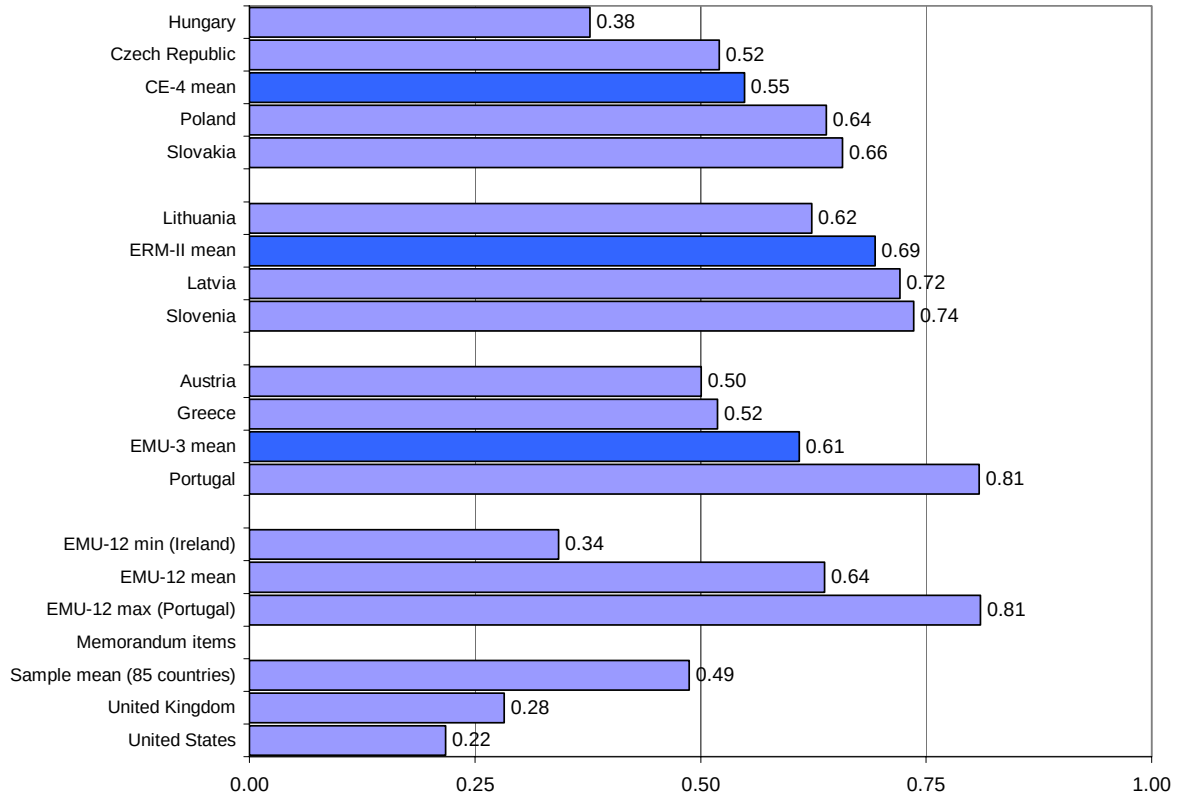
Galuscak and Munich (2005) estimate the wage curve in the Czech Republic over 1993–2001. The wage curve links real wages and unemployment at the regional level. The authors find substantial wage adjustment for the period 1994–1996, followed by a decrease in wage flexibility during the recession of 1997–1999. After 1999, wage flexibility did not return to the original level, most probably due to an increase in long-term unemployment. This is what we can observe from the time-series estimates of wage flexibility at the macro level: in the static Phillips curve (Table 3), wage elasticity is significant and correctly signed for 1995–1999, then it becomes insignificant for 2000–2004; according to the time-varying Phillips curve (Figure 4), wage elasticity increased up to 1998 and has declined since 1999.

Blanchflower (2001) explores the behavior of wages in a larger set of Eastern European countries during 1991–1997. A wage curve is found in the Czech Republic, Estonia, Hungary, Latvia, Poland, and Slovakia. The Slovenian data do not support a significant link between wages and unemployment. Wage data are unavailable for Lithuania. The magnitude of wage adjustment in Eastern Europe, at the regional level, is found to be broadly similar to the estimates for other countries (a wage elasticity of around -0.1); in Estonia and Latvia, the wage elasticity is much higher, at about -0.5. Notice that the estimates are performed for the mid-1990s. In the author's opinion, "it is likely that the absolute size of these estimates will fall as more years of data become available and full sets of region fixed dummies are included. This is generally what happens in OECD countries." More recent evidence seems to support this hypothesis. Iara and Traistaru (2004) report wage elasticity for Poland in the range of -0.04 to -0.06 over 1992-1998.

No significant wage adjustment was found for Hungary during 1992-1999. Covering a larger set of countries over the period 1993-2003, von Hagen and Traistaru-Siedschlag (2005) obtain regional wage elasticity of -0.15 for the Baltic countries, -0.06 for Slovakia, insignificant for the Czech Republic and Poland, and even positive for Hungary (0.15) and Slovenia (0.56) which indicates a sort of hysteresis (regions with higher unemployment are characterized by higher wages, the phenomenon known as "compensating differential"). Summarizing, wage flexibility at the regional level in the eight East European NMS does not appear to be higher than in other developed nations.

A complementary comparison of wage flexibility across countries could be done based on institutional characteristics of labor markets. Botero *et al.* (2004) construct aggregate indices of labor market rigidity ("regulation of labor") across 85 industrialized and developing countries for the late 1990s. The underlying indicator of protection of employed workers is the closest proxy for micro-economic wage flexibility. Indeed, this indicator is based on assessing the cost of increasing hours worked and the cost of firing, and it takes into account dismissal procedures and alternative employment contract practices. These characteristics are determinants of the (downward) wage flexibility at the microeconomic level, since the more protected workers are, the less willing they are to accept wage decreases.

Figure 5: Indices of Labor Market Rigidity (0-low, 1-high)



Source: Botero *et al.* (2004)
Note: Higher indices mean higher labor market rigidity.

Figure 5 illustrates indices of labor market rigidity. The data are available for all the countries of our sample except Estonia. Overall, the CE-4, the ERM-II participants and the EMU-3 have quite high rigidities of comparable magnitude (the corresponding averages are 0.55, 0.69, and 0.61),

which is above the sample mean across 85 countries (0.49) and much higher than, for example, in the case of the United Kingdom (0.28) or the United States (0.22). The rigidity in the CE-4 is slightly lower than in the three ERM-II participants. The pattern of rigidities at the micro level does not differ much from the estimated macroeconomic indicators of wage flexibility. A similar finding of no significant wage flexibility is reported in Radziwiłł and Walewski (2003). The authors analyze a broad set of indicators at the macro and micro levels and conclude that wages are not flexible in six new member states (accession countries at that time), except for some evidence of flexibility in Lithuania.

6. Conclusions and Policy Implications

In this paper we have attempted to measure aggregate wage flexibility in eight new EU member states, applying classical time series/panel estimates and time-varying and cointegration techniques. The macroeconomic data over the past decade do not seem to support the argument that the degree of wage adjustment is significantly higher for countries which already participate in the ERM-II. Nor is wage flexibility higher in the three EMU members selected. Several policy implications follow from the analysis.

First, the assessment of wage flexibility gives some indication of the costs related to entering the ERM-II and subsequently the euro area. Indeed, the degree of wage flexibility (nominal, real) shows the extent to which various shocks can be accommodated by wages. In the hypothetical example of perfectly flexible wages, abandoning independent exchange and interest rate policies would not be costly, since any external or internal shocks would be accommodated by wages. In the opposite extreme case of rigid wages (and assuming no labor mobility), other channels will bear the burden of shocks. For instance, an increase in unemployment is one possible outcome of wage rigidities. A lack of wage flexibility is considered to be one of the costs of euro adoption. However, the costs should be assessed against the potential benefits of joining the euro area.

Second, there is a question of whether wage flexibility is endogenous to fixing the exchange rate. In other words, is high wage flexibility required prior to euro adoption in order to minimize the adverse impact of shocks, or will the mere fact of joining the euro area improve wage flexibility *ex post*? The results of our study suggest that higher wage flexibility is an attribute of neither the current ERM-II participants nor the three peripheral EMU members. Hence, joining the euro area is not likely to lead automatically to higher wage flexibility. Rather, the opposite effect could occur. Therefore, there is a call for adopting more flexible labor market policies in the monetary union in order to be better able to address asymmetric shocks.

Third, in a low-inflation environment, real wage flexibility becomes almost synonymous with nominal wage flexibility, and both terms characterize the cost of disinflation. However, if nominal wages are rigid, especially downward, then the adjustment to shocks would go more quickly *via* real wages at higher inflation rates. Indeed, real wages can decrease due to a reduction in nominal wages or due to a rise in the price level. If nominal wages are sticky, then non-indexed price increases reduce the real cost of labor. Thus, the observed episodes of real wage flexibility during the 1990s could be at least partially linked to inflation, which reached two-digit numbers in a number of countries. Consequently, a decline in inflation in the new member states over the past decade may have naturally contributed to the observed decrease in real wage flexibility, or the absence of such.

Last but not least, if the central bank sets its inflation target at too low a level, there might be not enough room for real wage adjustments. This point is reflected in ECB (2003), according to which the price stability criterion is interpreted as keeping the inflation rate close to two percent. This is different from the original interpretation of price stability as inflation between zero and two percent. When the ability of wages to adjust is limited, the productivity channel may be viewed as an alternative shock absorber. In particular, if productivity grows faster than real wages, this creates some margin for coping with shocks.

References

ALOGOSKOUFIS, G. S. AND SMITH, R. (1991): "The Phillips Curve, the Persistence of Inflation, and the Lucas Critique: Evidence from Exchange-Rate Regimes". *American Economic Review*, Vol. 81, No. 5, pp. 1254–1275.

BELKE, A. AND SETZER, R. (2004): "Incertitude sur le taux de change et chomage dans les pays candidates: un argument pour l'euroisation ?" ("Exchange Rate Uncertainty and Unemployment in the Candidate Countries: An Argument for Euroisation?"). *Economie et prevision*, No. 163, 2004/2, pp. 63–74.

BLANCHFLOWER, D. G. (2001): "Unemployment, Well-being and Wage Curves in Eastern Europe". *Journal of the Japanese and International Economies,* 15(4): 364–402.

BOERI, T. AND BRUCKER, H. (2005): "Why are Europeans so Tough on Migrants?" *Economic Policy*, 44, 630–703.

BOERI, T., BURDA, M., AND KÖLLÕ, J. (1998): *Mediating the Transition: Labour Markets in Central and Eastern Europe.* Centre for Economic Policy Research, London.

BOTERO, J., DJANKOV, S., LA PORTA, R., LOPEZ-DE-SILANES, F., AND SHLEIFER, A. (2004): "The Regulation of Labor". *Quarterly Journal of Economics*, Vol. 119, pp. 1339–1380.

CARLIN, W. AND SOSKICE, D. (1990): *Macroeconomics and the Wage Bargain.* Oxford University Press, Oxford.

ENDERS, W. (2004): *Applied Econometric Time Series*. Wiley Series in Probability and Statistics, U.S.A.

ENDERS, W. AND DIBOOĞLU, S. (2001): "Do Real Wages Respond Asymmetrically to Unemployment Shocks? Evidence from the U.S. and Canada". *Journal of Macroeconomics*, Vol. 23, No. 4, pp. 495–515.

EUROPEAN CENTRAL BANK (2003): *Review of the Monetary Policy Strategy*. (May).

EUROPEAN COMMISSION (2003): "Wage Flexibility and Wage Interdependence in EMU: Some Lessons from the Early Years" in *The EU Economy: 2003 Review*, pp. 153–200. DG ECFIN/391/03-EN. Brussels, November.

FIDRMUC, J. (2004): "Migration and Regional Adjustment to Asymmetric Shocks in Transition Economies". *Journal of Comparative Economics*, 32, pp. 230–247.

FLEK, V. (ed.) (2004): *Anatomy of the Czech Labour Market: From Over-employment to Under-employment in Ten Years?* Czech National Bank, Prague.

GALUSCAK, K. AND MUNICH, D. (2005): "Regional Wage Adjustments and Unemployment: Estimating the Time-Varying Wage Curve". *Finance a Uver/Czech Journal of Economy and Finance*, Vol. 55, No. 1–2, pp. 66–82.

GULDE, A.-M., KAHKONEN, J., AND KELLER, P. M. (2000): "Pros and Cons of Currency Board Arrangements in the Lead-Up to EU Accession and Participation in the Euro Zone". *IMF Policy Discussion Papers*, No. 1.

HALLETT, H. A. J., MA, Y., AND DEMERTZIS, M. (2000): "The Single Currency and Labour Market Flexibility: A Necessary Partnership?" *Scottish Journal of Political Economy*, Vol. 47, No. 2, April.

HM TREASURY (2003): "EMU and Labour Market Flexibility" in *UK Membership of the Single Currency: EMU Studies* (June). http://www.hm-treasury.gov.uk/.

HYCLAK, T. AND JOHNES, G. (1992): *Wage Flexibility and Unemployment Dynamics in Regional Labor Markets*. W. E. Upjohn Institute for Employment Research, Kalamazoo, Michigan.

IARA, A. AND TRAISTARU, I. (2004): "How Flexible are Wages in EU Accession Countries?" *Labour Economics*, 11, pp. 431–450.

KOPITS, G. (1999): "Implications of EMU for Exchange Rate Policy in Central and Eastern Europe". IMF Working Paper, No. 9.

LAYARD, R., NICKELL, S., AND JACKMAN, R. (1991): *Unemployment.* Oxford University Press, Oxford.

LUTKEPOHL, H. (1994): "Interpretations of Cointegrating Relations". *Econometric Reviews*, 13, pp. 391–394.

MARCELLINO, M. AND MIZON, G. E. (2000): "Modelling Shifts in the Wage-price and Unemployment-inflation Relationships in Italy, Poland and the UK". *Economic Modelling*, 17, pp. 387–413.

OBSTFELD, M. (1997): "Europe's Gamble". *Brookings Papers on Economic Activity.* No. 2, pp. 241–300.

PISSARIDES, C. A. (1997): "The Need for Labor-market Flexibility in a European Economic and Monetary Union". *Swedish Economic Policy Review*, Vol. 4, No. 2.

PLASMANS, J., MEERSMAN, H., VAN POECK, A., AND MERLEVEDE, B. (2002): "The Unemployment Benefit System and Wage Flexibility in EMU: Time-varying Evidence in Five Countries". Faculty of Applied Economics (University of Antwerp) Research Paper, No. 2002-020.

RADZIWIŁŁ, A. AND WALEWSKI, M. (2003): "Future EMU Membership and Wage Flexibility in Selected EU Candidate Countries". Center for Social and Economic Research (CASE) Working Paper, No. 265. Warsaw, December.

SCHIFF, J., GEORGE, S., LÜNDBACK, E., MOERS, L., MERLINO, A., AND POIRSON, H. (2001): "Labor Markets in Hard-Peg Accession Countries: The Baltics and Bulgaria". IMF Country Report, No. 01/100, July. Washington, D.C.

TYRVÄINEN, T. (1995a): "Wage Determination in the Long Run, Real Wage Persistence and Unemployment: Multivariate Analysis of Cointegrating Relationships in 10 OECD Economies". Bank of Finland Discussion Papers, 12/95.

TYRVÄINEN, T. (1995b): "Wage Setting, Taxes and Demand for Labour: Multivariate Analysis of Cointegrating Relations". Empirical Economics, 20(2): 271–297.

VON HAGEN, J. AND TRAISTARU-SIEDSCHLAG, I. (2005): "Macroeconomic Adjustment in the New EU Member States" in C. Detken, V. Gaspar and G. Noblet (eds), *The New EU Member States: Convergence and Stability*, Frankfurt: European Central Bank, pp. 121–174.

CESifo Working Paper Series

(for full list see www.cesifo-group.de)

1856 Biswa N. Bhattacharyay, Understanding the Latest Wave and Future Shape of Regional Trade and Cooperation Agreements in Asia, November 2006

1857 Matz Dahlberg, Eva Mörk, Jørn Rattsø and Hanna Ågren, Using a Discontinuous Grant to Identify the Effect of Grants on Local Taxes and Spending, November 2006

1858 Ernesto Crivelli and Klaas Staal, Size and Soft Budget Constraints, November 2006

1859 Jens Brøchner, Jesper Jensen, Patrik Svensson and Peter Birch Sørensen, The Dilemmas of Tax Coordination in the Enlarged European Union, November 2006

1860 Marcel Gérard, Reforming the Taxation of Multijurisdictional Enterprises in Europe, "Coopetition" in a Bottom-up Federation, November 2006

1861 Frank Blasch and Alfons J. Weichenrieder, When Taxation Changes the Course of the Year – Fiscal Year Adjustments and the German Tax Reform 2000/2001, November 2006

1862 Hans Jarle Kind, Tore Nilssen and Lars Sørgard, Competition for Viewers and Advertisers in a TV Oligopoly, November 2006

1863 Bart Cockx, Stéphane Robin and Christian Goebel, Income Support Policies for Part-Time Workers: A Stepping-Stone to Regular Jobs? An Application to Young Long-Term Unemployed Women in Belgium, December 2006

1864 Sascha O. Becker and Marc-Andreas Muendler, The Effect of FDI on Job Separation, December 2006

1865 Christos Kotsogiannis and Robert Schwager, Fiscal Equalization and Yardstick Competition, December 2006

1866 Mikael Carlsson, Stefan Eriksson and Nils Gottfries, Testing Theories of Job Creation: Does Supply Create Its Own Demand?, December 2006

1867 Jacques H. Drèze, Charles Figuières and Jean Hindriks, Voluntary Matching Grants Can Forestall Social Dumping, December 2006

1868 Thomas Eichner and Marco Runkel, Corporate Income Taxation of Multinationals and Unemployment, December 2006

1869 Balázs Égert, Central Bank Interventions, Communication and Interest Rate Policy in Emerging European Economies, December 2006

1870 John Geweke, Joel Horowitz and M. Hashem Pesaran, Econometrics: A Bird's Eye View, December 2006

1871 Hans Jarle Kind, Marko Koethenbuerger and Guttorm Schjelderup, Taxation in Two-Sided Markets, December 2006

1872 Hans Gersbach and Bernhard Pachl, Cake Division by Majority Decision, December 2006

1873 Gunther Schnabl, The Evolution of the East Asian Currency Baskets – Still Undisclosed and Changing, December 2006

1874 Horst Raff and Michael J. Ryan, Firm-Specific Characteristics and the Timing of Foreign Direct Investment Projects, December 2006

1875 Jukka Pirttilä and Håkan Selin, How Successful is the Dual Income Tax? Evidence from the Finnish Tax Reform of 1993, December 2006

1876 Agnieszka Stążka, Sources of Real Exchange Rate Fluctuations in Central and Eastern Europe – Temporary or Permanent?, December 2006

1877 Xavier Calsamiglia, Teresa Garcia-Milà and Therese J. McGuire, Why do Differences in the Degree of Fiscal Decentralization Endure?, December 2006

1878 Natacha Gilson, How to be Well Shod to Absorb Shocks? Shock Synchronization and Joining the Euro Zone, December 2006

1879 Scott Alan Carson, Modern Health Standards for Peoples of the Past: Biological Conditions by Race in the American South, 1873 – 1919, December 2006

1880 Peter Huber, Michael Pfaffermayr and Yvonne Wolfmayr, Are there Border Effects in the EU Wage Function?, December 2006

1881 Harry Flam and Håkan Nordström, Euro Effects on the Intensive and Extensive Margins of Trade, December 2006

1882 Panu Poutvaara and Mikael Priks, Hooliganism in the Shadow of the 9/11 Terrorist Attack and the Tsunami: Do Police Reduce Group Violence?, December 2006

1883 Ruud A. de Mooij and Gaëtan Nicodème, Corporate Tax Policy, Entrepreneurship and Incorporation in the EU, December 2006

1884 Johannes Becker and Clemens Fuest, Corporate Tax Policy and International Mergers and Acquisitions – Is the Tax Exemption System Superior?, January 2007

1885 Momi Dahan and Udi Nisan, The Effect of Benefits Level on Take-up Rates: Evidence from a Natural Experiment, January 2007

1886 José García-Solanes, Francisco I. Sancho-Portero and Fernando Torrejón-Flores, Beyond the Salassa-Samuelson Effect in some New Member States of the European Union, January 2007

1887 Peter Egger, Wolfgang Eggert and Hannes Winner, Saving Taxes Through Foreign Plant Ownership, January 2007

1888 Timothy J. Goodspeed and Andrew Haughwout, On the Optimal Design of Disaster Insurance in a Federation, January 2007

1889 Wim Groot, Henriëtte Maassen van den Brink and Bernard van Praag, The Compensating Income Variation of Social Capital, January 2007

1890 Bas Jacobs, Ruud A. de Mooij and Kees Folmer, Analyzing a Flat Income Tax in the Netherlands, January 2007

1891 Hans Jarle Kind, Guttorm Schjelderup and Frank Stähler, Newspapers and Advertising: The Effects of Ad-Valorem Taxation under Duopoly, January 2007

1892 Erkki Koskela and Rune Stenbacka, Equilibrium Unemployment with Outsourcing under Labour Market Imperfections, January 2007

1893 Maarten Bosker, Steven Brakman, Harry Garretsen, Herman de Jong and Marc Schramm, The Development of Cities in Italy 1300 – 1861, January 2007

1894 Michel Beine, Oscar Bernal, Jean-Yves Gnabo and Christelle Lecourt, Intervention Policy of the BoJ: A Unified Approach, January 2007

1895 Robert S. Chirinko and Daniel J. Wilson, State Investment Tax Incentives: A Zero-Sum Game?, January 2007

1896 Theo S. Eicher and Oliver Roehn, Sources of the German Productivity Demise – Tracing the Effects of Industry-Level ICT Investment, January 2007

1897 Helge Berger, Volker Nitsch and Tonny Lybek, Central Bank Boards around the World: Why does Membership Size Differ?, January 2007

1898 Gabriel Felbermayr and Wilhelm Kohler, Does WTO Membership Make a Difference at the Extensive Margin of World Trade?, January 2007

1899 Benno Torgler and Friedrich Schneider, The Impact of Tax Morale and Institutional Quality on the Shadow Economy, January 2007

1900 Tomer Blumkin and Efraim Sadka, On the Desirability of Taxing Charitable Contributions, January 2007

1901 Frederick van der Ploeg and Reinhilde Veugelers, Higher Education Reform and the Renewed Lisbon Strategy: Role of Member States and the European Commission, January 2007

1902 John Lewis, Hitting and Hoping? Meeting the Exchange Rate and Inflation Criteria during a Period of Nominal Convergence, January 2007

1903 Torben M. Andersen, The Scandinavian Model – Prospects and Challenges, January 2007

1904 Stephane Dees, Sean Holly, M. Hashem Pesaran and L. Vanessa Smith, Long Run Macroeconomic Relations in the Global Economy, January 2007

1905 Richard Jong-A-Pin and Jakob De Haan, Political Regime Change, Economic Reform and Growth Accelerations, January 2007

1906 Sascha O. Becker and Peter H. Egger, Endogenous Product versus Process Innovation and a Firm's Propensity to Export, February 2007

1907 Theo S. Eicher, Chris Papageorgiou and Oliver Roehn, Unraveling the Fortunates of the Fortunate: An Iterative Bayesian Model Averaging (IBMA) Approach, February 2007

1908 Liliana E. Pezzin, Robert A. Pollak and Barbara S. Schone, Efficiency in Family Bargaining: Living Arrangements and Caregiving Decisions of Adult Children and Disabled Elderly Parents, February 2007

1909 Christian Keuschnigg and Soren Bo Nielsen, Self-Selection and Advice in Venture Capital Finance, February 2007

1910 Rune Jansen Hagen and Gaute Torsvik, Irreversible Investments, Dynamic Inconsistency and Policy Convergence, February 2007

1911 Eric A. Hanushek and Ludger Woessmann, The Role of School Improvement in Economic Development, February 2007

1912 Bernard M. S. van Praag, Perspectives from the Happiness Literature and the Role of New Instruments for Policy Analysis, February 2007

1913 Volker Grossmann and Thomas M. Steger, Growth, Development, and Technological Change, February 2007

1914 Margarita Katsimi and Thomas Moutos, Human Capital and the Feldstein-Horioka Puzzle, February 2007

1915 Oliver Roehn, Theo S. Eicher and Thomas Strobel, The Ifo Industry Growth Accounting Database, February 2007

1916 Ian Babetskii, Aggregate Wage Flexibility in Selected New EU Member States, February 2007