

What Goes Up Must Come Down

Cyclicalities in Public Wage Bill Spending

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Abstract

This paper analyzes the cyclicalities of public sector wage bill spending in Europe and Central Asia and assesses the impact of wage bill spending on fiscal discipline before, during, and after the global financial crisis of 2008/09. While there are important differences across countries, the results show that public sector wage bill spending tends to behave strongly pro-cyclically, especially in transition economies. Moreover, while wage bill spending is pro-cyclical during both good and bad times, adjustments during economic downturns tend to be sharper than expansions during periods of economic booms. In addition, there is evidence of political cycles, with stronger wage bill growth in pre-election periods.

Finally, the analysis reveals that while the size of the wage bill does not seem to systematically affect fiscal discipline across countries, expansions within countries over time are associated with deteriorating fiscal positions. These findings provide a strong impetus for public wage and employment policies that aim to restrain excessive growth of the wage bill during boom periods. This prospective management of the wage bill would not only reduce the need for painful adjustments during periods of fiscal consolidation, but also contribute to strengthening the overall countercyclical and stabilizing impact of fiscal policies.

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What Goes Up Must Come Down – Cyclicalitity in Public Wage Bill Spending

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1. Introduction

Managing the cost of public sector employment is a key challenge across Europe and Central Asia (ECA) due to continued pressures for fiscal consolidation. In many countries, wage and hiring freezes remain in place, and in some countries, significant efforts to downsize the public sector workforce are underway despite strong resistance from government employees and public unions. This latest adjustment in wage bill spending follows a rapid, pro-cyclical expansion of wage bill spending prior to the 2008 global financial crisis when most countries in the region experienced rapid economic growth. During this period, increased revenue collection eased fiscal constraints, while growth put strong upward pressure on public sector wages to keep pace with rapid wage growth in the private sector.

This paper examines the cyclical behavior of wage bill expenditures in ECA and assesses its impact on fiscal discipline before, during, and after the 2008 global financial crisis. We focus on the macro-fiscal dynamics of public wage spending. Our primary objective is to understand how business cycles (both economic and political) affect aggregate wage bill spending and how wage bill spending in turn impacts the overall fiscal position of governments. While there are important microeconomic implications of the public sector remuneration system, such as the incentives offered by the public sector to attract, retain, and motivate qualified employees, they are not considered in the context of this paper.

Understanding the cyclical behavior of the public sector wage bill and its impact on public finances is important for a number of reasons. First, from a macro-fiscal perspective, since wage bill spending accounts on average for about a quarter of total public spending, its behavior will strongly affect the overall fiscal position, potentially offsetting attempts at countercyclical stabilization in other parts of the budget (e.g. automatic stabilizers). Second, there is some evidence that fiscal multipliers associated with public wages and employment may be particularly high (Bermperoglou, Pappa, and Vella, 2012). This effect would hold during boom periods when wage and employment growth in the public sector may exacerbate economy-wide wage and inflationary pressures, as well as during downturns when cuts in public employment depress consumption growth and lead to additional output loss. Understanding and managing wage bill dynamics over the economic cycle is therefore critical to enhance the counter-cyclical and stabilizing properties of overall fiscal policy. Finally, understanding the behavior of the wage bill and its response to the business and electoral cycle can also inform fiscal projections and forecasts.

Our results indicate that both business and electoral cycles strongly affect the behavior of the aggregate public sector wage bill. Overall, the wage bill tends to behave pro-cyclically in relation to the macroeconomic cycle. In addition, we find that cyclicity of wage bill spending is asymmetric: wage bills tend to adjust more strongly during periods of economic downturns. Wage bill growth also tends to accelerate during pre-election periods. Finally, the analysis reveals that while the size of the wage bill across countries does not seem to matter for fiscal discipline, expansions in aggregate wage bill expenditures within countries over time tend to be associated with deteriorating fiscal positions.

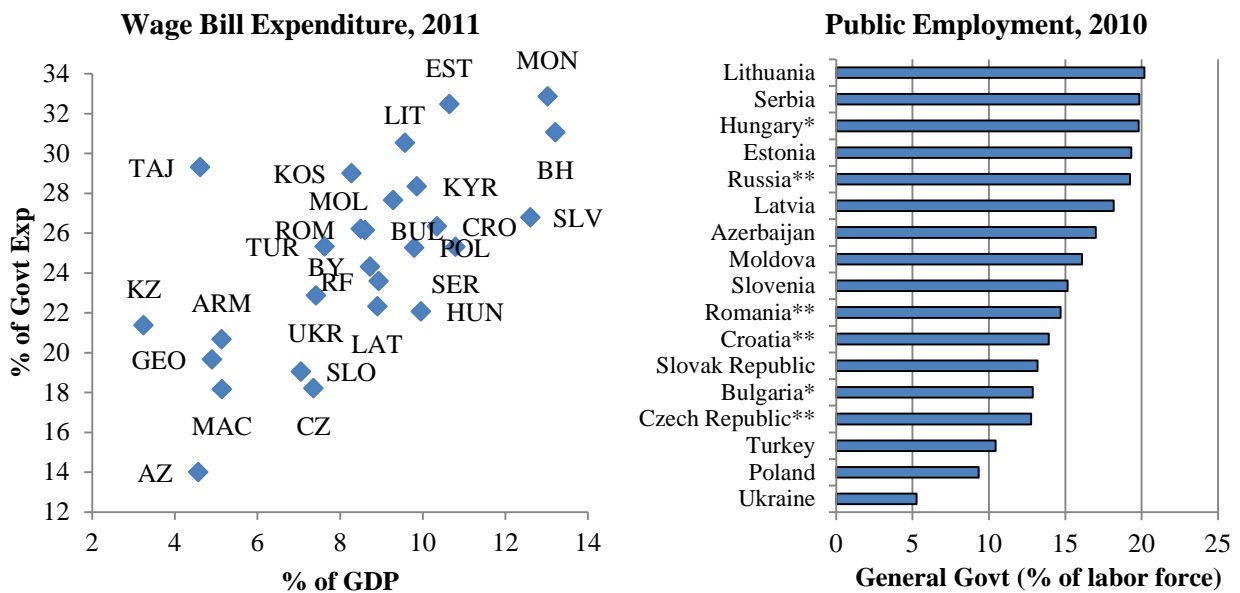
This paper builds on a large body of literature on macro-economic and political cycles in fiscal policy, for example Ilzetki and Végh (2008); Kaminsky, Reinhart, and Végh (2004); Akitoby et al. (2006); and Galí and Perotti (2003). While much attention in this strand of research has been given to the role of automatic stabilizers (e.g. social transfers) and/or discretionary stimulus spending (e.g. public investment programs), fewer studies have focused on the cyclical properties of government spending allocated to the production of public goods and services, and specifically the public wage bill. As opposed to the expected counter-cyclical behavior of automatic stabilizers, the wage bill is expected to behave pro-cyclically. Public sector wages are expected to align with overall income growth. Otherwise, in expansions too few people would apply to and remain in public employment, while in recessions too many people would queue for public sector jobs. Lamo, Perez, and Schuknecht (2008) have shown this effect empirically across OECD countries, finding a strong positive correlation between public and private sector wages over the business cycle. In addition to wages, public employment may also rise during economic boom periods as governments often use increased revenues to boost public sector employment. Freeman (1987) shows that public sector employment and wages change substantially, both in the short and long-term, in response to changes in economic conditions. Although they do not explicitly investigate cyclicity, Kraay and Van Rijckeghem (1995) find that the public wage bill is positively associated with the relaxation of resource constraints (e.g. more revenue) in developing countries, but this relation did not hold for OECD countries. Cahuc and Carcillo (2012) in turn find that increases in the public wage bill across OECD countries tend to be associated with deteriorating fiscal positions. At the same time, the literature on the composition of fiscal adjustments suggests that fiscal adjustments that rely significantly on the reduction of public wage expenditures tend to be more successful (Alesina and Perotti, 1995; Hernández de Cos and Moral-Benito, 2012), suggesting a pro-cyclical adjustment of the wage bill during downturns.

Complementing the literature on the effects of the business cycle, several studies have examined the impact of electoral cycles on fiscal policy. Shi and Svensson (2006), for example, find that fiscal deficits increase, on average, by 1 percent of GDP in elections, with the effect significantly higher in developing countries. They state that the institutional features, such as strong constraints on politicians and more informed voter, which make fiscal policy manipulations less effective, account for the difference between developed and developing countries. Other studies have shown that pre-electoral fiscal manipulation is more likely in new democracies (Brender and Drazen, 2005), in less transparent political systems (Alt and Lassen 2006), in countries with less independent media (Brender, 2003), in environments that have less information (Brender and Drazen 2005), in poorer country countries (Schuknecht 2000), and in the absence of international scrutiny (Hyde and O'Mahony, 2010). Most of these studies consider fiscal aggregates, such as overall public spending and deficit levels, and do not consider explicit expenditure categories, such as the public wage bill. Public employment and wage policies, however, may be particularly affected by political considerations. Alesina et al. (2001), for example, show that public employment serves strong redistributive purposes across regions in Italy. In addition, Dahlberg and Mörk (2011), using data from Sweden and Finland, find that there is a significant election year effect in local government employment.

2. Wage Bill Dynamics in Europe and Central Asia

The size of the public wage bill varies significantly across countries, corresponding to differences in the total workforce and public pay policies.² If measured as a percentage of GDP, the level of wage bill expenditures varies between 4 percent of GDP in Kazakhstan to 14 percent in Montenegro (see Figure 1). While cross-country public employment data are not readily available for the entire set of countries, available data suggest similar variation in employment numbers, ranging from 5 percent of the labor force in Ukraine to about 20 percent in Lithuania. This variation is a reflection of the different roles and functions assigned to the public service, rooted in different traditions and institutional legacies, preferences, and social contracts. Despite these differences, wage bill expenditures absorb a significant share of public spending across most countries. If measured as a share of public spending, the majority of countries spent between 20-30 percent of total spending on compensation of the public workforce in 2011 (although Azerbaijan only spends 14 percent, while Montenegro spends 33 percent of consolidated expenditures).

Figure 1. Size of the Public Wage Bill



Source: ECA Fiscal Database, ILO Laborsta, Country sources.

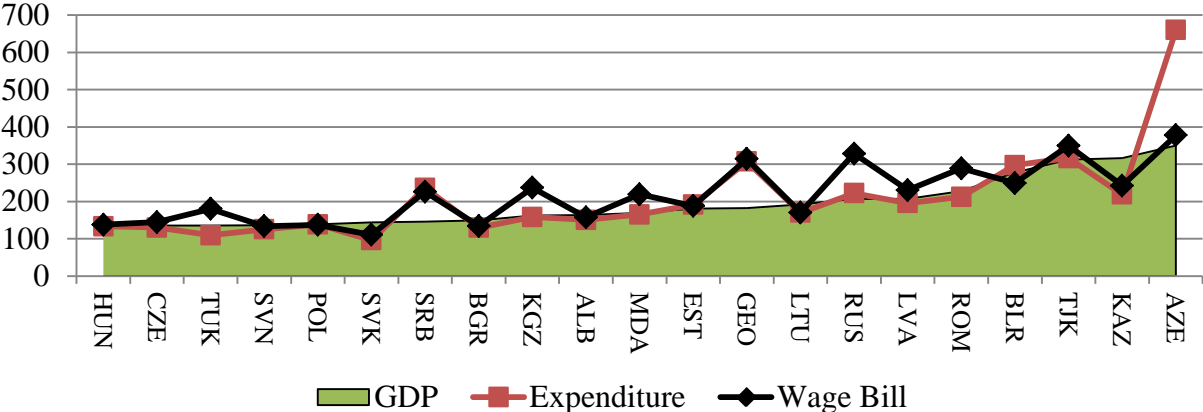
*2009; **2008

Over the past decade, countries have experienced very different patterns of wage bill growth over time. Before the crisis, many countries experienced strong economic growth, which supported an expansion of wage bill expenditures across the region. The average annual growth of wage bill expenditure was 9.4 percent in real terms between 2000 and 2008, driven by expansionary income policies in public sector wages. This general trend, however, masks

² For the purposes of this paper, the public wage bill is confined to the direct budgetary costs of general government employment, and excludes publicly owned enterprises and corporations. This definition comprises all levels of government (central, state, local), and includes ministries and agencies directly financed and controlled by government. Non-monetary benefits, such as free health services, housing, or cars, as well as intangible benefits, such as higher job security or prestige, are omitted due a lack of systematic data.

considerable variation across countries. There are several countries (Tajikistan, Romania, Latvia, Russia, Georgia, Estonia, Moldova, Kyrgyz Republic, Serbia, Turkey, Czech Republic and Hungary) that experienced rapid wage bill expansions that outpaced GDP growth (see Figure 2). In many of these cases, wage bill growth also exceeded total expenditure growth. Other countries, such as Albania, Poland, and Slovenia experienced much more restrained wage bill growth, broadly in line with GDP growth. At the same time, the wage bill grew significantly less than GDP growth and total expenditures in Azerbaijan, Kazakhstan, Belarus, Lithuania, Bulgaria, and the Slovak Republic.

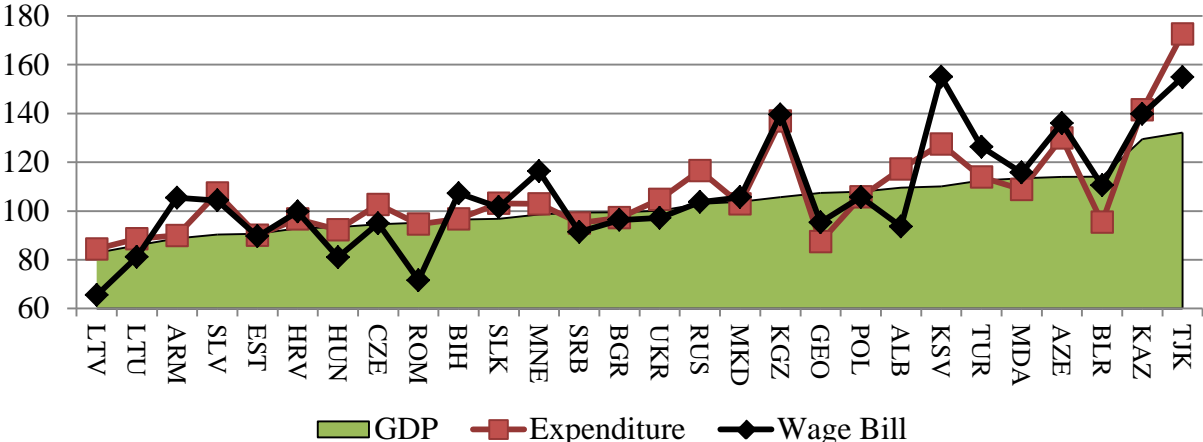
Figure 2. Real Growth Index 2000-2008 (year 2000=100)



Source: ECA Fiscal Database, Country sources

During the crisis, many countries, especially those that had experienced rapid expansions prior to the crisis, were forced to make drastic cuts to the overall size of their wage bill to restrain the fiscal deficit. Some of the countries that were hit hardest by the economic crisis, such as Latvia, Romania, Hungary, and Lithuania, experienced particularly large declines in real wage bill expenditures (see Figure 3). In 2011, Latvia’s real wage expenditures stood at only 65% of their 2008 level, while Romania’s real wage expenditures were only 72% of their 2008 level.

Figure 3. Real Growth Index 2008-2011 (year 2008=100)



Source: ECA Fiscal Database, Country sources

Although the policy responses varied across the region (see Table 1), countries primarily restrained real wage growth in the public sector by freezing hiring and nominal wages. Some countries, such as Bosnia, Latvia, Lithuania, and Romania, implemented cuts in nominal wages, mostly by cutting or suspending variable pay components, such as allowances. In addition, some countries curtailed employment, mostly relying on attrition in combination with general hiring freezes. Only a few countries, such as Latvia, which cut 25% of the general government workforce, implemented deeper government restructurings and right-sizing exercises. On the opposite side, Tajikistan, Kosovo, Kyrgyz Republic, Azerbaijan, Turkey, Montenegro, and Slovenia experienced strong expansions of the wage bill, partly in response to countercyclical policies and more favorable economic conditions.

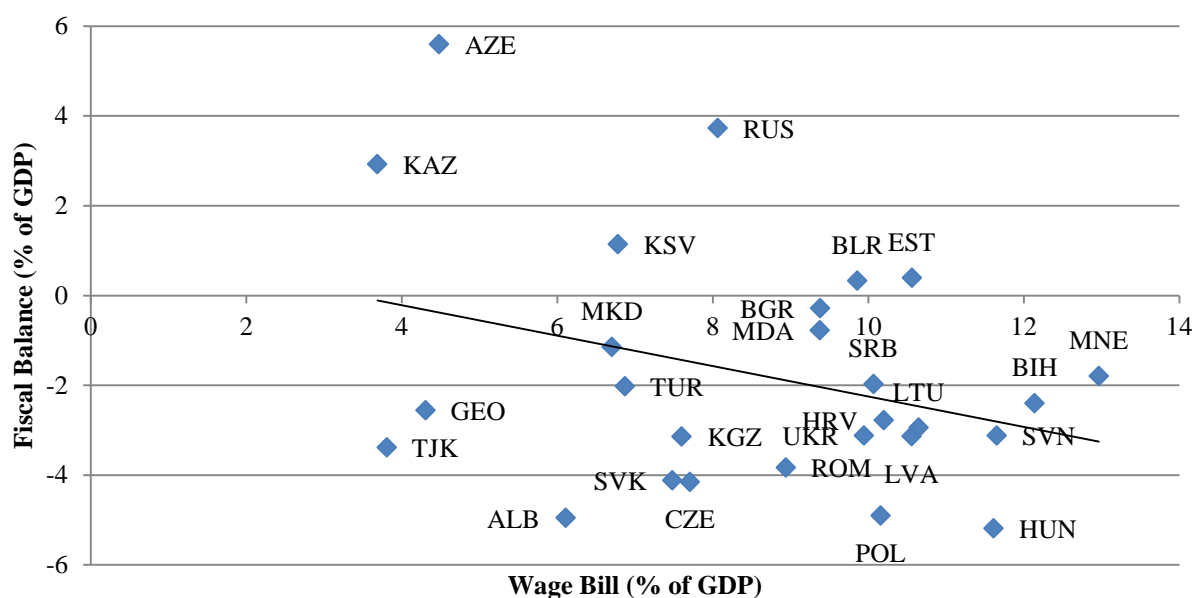
Table 1. Wage Bill Related Policy Responses to the Financial Crisis (2008-10)

Nominal Wage Freeze	Nominal Wage Cuts	Hiring Freeze	Retrenchment /Rationalization
Belarus	Bosnia	Croatia	Bulgaria
Croatia	Latvia	Georgia	Hungary
Georgia	Lithuania	Bulgaria	Latvia
Hungary	Romania	Hungary	Moldova
Macedonia	Serbia	Latvia	Serbia
Montenegro		Macedonia	Slovakia
Russia		Moldova	Romania
Slovakia		Montenegro	
Ukraine		Ukraine	

Source: Country Sources, World Bank Staff.

However, high wage bill spending does not necessarily imply unsustainable public finances. The notion that large public sectors imply fiscal profligacy is not supported by empirical evidence. For example, Estonia and Lithuania have high levels of public employment yet do not experience large or recurrent deficits. Simple cross-country correlations between the share of wage bill expenditures and the overall government deficit (both measured in relation to GDP) show that there is a weak, but insignificant relationship between wage bill spending and fiscal balances (see Figure 4).

Figure 4. Wage Bill vs. Fiscal Balance (2000-2011 averages)



Source: ECA Fiscal Database, Country sources

3. Data and Empirical Strategy

The data set contains public wage bill data for 26 ECA³ countries, covering the period 2000-2011 (see Table A5 for a complete list of countries used in the analysis).⁴ Nineteen Western European countries are subsequently used as a comparator group to determine if the effects are less significant in non-transition economies. Table A1 in the annex reports the summary statistics for all variables used in the analysis. There is considerable variation, both between and within countries, which justifies the panel estimation method.

We test three related hypotheses. The first hypothesis is that wage bill growth pro-cyclically responds to the business cycle and the electoral cycle. The second hypothesis is that the wage bill spending is characterized by downward rigidity, e.g. that spending increases are stronger in boom periods than wage bill decreases in downturns. The third hypothesis is that wage bill expansions are associated with a deterioration of the overall fiscal position.

H1: Cyclicity of Wage Bill Spending

The first hypothesis explores the cyclical behavior of wage bill spending. Periods of high growth tend to increase wages in the private sector, and lead to calls for higher wages or benefits in the

³ Turkmenistan and Uzbekistan were not included due to data availability, and Armenia and Azerbaijan were dropped due to spurious data.

⁴ The sample period reflects the availability of data. Public wage bill data does not exist for most ECA countries prior to the year 2000. Data on public employment is not comprehensively available for most countries in the sample. Therefore, it is not possible to decompose changes in wage bill expenditure into changes in public employment and in pay policies.

public sector to maintain the attractiveness of public sector jobs. To capture this effect, we define wage bill growth as the real growth of wage bill expenditure from year to year,⁵ and we include the output-gap, which was calculated using the Hodrick–Prescott filter, as a measure for the cyclical position of the economy. We also include a dummy variable for legislative or executive election years to examine the impact of the electoral cycle on wage bill spending.

In addition to simple OLS and Fixed Effects regressions, we use a Difference Generalized Method of Moments (D-GMM) approach, also known as the Arellano-Bond method (Arellano and Bond, 1998), to estimate our dynamic panel in all three hypotheses. This model is designed for “large N small T” panel data sets, and generates valid internal instruments to correct for persistence and identification issues (Roodman, 2009). The dynamic panel specification minimizes the identification challenges, but it introduces a potential new source of endogeneity by including the lagged dependent variable.⁶ The D-GMM estimation method overcomes this issue by instrumenting y_{it-1} with y_{it-2} . These instruments are useful as long as y_{it} does not approximate a random walk. Table A2 displays the results of the unit root tests for the dependent variable and the Im-Pesaran-Shin (IPS) test for a random walk is rejected. To minimize the number of instruments, we only include covariates that are not endogenous to the dependent variable, which eliminates the need to introduce additional internal instruments.⁷ Since the number of moment conditions increases with T, the Hansen J test is used to test for over-identifying restrictions. Specifically, our estimation equations are as follows:

$$y_{it} = \alpha + \beta y_{it-1} + \delta Elections_{it} + \lambda OutputGap_{it} + \gamma z_{it} + \varepsilon_{it} \quad (1)$$

where y_{it} is *WageBillGrowth*, *Elections* denotes whether an election was held in a given year, *OutputGap_{it}* represents the output gap as a share of GDP, z_{it} is a vector of covariates that includes a dummy variable to capture the presence of an IMF program (which we would expect to reinforce fiscal restraint through specific conditionality and, in some cases, directly through constraints on public wage bill spending), and the revenue to GDP ratio (which serves as a proxy for resource constraints). The error term ε_{it} contains country and year fixed effects, and the idiosyncratic error ϵ_{it} is assumed to have a mean of zero.⁸

$$\varepsilon_{it} = \sigma_i + \mu_t + \epsilon_{it} \quad (2)$$

⁵ The growth rate was derived from constant local currency units to minimize potential measurement errors from conversion into a uniform currency unit.

⁶ In the OLS estimation method, there will be a positive bias on the first lag of dependent variable. The differenced version of the equation eliminates the positive bias, but has a negative bias since $y_{it}^* = \Delta y_{it}$ is negatively correlated with $y_{it-1}^* = \Delta y_{it-1}$. The unbiased estimate should thus lie between the FE and OLS estimate, which also provides a specification check (Bond, 2002, Grigoli et al., 2012).

⁷ Furthermore, following the recommendation of Roodman (2009), the instrument matrix is collapsed to minimize the risk of this potential bias.

⁸ More detail on a number of corrections and robustness checks that were applied to the models is included in the annex to this paper.

Table 2: Wage Bill Growth and Cyclicity

Dependent Variable:	Wage_Bill_Growth _{it} (Growth Rate of Real Wage Bill, %)				
	Model	OLS	FE	D-GMM-1	D-GMM-2
	(1)	(2)	(3)	(4)	(5)
Wage_Bill_Growth _{it-1}	0.220*** (0.070)	0.030 (0.075)	0.131 (0.082)	0.124 (0.081)	0.185 (0.271)
IMF_Program _{it}	-1.479 (1.156)	-2.596* (1.419)	-2.838 (2.119)	-2.828 (2.386)	-13.037* (7.402)
Revenue_GDP _{it}	-0.259** (0.120)	0.200 (0.256)	0.397 (0.630)	0.470 (0.392)	0.154 (0.224)
Output_Gap _{it}	1.274*** (0.300)	1.379*** (0.368)	1.463*** (0.374)	1.506*** (0.422)	0.618* (0.325)
Elections _{it}	3.088* (1.788)	3.180 (2.002)	3.273* (1.636)	2.721* (1.379)	0.735 (0.494)
Year Effects	Yes	Yes	Yes	Yes	Yes
Internal Instruments	No	No	Yes	Yes	Yes
# of Instruments	--	--	22	22	22
AR(1) Test p-val.	--	--	0.003	0.009	0.065
AR(2) Test p-val.	--	--	0.194	0.268	0.792
Hansen J Test p-val.	--	--	0.740	0.740	0.462
Sample Period	2000-2011	2000-2011	2000-2011	2000-2011	2000-2011
Countries	26	26	26	26	19
Observations	236	236	210	210	171

Notes: The unit of observation is a country-year from the sample described in the Data Appendix. Columns (1) and (2) report standard errors clustered at the country level. Column (3) reports one-step difference GMM with clustered standard errors, while column (4) reports two-step GMM whose standard errors have had the Windmeijer correction. Column (5) reports only Western European countries. The internal instrument is the second lag of Wage_Bill_Growth_{it}, and internal instruments are collapsed. ***, **, * indicate statistical significance at the 1%, 5%, 10% levels, respectively.

The results are reported in Table 2. The table presents the baseline results for OLS and Fixed Effects, one-step D-GMM (D-GMM-1), two-step D-GMM with Windmeijer corrected standard errors (D-GMM-2), and D-GMM-2 for only Western European countries (D-GMM-3). The results show that the real wage bill growth rate is significantly higher in election years and in periods when the output gap is positive. In election years, the real wage bill growth increases by 2.7% percentage points. This effect, however, is not present in Western European countries. The latter is consistent with previous research that found that political cycles are effectively mitigated in higher income countries with stronger checks and balances to prevent manipulation of fiscal policies during the electoral cycle. *OutputGap* is positive and significant across all specifications, though the effect is less in Western European countries than in transition economies (with the coefficient for transition economies being about twice the coefficient in Western European countries). This result is consistent with earlier findings of more pronounced pro-cyclicality of fiscal policies in developing and transition economies. While the coefficient on

the IMF dummy is negative as expected, it is not significant in any of the D-GMM specifications except for Western European countries (reflecting the experiences of Greece, Iceland, and Portugal). Regarding the specification tests, the first-order serial correlation is not rejected as expected, while the second-order serial correlation is rejected. The Hansen J test does not reject over-identifying restrictions. We can thus conclude that D-GMM-2 is an internally consistent estimator. These results are consistent when the output gap is replaced with GDP growth to measure the business cycle (see table A3 in the annex).

Table 3: Expenditure Growth and Cyclicity

Dependent Variable:	Expenditure_Growth _{it} (Growth Rate of Real Expenditure, %)				
	Model	OLS	FE	D-GMM-1	D-GMM-2
	(1)	(2)	(3)	(4)	(5)
Expenditure_Growth _{it-1}	0.357*** (0.066)	0.122 (0.091)	0.230* (0.113)	0.251** (0.115)	-0.308** (0.136)
IMF_Program _{it}	-0.219 (1.132)	-1.726 (1.600)	-2.443 (1.624)	-2.452 (1.927)	-1.283 (12.091)
Revenue_GDP _{it}	-0.046 (0.112)	0.226 (0.283)	0.727** (0.263)	0.669** (0.270)	0.509* (0.266)
Output_Gap _{it}	0.300 (0.303)	0.462 (0.392)	0.555 (0.379)	0.297 (0.310)	0.910* (0.500)
Elections _{it}	1.210 (1.010)	1.643 (1.060)	1.073 (1.047)	0.749 (1.187)	0.671 (0.910)
Year Effects	Yes	Yes	Yes	Yes	Yes
Internal Instruments	No	No	Yes	Yes	Yes
# of Instruments	--	--	22	22	22
AR(1) Test p-val.	--	--	0.000	0.003	0.130
AR(2) Test p-val.	--	--	0.980	0.852	0.918
Hansen J Test p-val.	--	--	0.371	0.371	0.833
Sample Period	2000-2011	2000-2011	2000-2011	2000-2011	2000-2011
Countries	26	26	26	26	19
Observations	230	230	204	204	166

Notes: The unit of observation is a country-year from the sample described in the Data Appendix. Columns (1) and (2) report standard errors clustered at the country level. Column (3) reports one-step difference GMM with clustered standard errors, while column (4) reports two-step GMM whose standard errors have had the Windmeijer correction. Column (5) reports only Western European countries. The internal instrument is the second lag of Wage_Bill_Growth_{it}, and internal instruments are collapsed. ***, **, * indicate statistical significance at the 1%, 5%, 10% levels, respectively.

To assess whether wage bill spending behaves differently from other public expenditure, we repeat this estimation with real growth rate of total public spending. The results are reported in table 3 and are markedly different. *Elections* is not significant in any of the specifications, while *OutputGap* is only significant for Western European countries. The revenue to GDP ratio, however, is positive and significant across all D-GMM specifications, suggesting that expanding

revenue translates into high public spending. These findings suggest that the wage bill behaves differently from other government expenditure, tending to be more pro-cyclical and responsive to electoral pressures than total government expenditure. This in turn implies that pro-cyclical behavior of the wage bill is offset by countercyclical and acyclical behavior in other parts of the budget (e.g. social welfare spending and government investment).

H2: Rigidity of Wage Bill Spending

The second hypothesis explores whether the behavior of wage bill spending is symmetric during good and bad times (periods with positive and negative output gap). Due to institutional rigidities of the public sector, public employment and wages are generally not expected to react to negative economic shocks. To test this hypothesis, we divide the sample into years where the output gap is positive (good times) and years with negative output gaps (bad times). *PositiveGap* is equal to the output gap when it is positive and to zero otherwise, and similarly, *NegativeGap* is equal to the negative (in absolute terms) gap when it is negative and to zero otherwise. The estimated equation is defined below and the error term is specified as in (2):

$$y_{it} = \alpha + \beta y_{it-1} + \delta Elections_{it} + \sigma PositiveGap_{it} + \varphi NegativeGap_{it} + \gamma z_{it} + \varepsilon_{it} \quad (3)$$

Table 3 shows that wage bill spending is pro-cyclical in both good and bad times. However, the coefficient is larger in bad times (about 30 percent above the coefficient in good times). This finding directly contradicts our expectation that wage bill spending would be characterized by downward rigidity. While public employment and nominal wages may indeed be rigid in most countries, nominal wage freezes (and the resultant erosion of real wages) may explain this unexpected downward flexibility of the wage bill during downturns. Table A4 in the annex replaces the positive and negative output gaps with positive and negative GDP growth, and the results are similar to the ones reported here. All coefficients display the same signs and the coefficient on negative GDP growth has nearly the same value and level of significance.

Table 4: Wage Bill Growth and Positive/Negative Output Gaps

Dependent Variable:	Wage_Bill_Growth _{it} (Growth Rate of Real Wage Bill, %)				
	Model	OLS	FE	D-GMM-1	D-GMM-2
	(1)	(2)	(3)	(4)	(5)
Wage_Bill_Growth _{it-1}	0.218*** (0.069)	0.028 (0.074)	0.135 (0.081)	0.125 (0.080)	0.172 (0.075)
IMF_Program _{it}	-1.484 (1.151)	-2.525* (1.419)	-2.882 (2.167)	-3.016 (2.512)	-13.029 (14.530)
Revenue_GDP _{it}	-0.265** (0.119)	0.220 (0.248)	0.379 (0.657)	0.521 (0.363)	0.129 (0.283)
Positive_Output_Gap _{it}	1.152*** (0.347)	1.159** (0.429)	1.621** (0.616)	1.383* (0.710)	0.714 (0.898)
Negative_Output_Gap _{it}	1.452*** (0.487)	1.677*** (0.525)	1.254** (0.575)	1.643*** (0.551)	-0.160 (1.620)
Elections _{it}	3.083* (1.768)	3.153 (2.005)	3.252* (1.658)	2.748* (1.406)	0.830 (0.823)
Year Effects	Yes	Yes	Yes	Yes	Yes
Internal Instruments	No	No	Yes	Yes	Yes
# of Instruments	--	--	23	23	22
AR(1) Test p-val.	--	--	0.002	0.009	0.094
AR(2) Test p-val.	--	--	0.225	0.289	0.747
Hansen J Test p-val.	--	--	0.720	0.720	0.462
Sample Period	2000-2011	2000-2011	2000-2011	2000-2011	2000-2011
Countries	26	26	26	26	19
Observations	236	236	210	210	171

Notes: The unit of observation is a country-year from the sample described in the Data Appendix. Columns (1) and (2) report standard errors clustered at the country level. Column (3) reports one-step difference GMM with clustered standard errors, while column (4) reports two-step GMM whose standard errors have had the Windmeijer correction. Column (5) reports only Western European countries. The internal instrument is the second lag of Wage_Bill_Growth_{it}, and internal instruments are collapsed. ***, **, * indicate statistical significance at the 1%, 5%, 10% levels, respectively.

H3: Impact of Wage Bill Spending on Fiscal Position

The third hypothesis is that wage bill expansions are associated with a deterioration of the overall fiscal position. To test this latter hypothesis, we regress the government balance as percentage of GDP as the dependent variable against the size of the wage bill (% of GDP) and a number of control variables. The estimated equation is defined below and the error term is specified as in (2):

$$y_{it} = \alpha + \beta y_{it-1} + \delta WageBill + \gamma x_{it} + \varepsilon_{it} \quad (4)$$

where y_{it} is *Government Balance*, *WageBill* denotes the public wage bill as a share of GDP, x_{it} is a vector of covariates, and ε_{it} is an error term that is again specified as in equation (2). Within x_{it} we include GDP growth as a proximate measure for the state of the economy, population growth to reflect demand for services, and GDP per capita to capture the potential impact of Wagner's Law (economic development leads to growth in public spending).⁹

Table 5: Wage Bill and Fiscal Position

Dependent Variable: Model	Gov_Balance _{it} (General Govt Balance, % of GDP)				
	OLS (1)	FE (2)	D-GMM-1 (3)	D-GMM-2 (4)	D-GMM-3 (5)
Gov_Balance _{it-1}	0.748*** (0.048)	0.347*** (0.073)	0.465*** (0.140)	0.404** (0.151)	0.919 (0.721)
WageBill _{it}	-0.041 (0.061)	-0.597** (0.238)	-0.450** (0.201)	-0.512** (0.187)	-0.644 (6.795)
GDP_Growth _{it}	0.152*** (0.038)	0.165*** (0.054)	0.120* (0.062)	0.083 (0.067)	-0.048 (0.185)
Population_Growth _{it}	-0.128 (0.203)	0.436 (0.341)	-0.940 (0.607)	-0.444 (0.565)	0.133 (3.187)
GDP_Per_Capita _{it}	-0.199 (0.152)	-3.339 (3.251)	-1.070 (3.651)	0.315 (3.192)	-12.319 (29.349)
Year Effects	Yes	Yes	Yes	Yes	Yes
Internal Instruments	No	No	Yes	Yes	Yes
# of Instruments	--	--	24	24	24
AR(1) Test p-val.	--	--	0.011	0.018	0.164
AR(2) Test p-val.	--	--	0.326	0.276	0.187
Hansen J Test p-val.	--	--	0.561	0.561	0.967
Sample Period	2000-2011	2000-2011	2000-2011	2000-2011	2000-2011
Countries	25	25	25	25	19
Observations	250	250	225	225	190

Notes: The unit of observation is a country-year from the sample described in the Data Appendix. Columns (1) and (2) report standard errors clustered at the country level. Column (3) reports one-step difference GMM with clustered standard errors, while column (4) reports two-step GMM whose standard errors have had the Windmeijer correction. Column (5) reports only Western European countries. The internal instrument is the second lag of Wage_Bill_Growth_{it}, and internal instruments are collapsed. ***, **, * indicate statistical significance at the 1%, 5%, 10% levels, respectively.

Table 5 reveals that the effect of the wage bill is negative across all columns and significant for the D-GMM regressions for transition economies, but not for Western European countries. The results from D-GMM-2 show that a one percentage point increase in the wage bill as a share of GDP increases the fiscal deficit by half a percentage point. This finding indicates that it is important to restrain wage bill growth to a manageable level in order to achieve fiscal

⁹ See Heller and Tait (1984).

sustainability. The coefficients on *Population growth*, and *GDP per capita* are not significant, and *GDP Growth* is not significant in the D-GMM-2 or D-GMM-3 estimations.

4. Conclusions

We find that public wage bill spending tends to behave strongly pro-cyclically, both during booms and busts. While this finding occurs in both transition economies and high-income EU countries, the level of pro-cyclicality tends to be higher in transition economies. Furthermore, we find that the wage bill tends to be more pro-cyclical during bad times than during good times. We also find that wage bill spending is impacted by electoral cycles, with election years characterized by steep increases. This latter finding only holds in transition economies, while we find no significant evidence of political cycles for Western European countries. Finally, we find that increases in the public wage bill are associated with a deterioration of the overall fiscal position.

These findings have direct implications for the fiscal management of the wage bill. Since the wage bill accounts for a large share of spending, its behavior will strongly affect overall expenditure trends. While some degree of pro-cyclicality in wages is expected and desirable, our findings suggest that there are benefits to restraining excessive growth of the wage bill during boom periods. In particular, introducing self-restraining elements that counterbalance political and other pressures would reduce the need for painful adjustments during periods of fiscal consolidation, and also contribute to strengthening the overall countercyclical and stabilizing impact of fiscal policies. At the macro level, constraining wage bill growth could be reinforced through fiscal rules that constrain expenditure growth, such as the rules implemented under the EU fiscal compact, or by linking wage bill growth to growth in private sector wages and changes in other economic variables, for example through indexation. At the micro level, such rules could be complemented by reforms to public pay systems that would enable greater differentiation of public sector pay to ensure pay adequacy within an overall resource constraint, and by strengthening institutional capacity to determine adequate staffing levels and the overall design of the public pay structure.

Beyond the management of the wage bill, pro-cyclical wage bill policies may also require a corollary social policy of enhancing unemployment and social welfare payments to offset the potential effects of contractionary wage bill policies during crisis. Put differently, a very pro-cyclical wage bill policy will require automatic stabilizers to work extra hard to offset the pro-cyclicality. On the contrary, during economic upturns excessive wage bill growth would crowd out public investment, limiting long-term growth prospects. So beyond the stabilization objective, the need for fiscal policy to support long-term growth would require fiscal policies to sustain public investments and maintain an appropriate balance between public consumption and public investment.

Finally, our findings open avenues for further research. Most importantly, a decomposition of the sources of wage bill growth into price (wages) and quantity (employment) effects would be important, but could not be undertaken due to the lack of reliable and comprehensive cross-country panel data on public sector employment. While public sector wages need to rise in economic upturns in order to remain competitive with private sector wages, the case for pro-

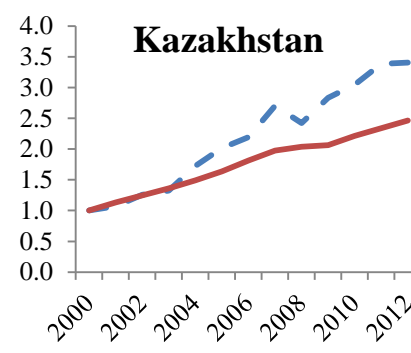
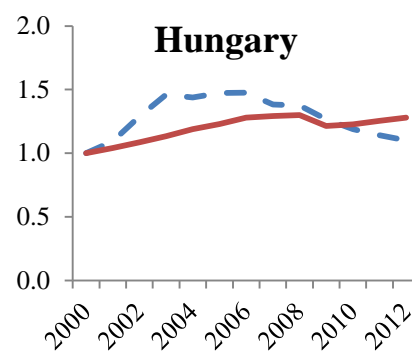
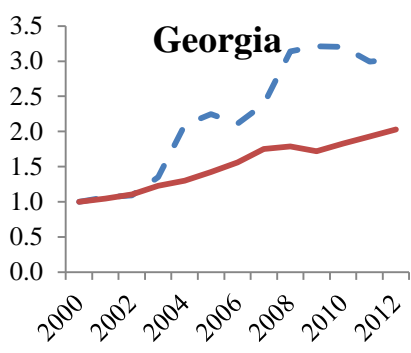
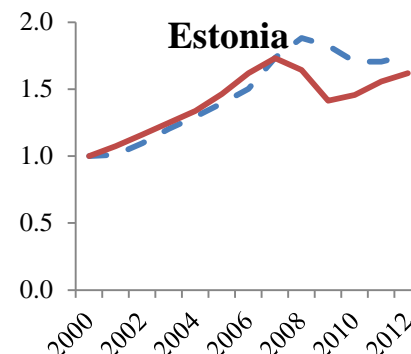
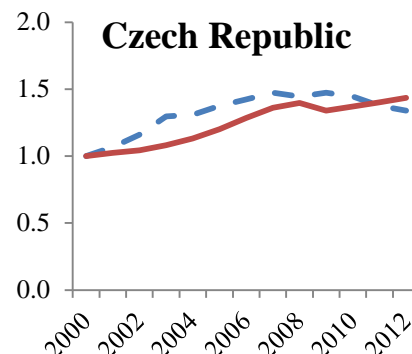
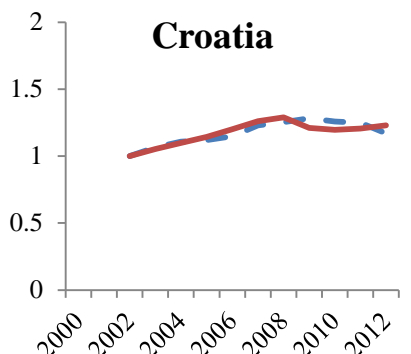
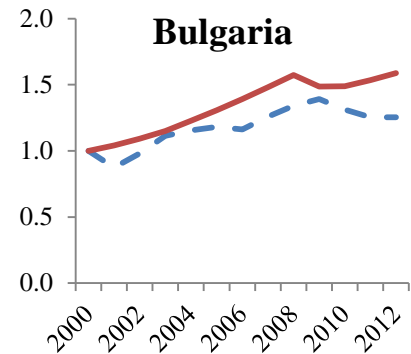
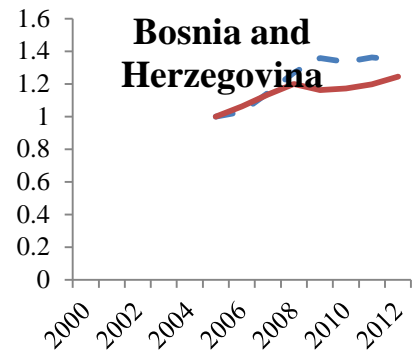
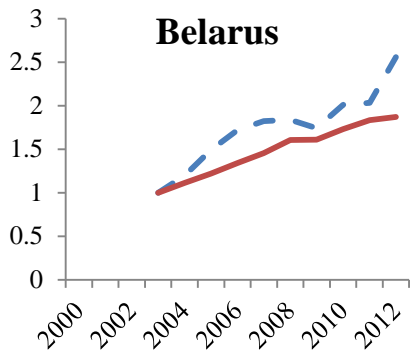
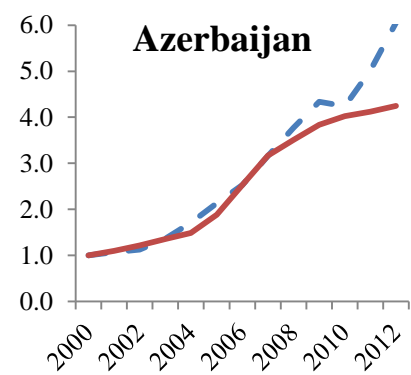
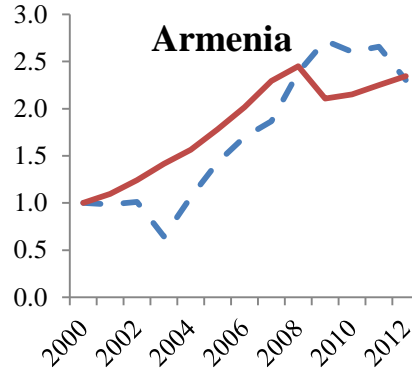
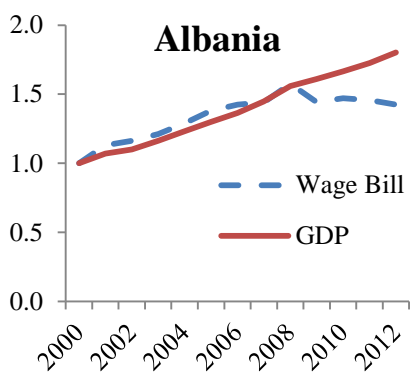
cyclical public employment policies is much less clear. It is presumably also more difficult to adjust employment during crisis than it is to contract real wages. As a result, the underlying public employment may be more rigid than what our findings on wage bill spending suggest. At the same time, there are important questions about the sustainability of adjustments that rely on wage adjustments, as wage pressures may reemerge quickly once a recovery is in sight.

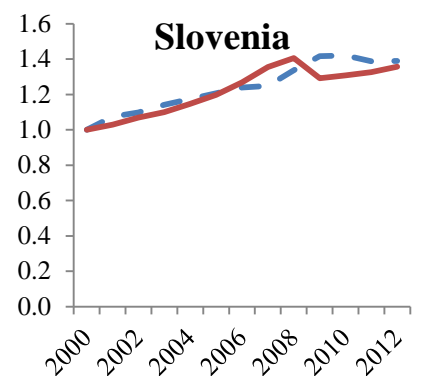
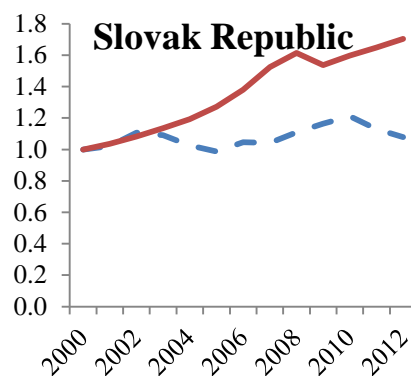
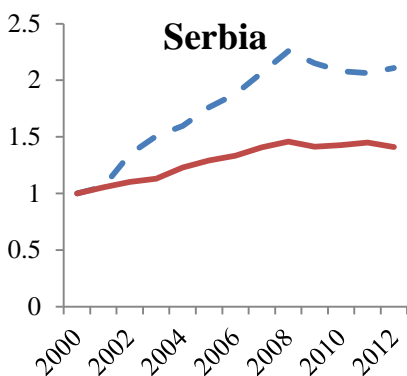
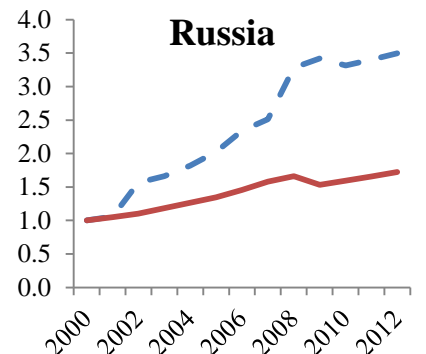
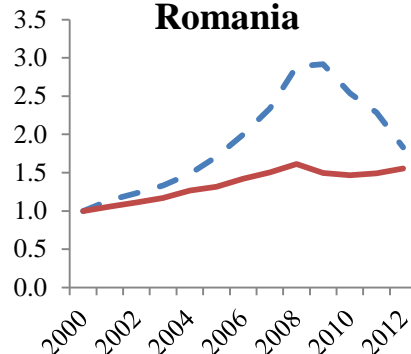
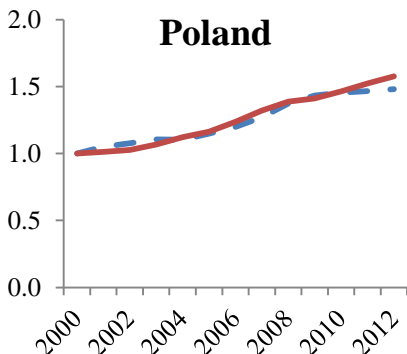
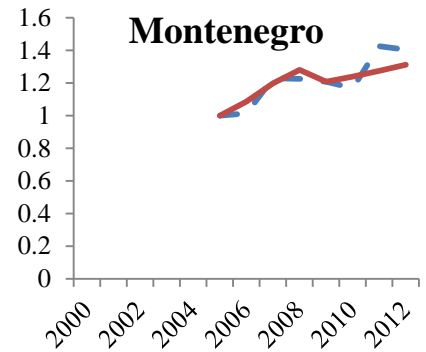
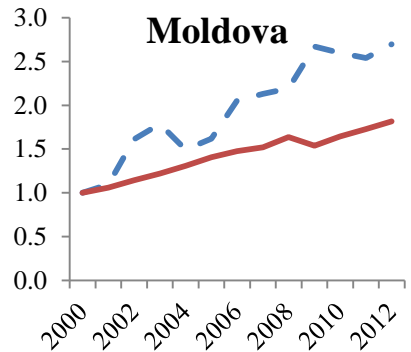
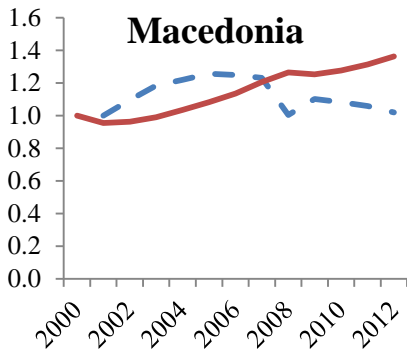
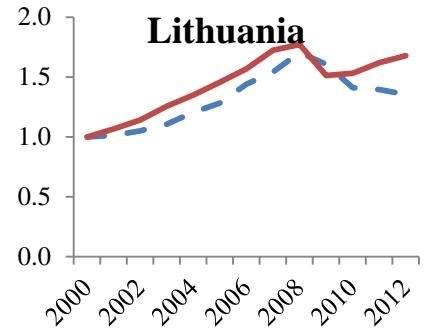
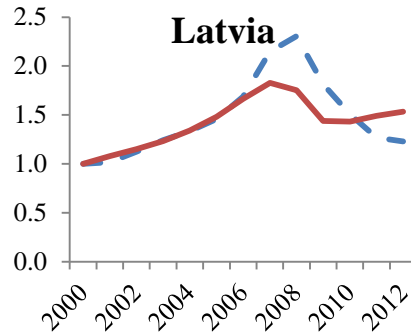
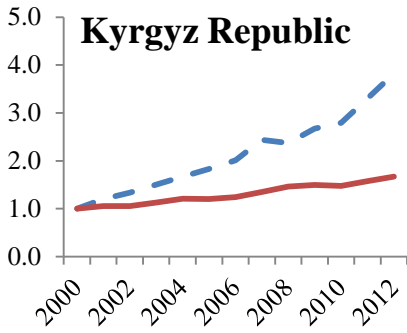
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Real GDP and Public Sector Wage Bill Growth, Indexed (2000=1)





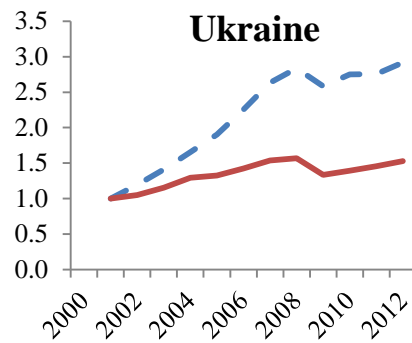
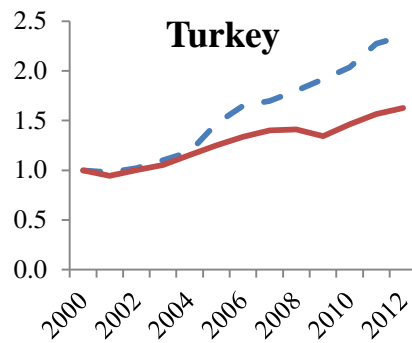
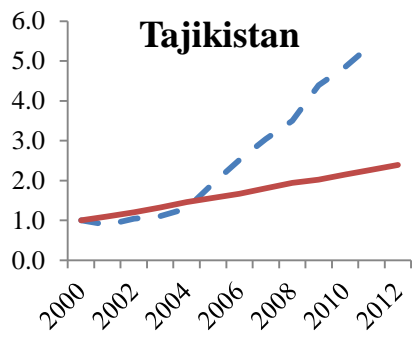


Table A1: Summary Statistics

Eastern Europe and Central Asia (26 countries)						
Variable	Obs.	Mean	Standard Deviation		Min	Max
			Between	Within		
Government Balance	297	-2.03	2.30	2.39	-9.60	10.22
Public Wage Bill	283	8.72	2.51	0.87	2.79	15.22
Wage Bill Growth	265	6.64	4.47	9.60	-21.28	55.05
Expenditure Growth	264	6.13	3.88	7.44	-9.45	37.71
Election Year	287	0.37	0.10	0.47	0	1
Output Gap	300	0.02	0.27	2.73	-8.94	11.23
IMF Program	300	0.37	0.28	0.39	0	1
GDP Growth	292	4.60	1.45	4.16	-18	13.5
Population Growth	300	0.06	0.57	0.46	-3.58	2.64
GDP per capita (log)	288	9.18	0.75	0.16	7.13	10.55
Revenue GDP	296	34.83	7.25	3.50	11.15	52.86
Western Europe (19 countries)						
Government Balance	228	-2.12	2.65	3.63	-30.90	7.00
Public Wage Bill	228	11.87	2.78	0.65	7.10	19.30
Wage Bill Growth	209	2.02	1.64	3.71	-14.46	15.98
Expenditure Growth	204	2.71	1.61	5.46	-26.88	36.84
Election Year	228	0.29	0.09	0.45	0	1
Output Gap	228	0.15	0.14	1.68	-4.85	5.19
IMF Program	228	0.03	0.08	0.15	0	1
GDP Growth	227	1.88	0.75	2.69	-8.54	10.84
Population Growth	228	0.67	0.56	0.35	-1.01	3.01
GDP per capita (log)	228	10.24	0.47	0.06	8.22	11.21
Revenue GDP	228	43.85	6.26	1.45	32.20	57.81

Notes: The summary statistics are based the 2000-2011 period. The data appendix contains describes the data sources, the measurement units, and how the variables were constructed. The number of observations differs across variables, reflecting the data availability from the different data sources.

Table A2: Unit Root Tests

	Government Balance	Wage Bill Growth
IPS Test Statistic $Z_{\bar{t}}$	-2.178***	-3.440***
p -value	0.015	0.000
Average Panel Length	11.88	10.87
Countries	26	23

Notes: The tests are performed on the sample of 26 Eastern Europe and Central Asian countries during 2000-2011 period. The table reports Im-Pesaran-Shin (IPS) unit root test results for the dependent variables. The null hypothesis is H_0 : all panels contain unit roots. The number of countries varies because the ISP test requires a minimum requirement of ten observations per country.

Table A3: Wage Bill Growth and Cyclicity (2)

Model	Dependent Variable: Wage_Bill_Growth _{it} (Growth Rate of Real Wage Bill, %)				
	OLS (1)	FE (2)	D-GMM-1 (3)	D-GMM-2 (4)	D-GMM-3 (5)
Wage_Bill_Growth _{it-1}	0.245*** (0.073)	0.090 (0.085)	0.182** (0.083)	0.164* (0.084)	0.043 (0.232)
IMF_Program _{it}	-1.253 (1.081)	-2.874* (1.423)	-3.235 (2.265)	-3.097 (2.588)	-9.567 (9.165)
Revenue_GDP _{it}	-0.170* (0.099)	0.031 (0.260)	0.183 (0.678)	0.101 (0.519)	0.098 (0.213)
GDP_Growth _{it}	0.866*** (0.201)	0.591* (0.294)	0.668* (0.339)	0.794*** (0.289)	0.608** (0.250)
Elections _{it}	3.238* (1.795)	3.601* (1.987)	3.796** (1.658)	3.038** (1.381)	1.007 (0.620)
Year Effects	Yes	Yes	Yes	Yes	Yes
Internal Instruments	No	No	Yes	Yes	Yes
# of Instruments	--	--	22	22	22
AR(1) Test p-val.	--	--	0.001	0.007	0.081
AR(2) Test p-val.	--	--	0.240	0.262	0.491
Hansen J Test p-val.	--	--	0.662	0.662	0.293
Sample Period	2000-2011	2000-2011	2000-2011	2000-2011	2000-2011
Countries	26	26	26	26	19
Observations	236	236	210	210	171

Notes: The unit of observation is a country-year from the sample described in the Data Appendix. Columns (1) and (2) report standard errors clustered at the country level. Column (3) reports one-step difference GMM with clustered standard errors, while column (4) reports two-step GMM whose standard errors have had the Windmeijer correction. Column (5) reports only Western European countries. The internal instrument is the second lag of Wage_Bill_Growth_{it}, and internal instruments are collapsed. ***, **, * indicate statistical significance at the 1%, 5%, 10% levels, respectively.

Table A4: Wage Bill Growth and Positive/Negative Growth

Model	Dependent Variable: Wage_Bill_Growth _{it} (Growth Rate of Real Wage Bill, %)				
	OLS (1)	FE (2)	D-GMM-1 (3)	D-GMM-2 (4)	D-GMM-3 (5)
Wage_Bill_Growth _{it-1}	0.252*** (0.076)	0.097 (0.086)	0.192** (0.080)	0.198* (0.094)	0.067 (0.220)
IMF_Program _{it}	-1.304 (1.075)	-2.766* (1.424)	-2.883 (2.281)	-2.297 (2.577)	-14.975 (11.539)
Revenue_GDP _{it}	-0.174 (0.102)	0.046 (0.255)	0.125 (0.606)	0.190 (0.532)	0.209 (0.276)
Positive_Growth _{it}	0.747*** (0.241)	0.263 (0.416)	0.055 (0.421)	0.250 (0.371)	0.558 (0.497)
Negative_Growth _{it}	1.061*** (0.333)	1.025*** (0.365)	1.352*** (0.374)	1.254*** (0.398)	0.367 (0.322)
Elections _{it}	3.300* (1.807)	3.654* (2.006)	3.899** (1.682)	2.892** (1.360)	0.752 (0.824)
Year Effects	Yes	Yes	Yes	Yes	Yes
Internal Instruments	No	No	Yes	Yes	Yes
# of Instruments	--	--	23	23	23
AR(1) Test p-val.	--	--	0.001	0.005	0.065
AR(2) Test p-val.	--	--	0.264	0.287	0.857
Hansen J Test p-val.	--	--	0.613	0.613	0.456
Sample Period	2000-2011	2000-2011	2000-2011	2000-2011	2000-2011
Countries	26	26	26	26	19
Observations	236	236	210	210	171

Notes: The unit of observation is a country-year from the sample described in the Data Appendix. Columns (1) and (2) report standard errors clustered at the country level. Column (3) reports one-step difference GMM with clustered standard errors, while column (4) reports two-step GMM whose standard errors have had the Windmeijer correction. Column (5) reports only Western European countries. The internal instrument is the second lag of Wage_Bill_Growth_{it}, and internal instruments are collapsed. ***, **, * indicate statistical significance at the 1%, 5%, 10% levels, respectively.

Table A5: Sample Countries

ECA	Western Europe
Albania	Austria
Belarus	Belgium
Bosnia & Herzegovina	Cyprus
Bulgaria	Denmark
Croatia	Finland
Czech Republic	France
Estonia	Germany
Georgia	Greece
Hungary	Iceland
Kazakhstan	Ireland
Kosovo	Italy
Kyrgyz Republic	Luxembourg
Latvia	Malta
Lithuania	Netherlands
Macedonia	Portugal
Moldova	Spain
Montenegro	Sweden
Poland	Switzerland
Romania	United Kingdom
Russian Federation	
Serbia	
Slovakia	
Slovenia	
Tajikistan	
Turkey	
Ukraine	

Table A6. Data Appendix

This appendix contains the complete list of variables used in the paper, together with details on measurement and sources.

Name	Definition	Source
Wage Bill	Wage bill expenditures as a share of GDP	ECA fiscal database, EUROSTAT
Wage Bill Growth	Real growth rate in wage bill expenditures (calculated)	ECA fiscal database, EUROSTAT
Public employment	General government employment as a percent of total labor force	ILO LABORSTA, World Bank Reports
Government Balance	Budget surplus / deficit as a share of GDP	ECA fiscal database, EUROSTAT
Expenditure Growth	Real growth rate in total expenditures (calculated)	ECA fiscal database, EUROSTAT
Election Year	Dummy variable defined as 1 if there was an executive or legislative election in a given year, zero otherwise	Database of Political Institutions
Output Gap	Calculated from real GDP using the HP filter	WEO
GDP growth	Real growth rate in GDP (percent)	WDI
Population growth	Annual growth in population (percent)	WDI
Revenue	Revenues as a share of GDP	WEO
IMF Program	Dummy variable defined as 1 if a country had an IMF program in a given year, zero otherwise	IMF
GDP per capita	Real GDP per capita in PPP	WDI