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Wage-Price Setting in New EU Member States

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Abstract

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This paper analyzes wage- and price-setting relations in new EU member countries. Panel estimates indicate a strong and significant relationship between real wages and labor productivity, as well as evidence of wage pass-through to inflation. Terms of trade shocks do not feed through to real wages. Country-specific wage developments, beyond differences in labor productivity growth, are mostly explained by real wage catch-up from different initial levels and different labor market conditions. Qualitative evidence also suggests that public sector wage demonstration effects and institutional factors may play a role in wage determination.

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I. BACKGROUND

Wage increases should not exceed labor productivity growth and should take into account labor market conditions and developments in competitor countries.

European Central Bank, *Convergence Report*, May 2008, p.32

Safeguarding macroeconomic stability and sustaining catching-up in a context of rising external imbalances and high inflation requires [...] a public sector wage policy that contributes to overall wage moderation in line with productivity gains.

European Commission, *Convergence Report*, May 2008, p.54

This paper analyzes wage- and price-setting relations in new EU member states (NMS), with a special focus on the link between real wages and productivity. The *Convergence Reports* of the ECB and European Commission, as well as the *NMS Convergence Programmes*, highlight that growth of real wages in line with labor productivity is widely viewed as a necessary element for long-run macroeconomic stability. A close relationship between these two real variables helps preserve country competitiveness, while limiting inflationary pressures and risk of a wage-price spiral.

Yet, increases in real wages are often not matched by comparable productivity gains. Most observers identify excess labor demand and a loose public sector wage policy as factors driving real wages above labor productivity. The rapid integration of NMS labor markets with trade partners from the European Union (EU) and improvements in data reporting due to the “deshadowing” of the “gray” economy are also provided as possible explanations.

While wage-price setting in advanced EU countries is well documented in the literature, to our knowledge little analytical work has been done on this topic for NMS. Blanchard and Katz (1999) provide a review of estimates of the empirical Phillips curve relation for OECD Europe and show a direct effect of productivity on wages, including evidence of an error correction term with a significant and right-signed coefficient. For NMS, Schiff and others (2006) provide an in-depth discussion of labor market performance in these countries, with a special emphasis on labor market participation and unemployment. Babetskii (2007) offers one of the few analyses of wage dynamics in the recent literature on NMS; however, the focus of his work is more on wage flexibility—that is, the relation between wages and unemployment—under different exchange rate policies.²

The aim of this paper is therefore to attempt to fill this gap in the literature by evaluating wage- and price-setting behavior in NMS. Our estimates of the empirical wage relation suggest a significant response of almost 80 percent of real wage growth to productivity gains in NMS, once we control for fixed effects. The unemployment rate and an error correction term enter significantly in the short-run dynamics specification; however, changes in the

² Labor productivity is included in Babetskii’s wage specification as a control variable but enters with a not significant and wrong-signed coefficient. His selected group of NMS does not include Bulgaria and Romania. The analysis uses quarterly data for the period 1995-2004.

terms of trade do not seem to feed through to real wages. Estimates of the price-setting equation suggest strong and significant wage pass-through to inflation.

As a caveat, the poor quality and restricted availability of labor market data for NMS impose strong constraints on the analysis. The choice of dropping earlier and less reliable observations comes at the cost of a shorter time window and thus difficulties in accounting for country-specific dynamics. Nevertheless, the adoption of a panel data approach helps enhance the power of the analysis. Moreover, stylized facts complement the econometric investigation.

The rest of this paper is organized as follows. Sections II and III outline our analytical framework for wage- and price-setting behavior. Section IV introduces the stylized facts on NMS at the center of our analysis. Section V discusses the empirical hypotheses to be tested in the subsequent sections. Section VI presents the econometric results, while Section VII offers a qualitative analysis of public sector wage policies and institutional factors. Section VIII concludes.

II. WAGE- AND PRICE-SETTING RELATIONS

In a very stylized setting, on the demand side of the economy, firms' labor demand is determined by a price-setting equation. Under the assumption of a Cobb-Douglas production function, prices are set by applying a markup μ over the unit labor cost. In logarithms,

$$p = ulc + \mu = [w - (y - n)] + \mu, \quad (1)$$

where μ is the markup—resulting from imperfect competition in the goods market and/or labor market imperfections, $(y - n)$ is labor productivity and $(w - p)$ is the real wage.

The supply side of the economy specifies the wage-setting equation. In the absence of frictions and imperfections in the labor market, the workers' desired wage level depends on labor productivity, the unemployment rate, u , and other factors, z . Abstracting from expectations, the wage-setting equation can thus be represented as follows:

$$w - p = -\beta u + (y - n) + z. \quad (2)$$

The variable z in the wage-setting equation includes a range of “wage-push” factors: unemployment benefits, minimum wages, restrictions on firing or hiring, the degree of unionization, and the tax wedge (both in terms of earnings and payroll taxes), as well as skills mismatch and information problems. By creating a disconnect between wages and effective total compensation, these factors affect, in turn, the firms' unit labor costs and wage-setting behavior.

III. ADDITIONAL CONSIDERATIONS

A. Data Issues

One of the main obstacles to the analysis of NMS is the limited availability and poor quality of labor market data. Due to the poor statistical quality of early series for transition economies, the sample period for the empirical analysis is restricted to 2001-07, and, to

maximize series comparability, Eurostat is used as the main data source.³ The limited time span is enhanced by the use of a panel data approach for the nine NMS in our sample;⁴ for comparison, estimates are also presented for the other EU countries (EU-18).

Furthermore, accurate definition and construction of the labor market indicators are essential for a correct interpretation of the data. In particular, in the analysis of real wages and productivity data, the selection of alternative price deflators or employment series can produce widely different results.

The choice of the GDP deflator as price deflator for real wages and productivity makes the data consistent.⁵ Productivity is defined here as real GDP per person employed. Therefore, the GDP deflator is the correct price variable to be used in the construction of real wages. Given that GDP deflator growth tends to be higher than private consumption growth during the sample period for most NMS (Figure 1), the use of the consumption deflator would bias real wage growth upward with respect to productivity growth.⁶

At the same time, workers' bargaining decisions are based on the purchasing power deriving from their real wages. Therefore, in the wage-setting equation, the nominal wage should be rather deflated by the private consumption deflator. However, the impact of productivity on real wages would need to be corrected by the difference between GDP and the consumption deflator. A useful way to rewrite the wage-setting equation is therefore as follows:

$$w - pc = -\beta u + (y - n) + \theta(p - pc) + z, \quad (2')$$

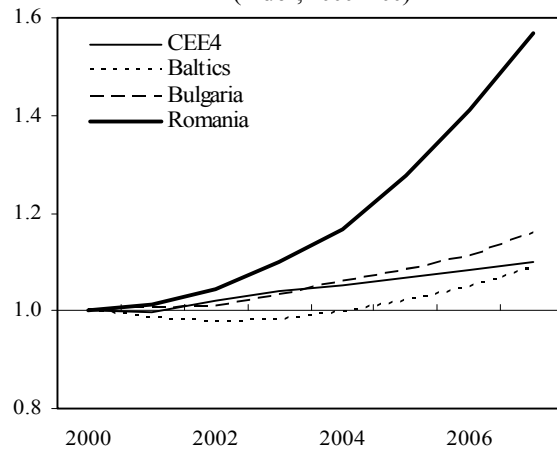
³ The only exceptions are represented by the unemployment rate series from the IMF's World Economic Outlook (WEO) database and the wage flexibility index from the World Bank's Doing Business indicators.

⁴ In the text below, we refer to the following regional groups among NMS: CEE4, comprising the Czech Republic, Hungary, Poland, and the Slovak Republic; and the Baltic countries, comprising Estonia, Latvia and Lithuania.

⁵ See Bosworth, Perry, and Shapiro (1994) and Feldstein (2008) for a further discussion of price- and wage-measuring issues.

⁶ Assuming that domestic demand and private consumption deflators grow at the same rate, this result implies an increase in the terms of trade, that is, an increase in the price of exports with respect to imports, which is consistent with the increase in the technology and human capital content of transition countries' exports during the convergence process.

Figure 1. NMS: Relationship Between GDP and Private Consumption Deflator, 2000-07 (Index, 2000=100)



Source: Eurostat; and author's calculations.

where real wages depend on the difference between growth in the GDP deflator (p) and the private consumption deflator (pc). For θ equal to one, equation (2') is equal to the baseline wage-setting equation and implies no pass-through from a terms of trade shock to real consumption wages.

Similar considerations apply to the selection of employment statistics. The use of payroll statistics or narrower estimates of employment rather than more comprehensive labor survey data could lead to an underestimation of the number of employees in the economy and, therefore, bias upward productivity estimates.

Finally, the role of the informal economy cannot be disregarded. The increasing deshadowing of the gray economy in recent years is likely to raise figures for employment and wages, although this is merely the result of broader reporting rather than changes in fundamentals.

B. Different Wage-Setting Behavior in the Private and Public Sector

The relation between real wages and labor productivity holds for the private sector, and mainly industry. As we have shown, wage- and price-setting relations imply that the rate of unemployment, the degree of competition in the economy, and a range of wage-push factors will determine deviations of real wages from productivity.

However, wage determination in the public sector may differ from that of the private sector and even have a wage-push effect on the entire economy. Shifts in public sector labor demand and a loose wage policy may have a demonstration effect on the private sector. Furthermore, in some countries collective bargaining at the national level may set by law the minimum conditions for all of the economy, thereby generating a wage-push effect originating from the public sector.

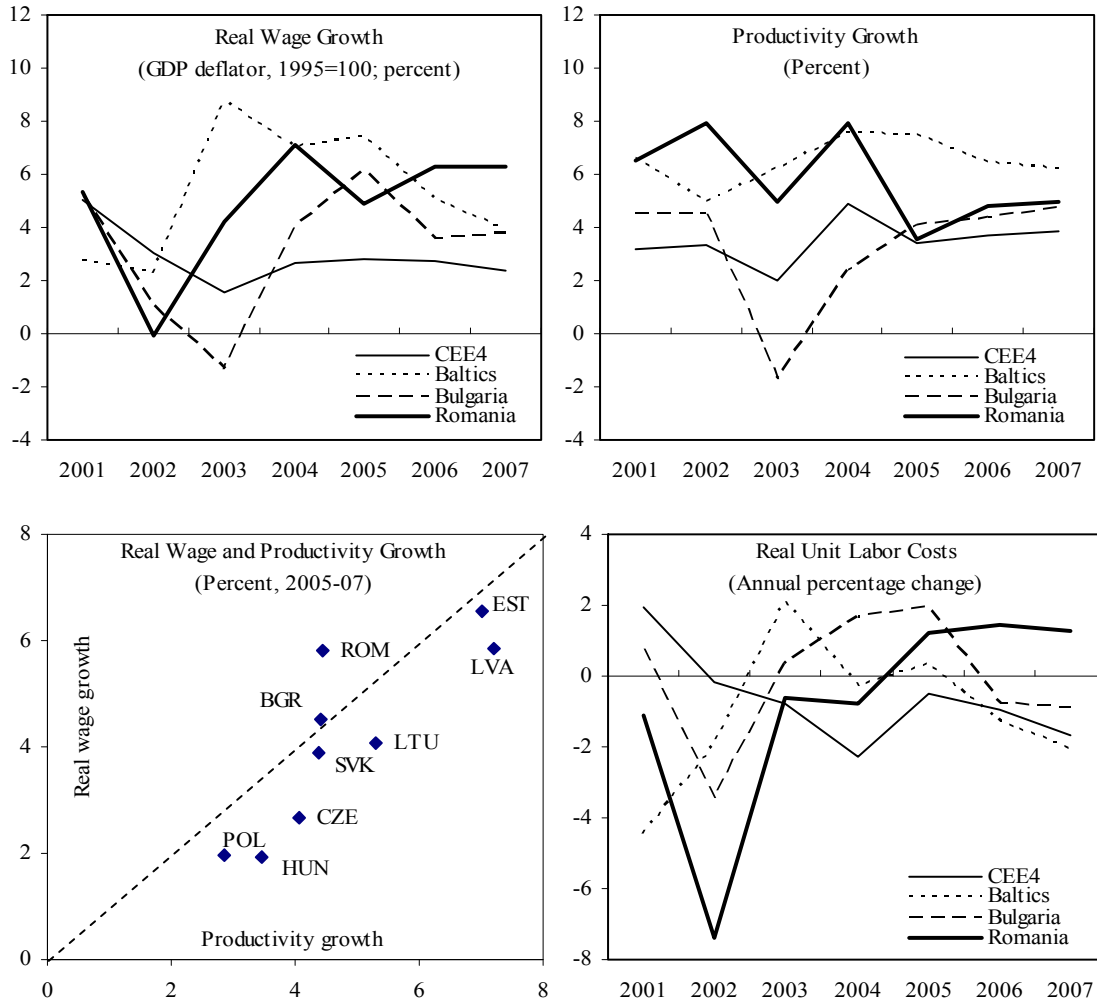
C. Catching Up to Euro Area Average Wages and Prices

Finally, wage-setting behavior in transition economies may be affected by these countries' convergence process. Real convergence toward comparable purchasing power could represent a further wage-push factor in most of the NMS that are starting from very low initial levels. Furthermore, increasing labor mobility across the EU and the growing weight of remittances from abroad in households' income could trigger an even faster nominal convergence in wages and prices.

IV. STYLIZED FACTS ON NMS

A first analysis of labor market data suggests that real wage growth has been high in most NMS over the last few years (Figure 2).⁷ In the CEE4 group, which is ahead in the convergence process, real wage growth has been relatively stable and on average well below 5 percent. Real wages have accelerated in the other NMS. However, they seem to have moderated since 2005 in the Baltics and Bulgaria, while they remain high in Romania.

Figure 2. NMS: Real Wages and Labor Productivity, 2001-07



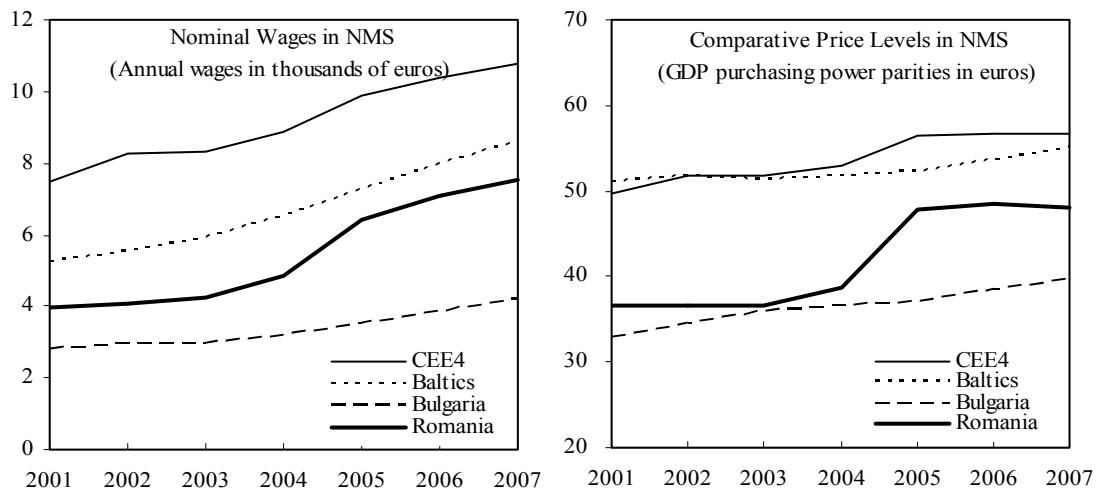
Sources: Eurostat; and author's calculations.

⁷ For the cross-country sample, the real wage is defined as the nominal wage deflated by the GDP deflator. According to the Eurostat definition, the nominal wage is the remuneration in cash paid by the employer during the reference year, before tax deductions and social security contributions payable by wage earners and retained by the employer. All bonuses, whether or not regularly paid, are included. Severance payments, as well as payments in kind, are excluded.

At the same time, productivity growth has been persistently high in NMS, especially in the Baltic countries.⁸ The Baltics stand out from the NMS for their sustained productivity gains in recent years, averaging 7 percent. Productivity in the other NMS, although gradually increasing, has been around 4 percent in the last three years.

As a result, real unit labor costs—measuring the difference between real wages and labor productivity—began decreasing in 2005 in most NMS, with the notable exception of Romania. While the increase of real wages above productivity has been corrected in most countries, since 2005 real wage growth in Romania has been higher than productivity gains.

Figure 3. NMS: Nominal Wage and Comparative Price Levels, 2001-07



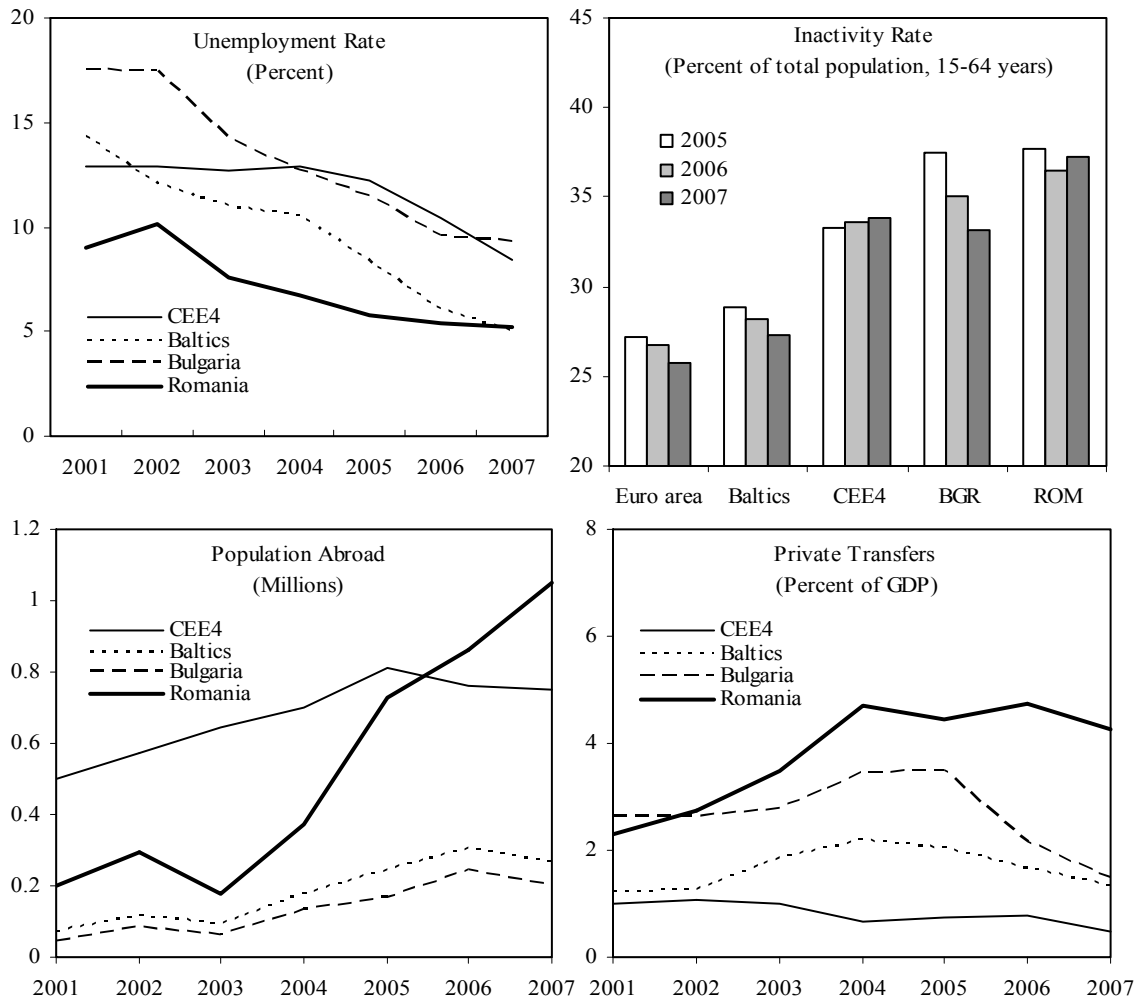
Sources: Eurostat; and author's calculations.

Recent wage-setting behavior in most NMS might reflect a catching up from extremely low wage levels relative to peer countries. As presented in Figure 3, euro wages in all NMS have been increasing, but there are still wide differences across countries. While wages in Romania have been catching up rapidly, the pace in other countries has been much slower, even when starting from lower levels, as in the case of Bulgaria. The same pattern is identifiable in NMS price adjustments: Romania's price levels have increased very rapidly, notably in 2004-05, compared with the much smoother adjustment of the other NMS.

According to the wage-setting relation, the level of the unemployment rate directly affects wage-setting behavior and its decline may therefore explain part of the increase in real wages across countries. Unemployment rates have decreased rapidly to single digits in most NMS over the last three years (Figure 4). This reduction has been matched by a change in the production structure, which has been associated with an increased need for skilled workers. However, inactivity rates are still well above the euro area average in most NMS, notably Bulgaria and Romania.

⁸ Labor productivity is defined as GDP at 1995 market prices per person employed, according to Eurostat.

Figure 4. NMS: Labor Force Developments, 2001-07



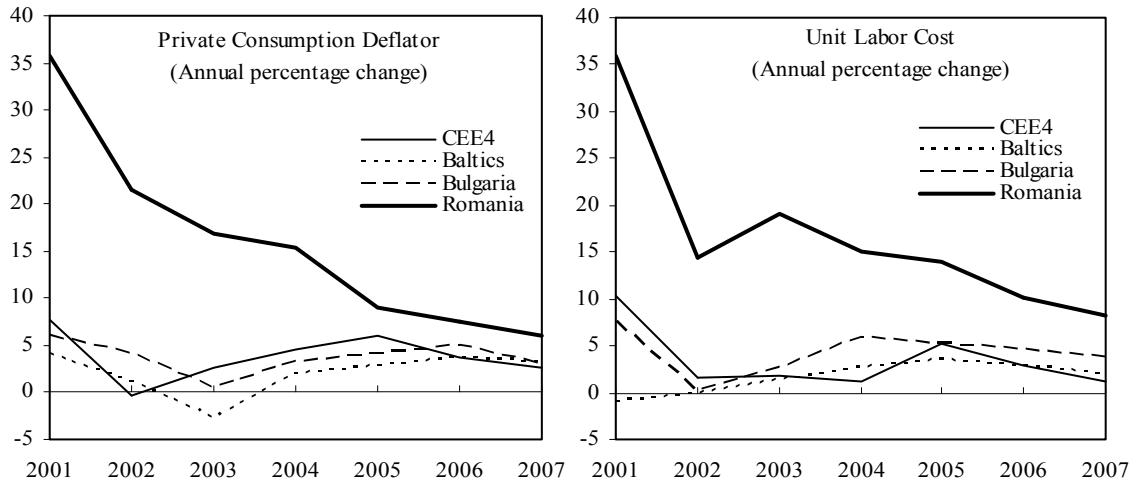
Sources: Eurostat; WEO; and author's calculations.

Large-scale emigration of the labor force is at the root of the tight labor markets in most NMS. Although national statistics on emigration flows tend to underestimate the number of citizens leaving their country every year, statistics from EU recipient countries offer quite a remarkable picture (Figure 4). For example, EU countries report more than 1 million Romanian citizens residing abroad. Most of the emigration in this country tends to originate from rural areas, where the activity rate is still very low and a large share of the working-age population has difficulties reentering the labor force.

Remittances from NMS citizens abroad may put further pressures on domestic wages, beyond the direct impact of migration on the labor force. Large inflows of remittances—proxied in Figure 4 by private transfers—by affecting households' disposable income, are likely to increase reservation wages and become a wage-push factor for domestic wages.

As regards price-setting behavior in NMS, the stylized facts suggest that unit labor costs and consumer prices have followed similar paths over the last few years. In all NMS, but even more remarkably in Romania, reductions in ULC have in general been matched by lower inflation (Figure 5).

Figure 5. NMS: Unit Labor Costs and Consumer Price Inflation, 2001-07



Source: Eurostat.

Finally, competition policy have improved in all NMS, although starting from very low levels in Bulgaria and Romania (Table 1). As described in Section II, the degree of competition in the goods market affects the price-setting behavior of firms and, as a result, their ability to accommodate nominal wage pressures via price increases. Enhanced competition, by reducing firms' markup, is expected to strengthen the relation between real wages and labor productivity.

Table 1. NMS: Index of Competition Policy, 2001-07

	CEE4				Baltics			BGR	ROM		
	CZE	HUN	POL	SVA	EST	LTU	LVA				
2001	2.9	2.7	3.0	3.0	3.0	2.8	3.0	3.0	2.3	2.3	2.3
2002	3.0	3.0	3.0	3.0	3.0	2.8	3.0	3.0	2.3	2.3	2.3
2003	3.0	3.0	3.0	3.0	3.0	2.9	3.0	3.0	2.7	2.3	2.3
2004	3.2	3.0	3.3	3.0	3.3	3.0	3.3	3.0	2.7	2.3	2.3
2005	3.2	3.0	3.3	3.3	3.3	3.2	3.3	3.3	3.0	2.7	2.3
2006	3.2	3.0	3.3	3.3	3.3	3.3	3.7	3.3	3.0	2.7	2.7
2007	3.2	3.0	3.3	3.3	3.3	3.3	3.7	3.3	3.0	2.7	2.7

Source: EBRD, Transition Indicators database.

V. EMPIRICAL WAGE- AND PRICE-SETTING EQUATIONS

The above stylized facts raise the two following questions: (i) to what extent have wages diverged from labor productivity in NMS, and (ii) what accounts for this divergence? We investigate three main empirical hypotheses in order to explain some of the deviation between real wage and labor productivity growth:

1. **Catch-up from unusually low wage levels.** Countries starting from very low initial wage levels may experience higher real wage growth in order to reach the equilibrium level suggested by the long-run relation between real wages and productivity. Further pressures on real wages may also arise from a direct wage catch-up to euro area nominal wages. This process can be intensified through improvements in households' incomes due to large remittances.
2. **Tight labor market conditions.** High labor productivity and changes in the production structure increase demand for qualified workers in countries simultaneously experiencing massive migration flows. Wage pressures in high-productivity sectors end up affecting also less productive sectors in the economy. **Shifts in public sector labor demand**, in part justified by recent EU memberships, can be a further source of pressure on wages.
3. **Institutional characteristics of the labor market.** Institutional factors may affect effective compensation and, more generally, economies' wage-setting behavior. Differences in tax wedges, minimum wages, and labor market rigidities, including the degree of unionization and collective bargaining in the economy, are among the main structural factors to be considered.

The first and part of the second hypothesis can be tested by means of an empirical wage equation (with econometric results presented in Section VI). The shifts in public sector labor demand and the institutional characteristics of the labor market are discussed more qualitatively by looking at the stylized facts (in Section VII), as data constraints do not allow an econometric analysis.

The conventional wage-setting equation discussed in Section II is estimated empirically following Blanchard and Katz (1999). The empirical equation is expressed in differences. Furthermore, as real wages are deflated by the consumption deflator, a variable accounting for the difference between GDP and the private consumption deflator—and therefore proxying changes in terms of trade—is added to the final specification.⁹ The short- and long-run dynamics of wages can be therefore represented by the following empirical wage equation:¹⁰

⁹ See, among others, OECD (1997) for a similar specification.

¹⁰ All variables are in logs.

$$\Delta(w_t - pc_t) = \alpha_w + \beta_w \Delta(y_t - n_t) - \gamma ECT_{t-1} + \theta \Delta(p_t - pc_t) - \delta u_t + \phi z_t + \varepsilon_t \quad (3)$$

$$ECT_t = (w_t - pc_t) - [\alpha_{LR} + \beta_{LR} (y_t - n_t) + \theta_{LR} (p_t - pc_t)]. \quad (4)$$

In the short run, real wage growth would depend on labor productivity growth, changes in terms of trade, and unemployment, as well as a series of wage-push factors that can be added to the regression as control variables. In line with Sargan (1964) and more recent empirical studies of European countries, the specification allows for a long-run adjustment component by means of an error correction term (ECT), defined as the difference in levels between real wages and productivity.

Furthermore, as any wage increase not justified by fundamentals could lead to inflation and generate a wage-price spiral, the analysis needs to consider the firms' price-setting behavior. Any increase in wages beyond productivity affects prices, by increasing unit labor costs in the firms' price-setting equation. The extent to which increases in nominal wages are transferred to prices will depend on the structural characteristics of the goods market and the firms' pricing power. In particular, if wages and markups are not flexible, the process of nominal adjustment to equilibrium will be slower and generate longer-lasting output fluctuations (Blanchard, 1985). Empirically, the price-setting equation in Section II can be translated into the following specification:

$$\Delta pc_t = \alpha_p + \beta_p \Delta w_t - \gamma \Delta(y_t - n_t) - \delta ECT_{t-1} + \phi \Delta mp_t + \varepsilon_t \quad (5)$$

$$ECT_t = pc_t - [\alpha_{LR} + \beta_{LR} w_t - \gamma (y_t - n_t) + \phi_{LR} mp_t]. \quad (6)$$

The short-run dynamics of inflation are explained by a level adjustment to steady state, represented by an ECT as in the previous wage equation, and by changes in firms' unit cost. The latter is defined as the unit labor cost plus an import price pass-through effect (mp). Changes in the firms' pricing power can also be added to both the long- and short-run specifications.

VI. ECONOMETRIC RESULTS

The econometric results from a panel analysis of the empirical wage equation for EU countries suggest a tight long-run relationship between real wages and labor productivity. The empirical long-run wage-setting equation is estimated separately for the 9 NMS and, for comparison purposes, the remaining 18 EU countries, comprising the euro area, Denmark, Sweden, and the U.K., over the period 2001-07, using the Eurostat database. The overall response of real wages to labor productivity, controlling for fixed effects, is equal to 0.86 in both samples (Table 2).

Table 2. EU-27: Long-Run Wage Equation Estimation

Specification:		
$w_{it}-pc_{it}=\alpha_i+\beta(y_{it}-n_{it})+\theta(p_{it}-pc_{it})+\varepsilon_t$		
2001-07	EU-18	NMS
Labor productivity	0.86 [0.03]***	0.86 [0.04]***
Terms of trade	1.02 [0.14]***	1.24 [0.21]***
Constant	1.13 [0.14]***	0.41 [0.22]*
R^2	0.86	0.95
Observations	126	63

Notes: Standard errors in parentheses. *, **, *** denote significance at 10, 5, and 1 percent levels, respectively.

A significant ECT enters into the wage equation of EU countries.¹¹ As presented in Table 3, the sign of the ECT coefficient is negative, implying an adjustment of real wage growth to deviations of real wages from their long-run equilibrium level. While the ECT coefficient estimated for the EU-18 is consistent with the 0.25 value estimated in the literature for OECD EU countries (Blanchard and Katz, 1999), the NMS coefficient is much higher at 0.46. Therefore, NMS present a faster speed of adjustment toward equilibrium—which supports our first hypothesis of a catch-up effect from very low starting wages in some countries, such as Bulgaria and Romania. However, there is no significant evidence of a direct wage catch-up effect to EU levels, arising because NMS countries' euro wages are lower than the euro area average.

As shown in Table 3, the short-run relationship between real wage growth and labor productivity gains is remarkably strong in NMS, and so is the relationship with unemployment. The labor productivity coefficient moves close to one once other control variables have been included in the specification. In the baseline specification for NMS, the response of real wage growth to unemployment is also significant and with the expected negative sign, in support of our hypothesis in Section V that tighter labor market conditions put pressure on real wages. However, results are not robust to the addition of new regressors: for example, the unemployment coefficient is lower and no longer significant once the remittances variable is added to the baseline specification. In fact, larger remittances in percent of GDP might be proxying higher disposable incomes as well as countries' tighter labor market conditions due to emigration flows. Finally, both likelihood ratio and Wald tests

¹¹ The residual of the long-run wage equation is found stationary and, in line with the Granger representation theorem, is entered in the empirical wage equation together with the short-run dynamics. However, the power of the test is affected by the small time dimension of the sample, which also imposes a parsimonious specification with homogeneous dynamics.

cannot reject the hypothesis that the coefficient on changes in the terms of trade is different from one in both EU-18 countries and NMS, therefore suggesting that shocks to the terms of trade do not pass through to real wage growth (that is a θ equal to one in equation 2' in Section III.A).¹²

Table 3. EU-27: Wage Error Correction Model Estimation

Specification:				
$\Delta(w_{it}-pc_{it})=\alpha+\beta\Delta(y_{it}-n_{it})+\gamma ECT_{it-1}+\theta\Delta(p_{it}-pc_{it})+\delta u_{it}+\varepsilon_t$				
	EU-18	NMS		
2001-07		(1)	(2)	(3)
Error correction term (lagged)	-0.28 [0.07]***	-0.46 [0.10]***	-0.49 [0.12]***	-0.44 [0.11]***
Labor productivity growth	0.42 [0.12]***	0.79 [0.12]***	0.81 [0.18]***	0.93 [0.18]***
Terms of trade growth	1.06 [0.13]***	1.20 [0.22]***	1.25 [0.21]***	1.22 [0.22]***
Unemployment rate	-1.13 [0.72]	-3.01 [1.55]*	-2.46 [1.87]	-2.40 [1.56]
Euro area wage level catch-up 1/			-0.02 [0.03]	
Remittances				0.01 [0.00]*
Constant	0.03 [0.01]	0.07 [0.04]*	0.08 [0.04]*	0.05 [0.04]
R^2	0.46	0.56	0.57	0.62
Observations	108	54	54	50

Notes: Standard errors in parentheses. *, **, *** denote significance at 10, 5, and 1 percent levels, respectively.

1/ Lagged deviation of euro area wage (in euros) from country wage (in euros).

A panel analysis across NMS of the empirical price equation shows evidence of large and significant pass-through effect from wage growth to inflation. The long-run estimation is consistent with the wage-setting analysis (Table 4). In the short-run dynamics, the average response of inflation to wage growth is strongly significant and estimated at around 0.65 in both country-group samples (Table 5).¹³ Labor productivity growth has the expected negative sign, implying that gains in productivity through reductions in firms' unit labor costs mitigate

¹² Other control variables are added to the baseline specification (including the activity level, excess demand for skilled workers, tax wedges, minimum wages, and the World Bank's "Employing Workers" indicator as a measure of labor rigidity). Although all these variables are found to have a wage-push effect, as suggested by the literature, lack of a sufficient time span for most indicators hampers the statistical reliability of these results, which are therefore omitted.

¹³ Results are robust to specifications allowing for lags of the dependent variable and the regressors.

inflationary pressures. The impact of an increase in unit labor costs on inflation in NMS would therefore be limited, as long as increases in nominal wages are matched by productivity gains.

Table 4. EU-27: Long-Run Price Equation Estimation

Specification:			
$pc_{it} = \alpha_i + \beta w_{it} + \gamma(y_{it} - n_{it}) + \theta(p_{it} - pc_{it}) + \varepsilon_t$			
2001-07	EU-18	NMS	
Nominal wage	0.76 [0.05]***	0.76 [0.05]***	0.78 [0.05]***
Labor productivity	-0.52 [0.09]***	-0.69 [0.09]***	-0.62 [0.09]***
Import deflator	0.16 [0.05]***	0.20 [0.10]**	0.24 [0.10]**
Pricing power			0.20 [0.09]**
Constant	3.59 [0.30]***	6.37 [0.50]***	5.98 [0.52]***
R^2	0.90	0.91	0.92
Observations	126	63	63

Notes: Standard errors in parentheses. *, **, *** denote significance at 10, 5, and 1 percent levels, respectively.

Table 5. EU-27: Price Error Correction Model Estimation

Specification:			
$\Delta pc_{it} = \alpha + \beta \Delta w_{it} + \gamma \Delta(y_{it} - n_{it}) + \delta ECT_{it-1} + \theta \Delta(p_{it} - pc_{it}) + \varepsilon_t$			
2001-07	EU-18	NMS	
Error correction term (lagged)	-0.21 [0.07]***	-0.32 [0.11]***	-0.35 [0.11]***
Nominal wage growth	0.63 [0.07]***	0.64 [0.07]***	0.65 [0.07]***
Labor productivity growth	-0.28 [0.13]**	-0.62 [0.18]***	-0.59 [0.18]***
Import deflator growth	0.14 [0.04]***	0.31 [0.11]***	0.32 [0.11]***
Changes in pricing power			0.07 [0.05]
R^2	0.56	0.88	0.89
Observations	108	54	54

Notes: Standard errors in parentheses. *, **, *** denote significance at 10, 5, and 1 percent levels, respectively.

The import price pass-through to domestic inflation is also strongly significant. In NMS, increases in the import deflator pass through to increases in the private consumption deflator by a coefficient of 0.31. For the EU-18 group, the coefficient is lower, at 0.14.

Finally, an additional variable controlling for firms' pricing power in NMS enters with the expected sign in both the long- and short-run specifications. As suggested by theory, prices are set at a higher level in countries with stronger firms' pricing power. The latter is proxied—with an inverted sign—by the EBRD index of competition policy: as shown in Table 1, Bulgaria and Romania have the lowest rank in the index for the entire sample period, as well as for recent years. Nevertheless, the relation holds significantly only in the long run.

VII. WAGE-SETTING VARIATION ACROSS NMS: PUBLIC SECTOR AND INSTITUTIONAL CHARACTERISTICS

The stylized facts on labor market developments in NMS, presented in Section IV, suggested a wide cross-country variation and for some countries diverging relations between real wage and productivity growth. The panel analysis of wage-setting behavior in NMS has highlighted an average response of almost 0.80 of real wage growth to labor productivity gains. Figure 6 shows the great variation in wage-setting developments across NMS by plotting each country-specific ECT, that is, the deviation of the country's real wage from equilibrium, and the actual and fitted values for real wage growth.

In Bulgaria, Romania, and Estonia, the actual level of the real wage remains above its estimated equilibrium level. In Estonia and Bulgaria actual real wage growth outpaced its estimated value – implied by labor productivity and labor demand – in 2003 and 2004, but it seems to have since reverted to more sustainable rates. In Romania, instead, real wage growth has accelerated since 2005, keeping the actual level of real wages well above its equilibrium value.

The CEE4 countries, meanwhile, have been able on average to keep a good relationship between real wages and labor productivity. Actual real wage growth tends on average to be lower than its estimated value, keeping real wages below their equilibrium level. This wage-setting behavior characterizes Poland, Hungary, and the Czech Republic¹⁴; however, the Slovak Republic and Latvia, among the Baltics, have reduced real wages to their equilibrium level only in more recent years.

¹⁴ Although the empirical analysis uses the Eurostat database for consistency, official statistics from the national authorities may offer a different picture on countries' wage setting behavior, as, for example, in the case of Poland, where national figures for real wage growth for 2006-07 are well above the Eurostat ones. As mentioned in Section III.A, these discrepancies could be due to the different coverage of the labor statistics (labor survey versus registered employment data) and the choice of the deflator (GDP-deflator versus CPI). Therefore, results for equilibrium real wages should be treated with caution.

Figure 6. How Far Are Real Wages in NMS away from Equilibrium?
(Percent)

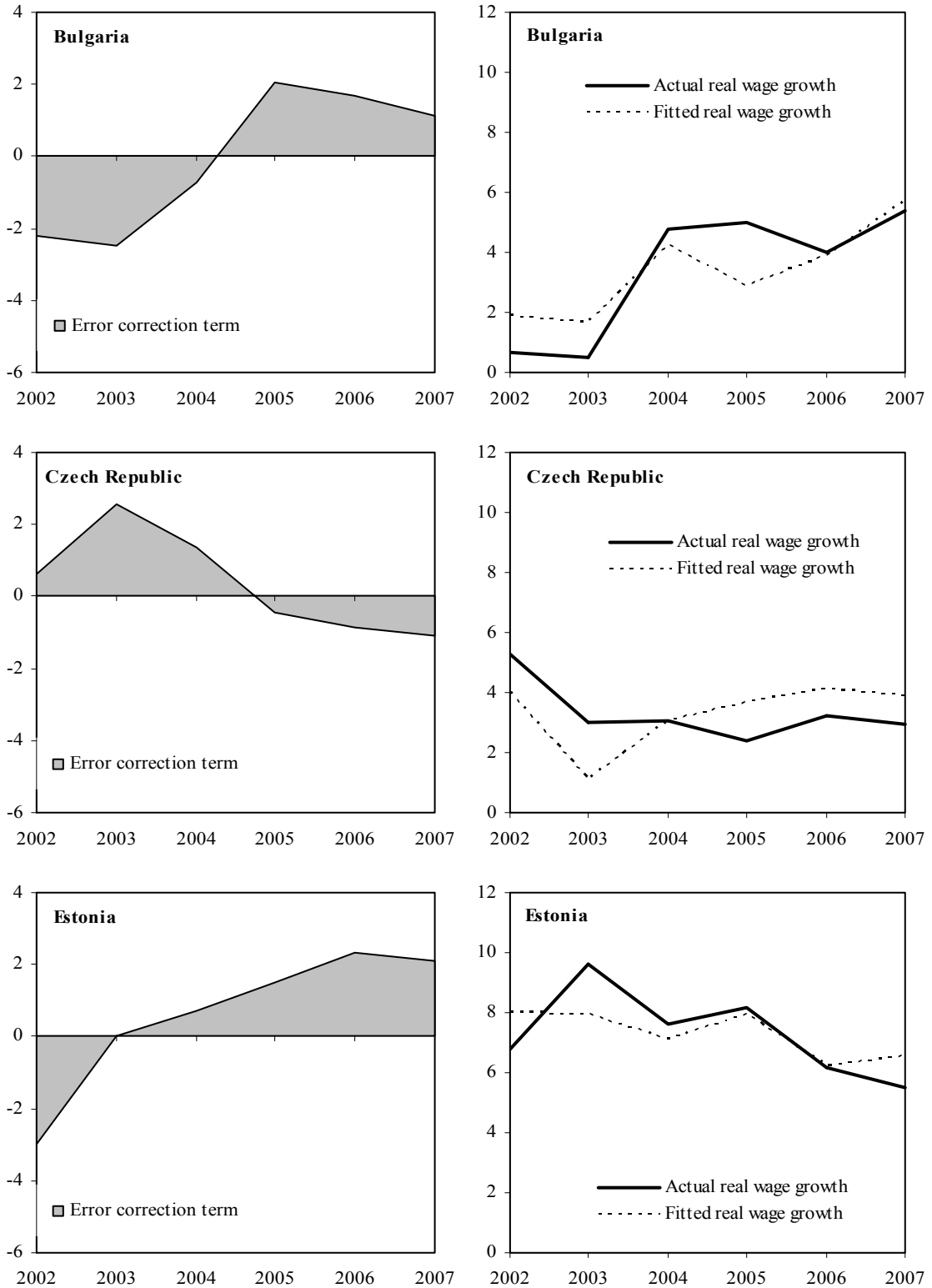


Figure 6. How Far Are Real Wages in NMS away from Equilibrium? (continued)
(Percent)

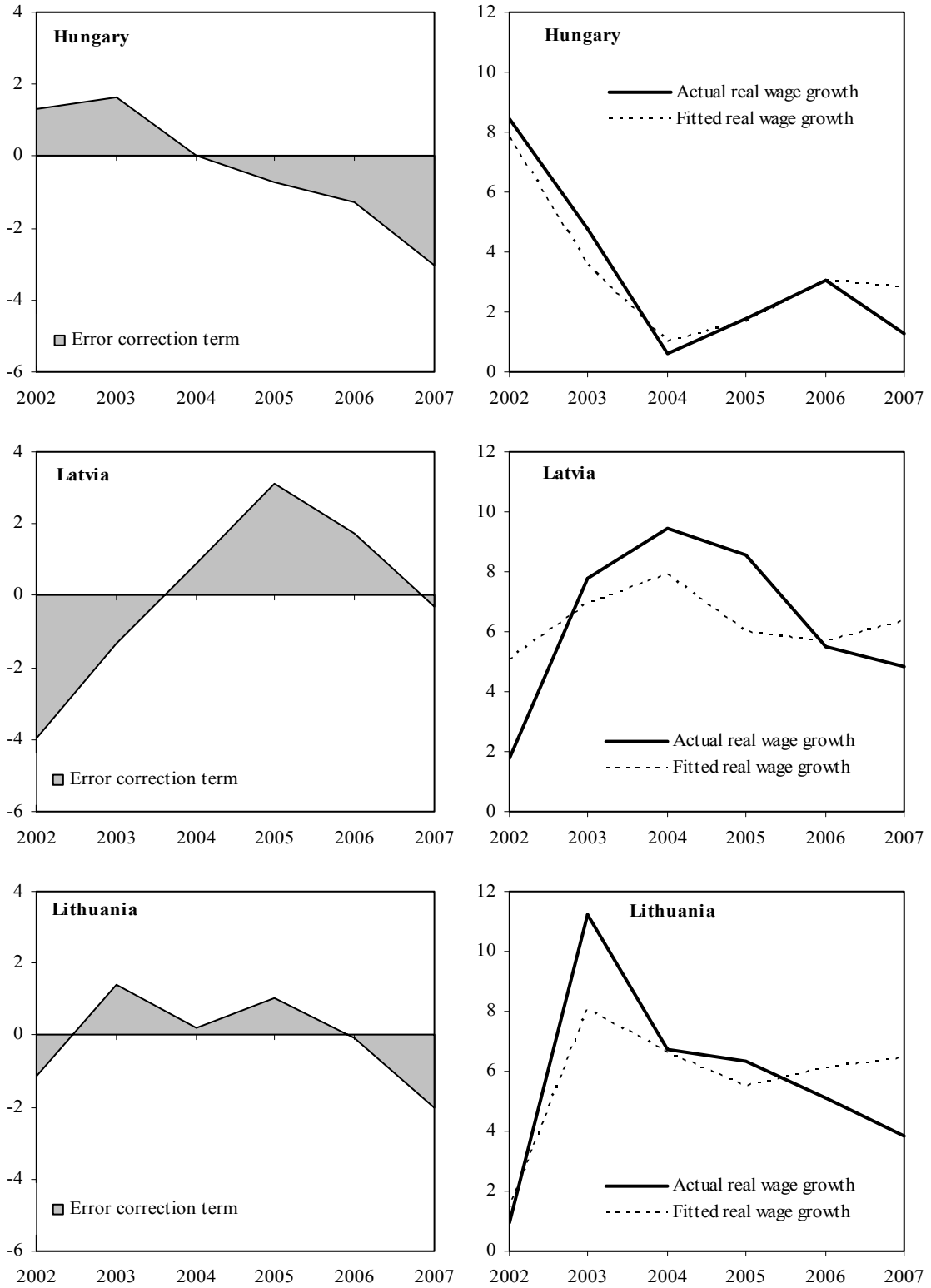
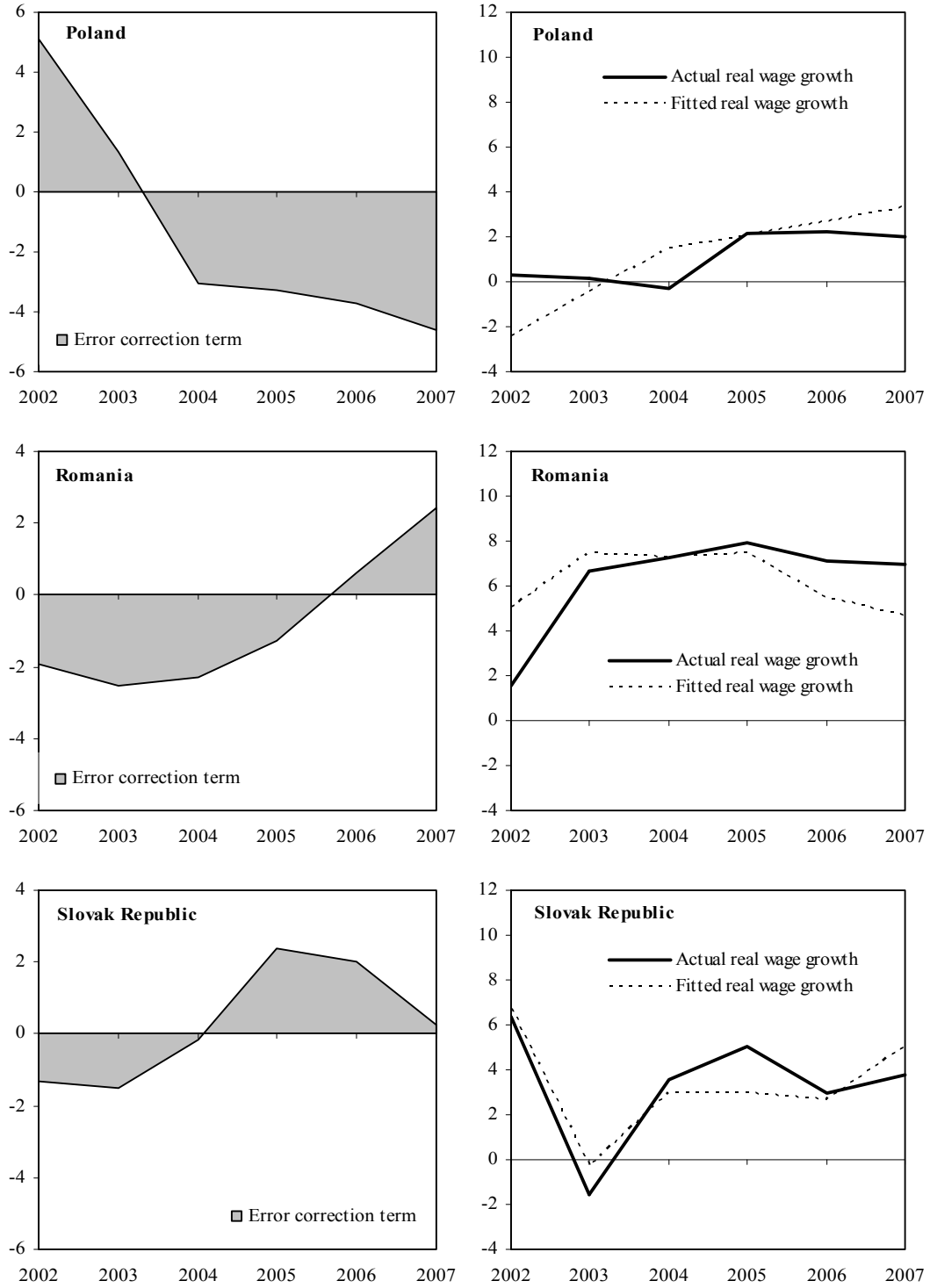


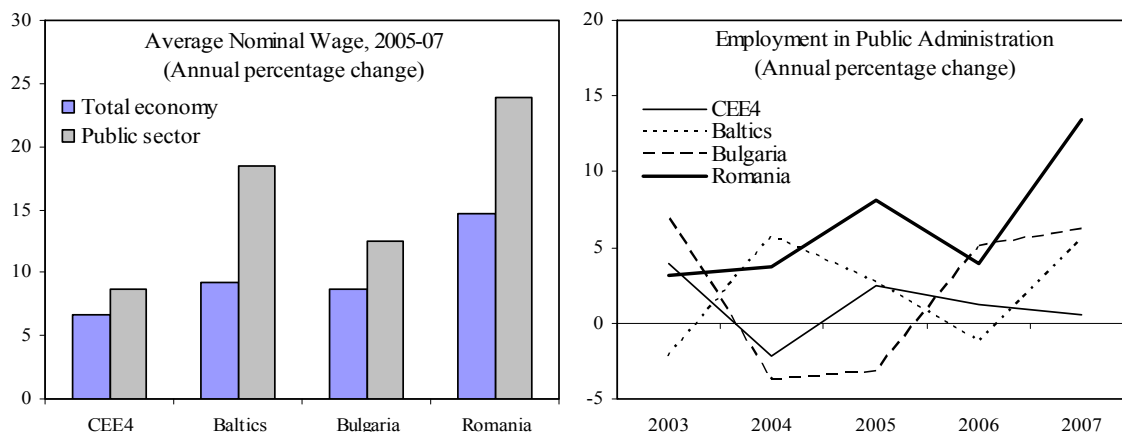
Figure 6. How Far Are Real Wages in NMS away from Equilibrium? (concluded)
(Percent)



Sources: Eurostat; and author's calculations.

The purpose of this section is to identify additional factors behind wage-setting variation across NMS, by discussing some of the hypotheses highlighted in Section V and that, due to data constraints, could not be tested in the previous econometric section. The analysis will therefore look further into the role of public sector labor demand and the different institutional characteristics of the labor market.

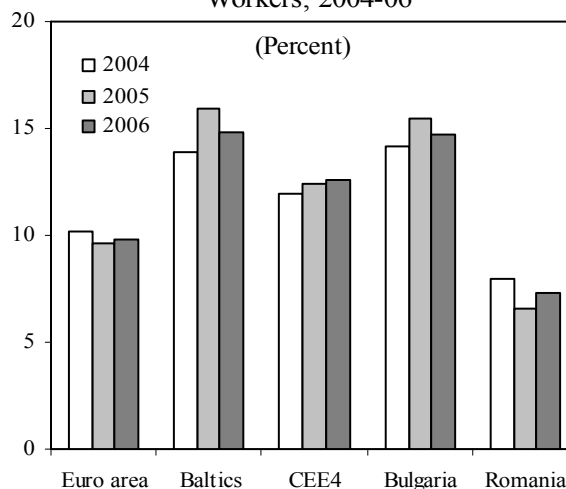
Figure 7. NMS: Nominal Wage and Employment Growth in the Public Sector



Sources: Eurostat; national authorities; and author's calculations.

In many NMS, real wages increased mostly in the public sector. In particular, real wages in the public administration have been raised by over 20 percent in the last three years in Romania and by 18 percent in the Baltics, especially Estonia and Latvia (Figure 7). Early data releases for 2008 suggest substantial increases also in Bulgaria. Among the CEE4 countries, public sector wage growth in the last two years has outpaced private sector wage growth in the Czech Republic, Hungary, and Poland, while it has been contained in Slovakia. As wage increases in the public sector are in general associated with negligible productivity gains, they are likely to lead to increases in real unit labor costs. Also, as presented in Christou (2007) for Romania and highlighted in Slovakia's *Convergence Programme*,¹⁵ a loose wage policy may have a significant demonstration effect on the private sector.

Figure 8. NMS: Excess Demand of Skilled Workers, 2004-06



Sources: Eurostat; and author's calculations.

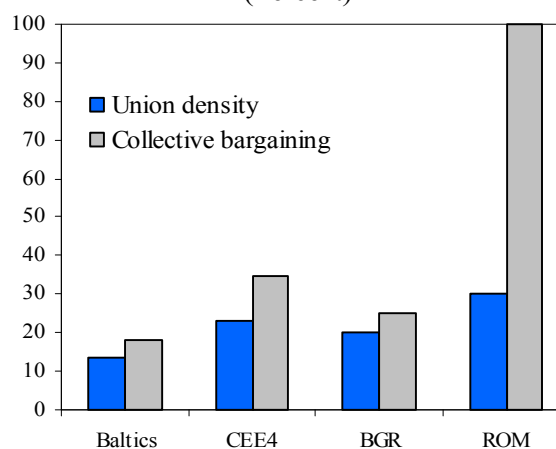
¹⁵ "Wage growth in the public sector should be kept strictly in compliance with labor productivity growth, since wages in the public sector have a signaling effect for the private sector" (Ministry of Finance of the Slovak Republic, *Convergence Programme for 2007-2010*, November 2007, p. 9).

Furthermore, hiring in the public sector, especially in the public administration, has been remarkably strong in the last years, with the exception of the CEE4 group (Figure 7). Although these increases in public employees in late-accession countries have been partly justified by the ongoing reorganization of the public administration according to EU regulations, their impact on the private sector may be significant, given the already tight labor market conditions and excess demand for skilled workers in these countries (Figure 8).¹⁶

Different structural characteristics of the labor market may also play a role in the relation between real wages and labor productivity. As noted already in Section III.B, the wage- and price-setting relations refer essentially to the industrial sector. However, collective bargaining at national level is likely to affect the wage-setting process for the whole economy, with demonstration effects from the high- to the low-productivity sectors and, conversely, from the public to the private sector.

Indeed, Romania—where the real wage-productivity gap is among the widest in the region—stands out from the other NMS also for the strongest level of unionization. Union density, defined as union members as a percentage of total employees, although much lower than in the past, is still 30-35 percent. Also, collective bargaining at the national level in Romania is regulated by law and sets national minimum pay and conditions that apply across the whole economy. The result is that national-level agreements cover all employees—implying collective bargaining coverage of 100 percent. Nevertheless, other countries like Estonia and Bulgaria, although also experiencing levels of real wages above their estimated equilibria, have instead quite limited union density and collective bargaining coverage.

Figure 9. Union Density and Collective Bargaining in NMS 1/
(Percent)



Source: European Trade Union Institute for Research, Education and Health and Safety.

1/ Survey data collected between 2000 and 2007.

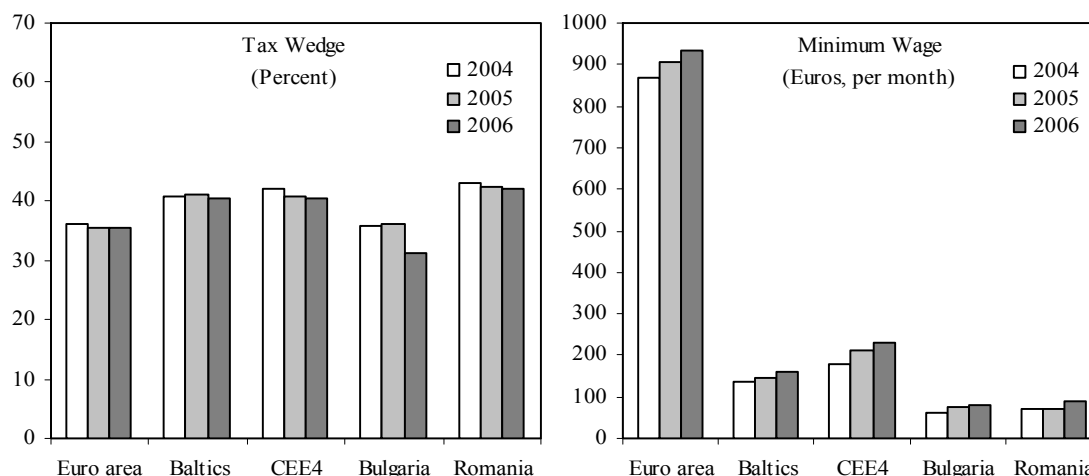
In Romania, collective bargaining at national level sets national minimum pay and conditions for all employees.

Specific nonwage labor costs also remain different across NMS (Figure 10). These wage-push factors create a wedge between the workers' wage and effective compensation and may therefore hide differences in the country price- and wage-setting strategy. Anyway, evidence from nonwage labor costs is mixed: for example, Romania has one of the widest tax wedges

¹⁶ "Excess demand" for skilled workers is defined as the difference between the percentage share of workers with tertiary education in unemployment and that one of workers in employment, considering only workers between 15 and 64 years old (World Bank, 2007).

among NMS, but also one of the lowest minimum wages (in levels and as a share of average wages). Moreover, changes in both indicators have only been marginal in most countries over the last few years and thereby do not justify the short-run dynamics of real wages.

Figure 10. NMS: Selected Labor Market Indicators, 2004-06



Source: Eurostat.

Finally, some of the Baltics states and Romania still lag behind the other NMS in terms of labor market flexibility, as proxied by the World Bank's Doing Business indicator for "Employing Workers". Labor flexibility is remarkably low in Estonia and Romania, which are also the countries with the largest deviations of real wages from equilibrium (Table 6 and Figure 6). Poor labor flexibility may indeed exacerbate tight labor market conditions in these countries, as firms cannot efficiently achieve the desired level of workers. On the other hand, Bulgaria, despite also being above equilibrium, has across time always been one of the best performers among NMS in terms of labor flexibility, according to the index. Therefore, the correlation between labor flexibility and developments in real unit labor costs should be interpreted with caution, also given reported evidence by the ILO of methodological shortcomings in the index construction.¹⁷

Table 6. NMS: Labor Flexibility, 2008 1/

	CEE4				Baltics			BGR	ROM		
	CZE	HUN	POL	SVA	EST	LTU	LVA				
Employing workers	59	69	47	56	58	29	12	30	46	68	18
Difficulty of hiring	91	81	94	94	90	78	81	81	72	90	56
Rigidity of hours	66	77	55	66	66	62	55	55	77	66	55
Difficulty of firing	86	89	94	77	83	76	66	83	77	94	77
Rigidity of employment	81	82	81	79	80	72	67	73	76	84	63

Source: World Bank, Doing Business database.

1/ For comparability, all indices normalized so that they range from 0 (lowest) to 100 (best).

¹⁷ See Berg and Cazes (2007).

VIII. CONCLUSIONS

A cross-country analysis of wage-setting behavior in new EU member countries points to three main factors accounting for developments in real unit labor costs: (i) catch-up from unusually low wage levels; (ii) tight labor market conditions, owing to strong labor demand, but also exacerbated by large-scale emigration and loose public sector wage policies; and (iii), in some cases, the institutional characteristics of the labor market.

Interestingly, other factors often suggested by the literature and by the national authorities do not seem to play a role in NMS wage-setting behavior. The panel estimates suggest no evidence of a direct wage catch-up effect arising from NMS countries' lower wages relative to the euro area. Also, terms of trade shocks do not feed through significantly to real wages.

Parallel panel estimates of the price-setting equation suggest a strong and significant wage pass-through to inflation. Real wages rising above productivity growth are therefore likely to feed through to inflation and, in turn, generate pressure for further wage increases.

According to these findings, public sector wage and employment policies should avoid aggravating private sector labor shortages and help contain inflationary pressures. Reforms that raise labor force participation and facilitate a more efficient matching of labor supply and demand also seem essential to reduce wage pressures, although the beneficial effects from such reforms are likely to take time to materialize.

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