



PUBLIC SECTOR WAGE PREMIUM AND OUTPUT VOLATILITY IN THE EUROPEAN UNION

Karlis VILERTS^{1*}

¹ Faculty of Business, Management and Economics, University of Latvia, Aspazijas blvd. 5,
Riga LV-1050, Latvia

Received 30 May 2018; accepted 09 June 2018

Abstract. This study seeks to uncover the role played by the public sector wage premium in explaining the output volatility. Furthermore, the study also explores the factors that might substantiate the cross-country differences in the volatility of the public sector wage premium. Using cross-sectional regression analysis for the European Union countries, the findings indicate that more volatile public sector wage premium is associated with higher fluctuations in the private sector employment and less stable growth. Findings also suggest that volatility of the public sector wage premium tends to be larger in countries with smaller governments and in countries where collective bargaining is the predominant regime for public sector wage setting.

Keywords: macroeconomic stability, output volatility, public sector wages, public sector wage premium, public sector wage setting.

Introduction

In most advanced economies public sector makes up for a notable fraction of the total employment. The sheer size of it and the fact that public sector employers compete with their private sector counterparts for workers suggest that public sector employment policies may alter private sector employment and compensation decisions and consequently affect the economic stability.

Previous studies have shown that public sector wage premium (average compensation in the public sector relative to the average compensation in the private sector) tends to be positive in many developed countries (Kollintzas, Papageorgiou, & Vassilatos, 2015) which may carry implications for the labour market. In fact, it has been shown that private sector wages and employment are very responsive to changes in public sector wages (European Commission, 2014) and that an increase in public sector wages may have negative side-effects e.g. loss of international competitiveness (Lane & Perotti, 2003), reduced private sector profitability (Alesina, Ardagna, Perotti, & Schiantarelli, 2002) and lower productivity (Kollintzas et al., 2015).

*Corresponding author. E-mail: kvilerts@gmail.com

Despite the consequences that mere existence of the public sector wage premium can cause, the dynamics of the public sector wage premium (and its economic effect) have often been neglected in the literature. Therefore, the main objective of this study is to investigate the macroeconomic effects of the public sector wage premium volatility, in particular how it affects the economic stability. Using cross-sectional regression analysis for EU countries over the period 1995–2016 the study investigates whether higher fluctuations in the public sector wage premium add to the volatility of the private sector employment and therefore amplify the output volatility. The second part of empirical analysis explores the determinants of the cross-country variation in volatility of the public sector wage premium.

Main findings of the study reveal that countries with more volatile public sector wage premium tend to have higher output volatility. This effect, however, is of indirect nature. Fluctuations in the public sector wage premium add to the volatility of private sector employment which in turn has an adverse effect on the economic stability. The findings are robust if the total employment is used instead of the private sector employment, which rules out the possibility that private sector jobs are perfectly “crowded out” by public sector jobs.

Considering these adverse effects, the study investigates factors that might contribute to the volatility of the public sector wage premium. Results suggest that the volatility the public sector wage premium tends to be larger in countries with smaller governments, providing support to the hypothesis that smaller governments apply more monopolistic wage setting. Findings also reveal the importance of wage setting practices and institutions. The fluctuations of the public sector wage premium are approximately 50% lower in those countries where the predominant regime of wage setting in the public sector is collective bargaining (instead of the unilateral decision). There is little evidence that differences in other wage setting institutions or fiscal consolidation efforts contribute in explaining the cross-country variation in the public sector wage premium volatility. A small number of observations could, however, be a reason for the lack of significance.

The study is ordered as follows. Section 1 reviews previous literature, focusing on the strands related to the public sector wage premium and output volatility. Section 2 describes the data used in the study. Section 3 presents the main findings. Finally, the last section concludes.

1. Literature review

This study is related to two strands of literature. First investigates the channels through which fluctuations in the public sector wage premium might affect the output volatility. Second explores the factors that might substantiate the existence and variation of the public sector wage premium.

The negative consequences of high output volatility have been well established in the previous literature. In a seminal paper G. Ramey and V. A. Ramey (1995) show that countries with higher output volatility also tend to have lower growth. They argue that the negative costs of higher volatility come from the uncertainty-induced planning errors by firms (as suggested in G. Ramey & V. A. Ramey (1991)). This has led to growing number of studies investigating the drivers of output volatility. Acemoglu and Zilibotti (1997) show that richer

countries tend to have a more diversified economic structure in terms of sectoral composition which therefore reduces the exposure to asymmetric shocks and adds to macroeconomic stability. Easterly, Islam, and Stiglitz (2001) argue that countries that are more open to international trade and hence are more exposed to the external shocks also have more volatile output. It has also been shown that economic fluctuations tend to be lower in countries that have larger governments with more room for automatic stabilizers (Debrun, Pisani-Ferry, & Sapir, 2008; Gali, 1994). Another set of studies suggest that active use of discretionary fiscal policy increases macroeconomic instability (Badinger, 2009; Badinger & Reuter, 2017; Fatas & Mihov, 2003).

The labour market drivers of output volatility and particularly the role played by the public sector wage premium, however, is relatively less explored. Boeing-Reicher and Caponi (2016) goes in that direction by showing that for a sample of U.S. metro areas higher public sector wages are associated with increased business cycle volatility.

The adverse side-effects of changes in public sector wages are mostly related to the linkages between public and private sector wages i.e. changes in public sector wages create labour movement between the sectors and affects the labour supply that is available to the private sector. This as a consequence changes the price of the labour (equilibrium wage) in the private sector (Afonso & Gomes, 2008; European Commission, 2014; Holm-Hadulla, Kamath, Lamo, Perez, & Schuknecht, 2010). In fact, the resulting increase in private sector wages has been associated with a loss of international competitiveness (Lane & Perotti, 2003), lower private sector profitability (Alesina et al., 2002) and lower productivity (Kollintzas et al., 2015).

Previous studies that have explored the potential implications of the public sector wage premium have mostly focused on the average size of the premium. Although averages are certainly informative, they might not reveal the whole story, particularly when investigating how public sector wage premium affects the private sector employment. Previous evidence on the cyclical response of wages suggests that relatively rigid public sector jobs become more attractive during the economic downturn when the public sector wage premium is higher whereas the opposite is true in an upswing (Caponi, 2017a; Gomes, 2015; Lane, 2003; Quadri & Trigari, 2007).¹ In the light of the above, the average public sector wage premium (which over the cycle would be closed to long-term mean) might not fully reflect the effect which the public sector wage premium exert on the private sector employment. In order to capture this interaction, we explore the volatility of the public sector wage premium as a potential determinant of the fluctuations in private sector employment.

Another strand of literature investigates the factors which substantiate the existence of the public sector wage premium.

Using a broad sample of OECD countries Campos, Depalo, Papapetrou, Perez, and Ramos (2017) show that size and composition of the public sector contribute in explaining the cross-country variation in the public sector wage premium. They argue that countries with lower shares of government employees should also have higher public sector wage premium. This is due to higher specialization in the provision of public sector goods and services which

¹ However, the extent and in some cases also the direction of cyclical response of public sector wages varies notably (see Hallerberg & Strauch, 2002; Lane, 2003; Lamo, Pérez, & Schuknecht, 2013).

could result in a more monopolistic wage setting. A similar hypothesis is also developed in more theoretical models (see Kollintzas et al., 2015).

Other factors that might explain the amplitude and the volatility of the public sector wage premium are related to wage setting practices and institutions which often differ between public and private sectors. The evidence from the previous studies highlights several factors, in particular, responsiveness of public sector wages to changes in productivity, degree of centralization in public sector wage setting, and labour market protection. For example, Gomes (2015) show that procyclicality in the public sector wage setting can reduce the part of the public sector wage premium that is brought about by different reaction of public and private sector wages to changes in productivity. Caponi (2017b) develops a regional model of segmented labour markets and shows that degree of public sector wage setting centralization matters. He argues that since homogenous public sector wages need to be attractive in the highly productive regions, the same wage results in a high public sector wage premium in less productive regions. Campos et al. (2017) show that countries with more stringent employment protection tend to have higher public sector wage premiums. They argue that higher public sector wages are needed to offset better (safer) conditions in the private sector.

Overall, previous literature on factors which substantiate the existence of the public sector wage premium, provide a valuable insight into the potential determinants of its volatility.

2. Data

The sample covers 27 European Union countries over the period 1995–2016.² The primary source of data used throughout the study is Eurostat, however, some additional variables are taken from other data sources (see appendix A1 for a list of all variables used in the study and the respective sources).

In the baseline specification compensation per employee is used as a measure of wages in both sectors. Compensation per hour worked as well as wages and salaries per employee (and per hour worked) are also used to test the robustness of findings. Compensation per employee in each sector is computed by dividing compensation of employees over a number of employees in the respective sector. Compensation of employees (as well as the number of employees) in the private sector is obtained by deducting compensation of employees (number of employees) in the public sector from the compensation of employees (number of employees) in the total economy. The public sector is defined by the National Accounts (NACE sectors O, P and Q public services, healthcare and education). Public sector wage premium is obtained by dividing the public sector wage measure over the respective measure for the private sector. Table 1 reports summary statistics for the sample used in the study.

On average, the compensation per employee in the public sector has been 1.05 times higher than in the private sector. Nevertheless, notable heterogeneity exists between the countries. In Cyprus and Portugal compensation per employee in the public sector is approximately 60% higher than in private sector. The ratio is the lowest in Sweden where public sector employees earn on average 20% less than their private-sector counterparts. Overall,

² United Kingdom is excluded from the sample due to missing data.

Table 1. Summary statistics of the public sector wage premium in the 27 EU countries

Country	Mean	St. dev.	Obs.
Austria	1.05	0.03	22
Belgium	0.97	0.02	22
Bulgaria	1.18	0.11	17
Croatia	1.09	0.09	8
Cyprus	1.63	0.08	22
Czech Republic	1.10	0.05	22
Denmark	1.01	0.09	42
Estonia	0.98	0.08	22
Finland	0.96	0.03	37
France	0.87	0.04	42
Germany	0.99	0.01	22
Greece	1.27	0.07	22
Hungary	1.08	0.10	22
Ireland	1.24	0.07	22
Italy	1.25	0.07	22
Latvia	0.98	0.14	22
Lithuania	0.97	0.07	22
Luxembourg	1.23	0.04	22
Malta	1.14	0.03	22
Netherlands	0.99	0.02	22
Poland	1.15	0.05	14
Portugal	1.57	0.11	22
Romania	1.43	0.22	21
Slovakia	0.97	0.06	22
Slovenia	1.20	0.09	22
Spain	1.21	0.05	22
Sweden	0.80	0.02	23
Total	1.05	0.09	42

Notes: Public sector wage premium is a ratio of compensation per employee in public and private sectors.

public sector employees earn more in most of the countries with exception of Sweden, Slovakia, the Netherlands, Belgium, Latvia, Lithuania, Estonia France, Finland and Germany.

The average volatility of the public sector wage premium is 0.09, however, it varies from country to country. With some exceptions, volatility of the public sector premium seems to be higher in Central and Eastern European countries, in particular, Romania and Latvia. In contrary, fluctuations are the lowest in Western European countries, especially in Germany, Sweden, the Netherlands and Belgium.

3. Main findings

3.1. Public sector wage premium and the output volatility

In this section, we explore the relationship between the public sector wage premium and the output volatility. Figure 1 shows a dot plot of both variables in the 27 EU countries.

Figure 1 provides stylized evidence of a positive relationship between both variables i.e. countries with higher fluctuations in the public sector wage premium also tend to have less stable growth.

Next, the relationship is explored econometrically.

$$\sigma_c^{Out} = \alpha_1 \sigma_c \left(\frac{w_{pub}}{w_{pri}} \right) + \alpha_j X_{j,c} + \epsilon_c, \tag{1}$$

where σ_c^{Out} is the log standard deviation of growth in real GDP per capita in a country c ,

$\sigma_c \left(\frac{w_{pub}}{w_{pri}} \right)$ is the log standard deviation of the public sector wage premium, $X_{j,c}$ is a vector of j covariates which could affect the output volatility, and α_j are the respective regression coefficients. These include government size defined as government expenditure over GDP, openness to international trade which is measured as a sum of imports and exports over GDP, and log of real GDP per capita. ϵ_c is the error term. Table 2 reports the main findings.

Column (1) of the Table 2 shows that higher volatility of the public sector wage premium is also associated with higher output volatility. The coefficient does not change significantly if other control variables are added to the equation (column 2). Regarding the control variables, coefficients for government size and trade openness turn out to be vaguely significant.

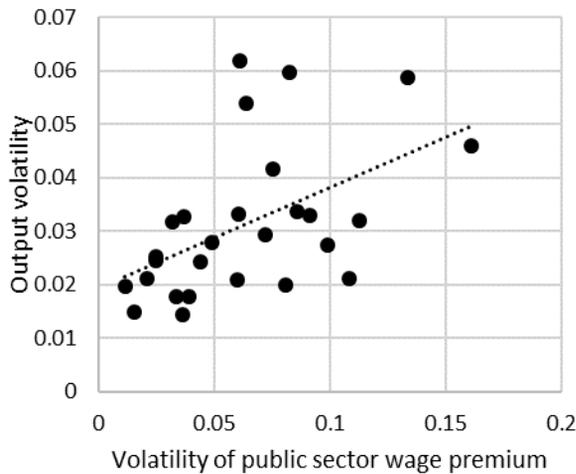


Figure 1. Volatility of the public sector wage premium and the output volatility (source: author’s calculations using Eurostat data)

Notes: volatility of the public sector wage premium is calculated as a standard deviation of a ratio of compensation per employee in public and private sectors.

Table 2. Estimated relationship between volatility of the public sector wage premium and the output volatility

	(1)	(2)	(3)
Volatility of the wage premium	0.358*** (0.08)	0.290** (0.10)	0.145 (0.12)
GDP per capita		0.061 (0.11)	0.071 (0.10)
Trade openness		0.140 (0.11)	0.220* (0.11)
Government size		-1.554** (0.61)	-0.294 (0.63)
Private employment			0.587*** (0.15)
N	27	27	27
r2	0.330	0.557	0.728

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ standard deviation in the parentheses. Volatility of the public sector wage premium is defined as a standard deviation of a ratio of compensation per employee in public and private sectors. Constant included, but not reported.

The signs of coefficients provide some support for previous studies which have argued that variability of the output is lower in countries with larger governments those that are less exposed to external shocks.³

The volatility of the public sector wage premium is likely to affect the economic stability indirectly by inducing fluctuations in private employment. In times when relative wages in public sector significantly exceed wages in the private sector, employees from the latter could seek the employment in the former. The opposite would be true in times when private sector wages exceed wages in the public sector. The results in column (3) reveal that the coefficient for the volatility of the public sector wage premium turns insignificant when the volatility of the private sector employment is added to the regression, thus supporting the indirect effect hypothesis.

The indirect effect of fluctuations in the public sector wage premium on the output volatility is further explored in Table 3 which reports the two-stage least squares (2SLS) estimates. 2SLS approach can be split into two parts: (a) the first stage uses the volatility of public sector wage premium along urbanization rate to instrument the volatility of the private sector employment; and (b) the second stage which employs the obtained private sector employment volatility to explain the output volatility. Another benefit of using the 2SLS approach is that it considers the potential endogeneity of private sector employment. Indeed, fluctuations in private sector employment might not be completely exogenous to output volatility. For example, shocks that impact the demand for domestically produced goods could also affect the private sector employment.

The upper panel of Table 3 (column 1) confirms the indirect relationship. Coefficient estimates indicate that 1% increase in the volatility of the public sector wage premium translates

³ Insignificance of other control variables might partially be due to relatively homogenous sample of 27 EU countries.

into a 0.3% increase in the volatility of private sector employment. In turn, the lower panel of Table 3 indicates that the respective increase of the private sector employment volatility is nearly perfectly (0.985) reflected in increased output volatility.

A valid argument could be raised that fluctuations of the private sector employment are perfectly offset by changes in the public sector employment (crowding out effect) leaving the volatility of the total employment unaffected by changes in the public sector wage premium. Estimates in column (2), however, reveal that the relationship holds even when the private sector employment volatility is replaced by the volatility of the total employment. The estimates of both first stage and second stage regressions are nearly identical.

These findings provide support for Caponi (2017a) who suggests that in a presence public sector wage premium (penalty) individuals might accept a temporary unemployment in order to obtain a public (private) sector job. Similar conclusions are reached by Algan, Cahuc,

Table 3. Volatility of the public sector wage premium and the output volatility (2SLS estimates)

	(1)	(2)
First stage regression (dependent variable: volatility of the private sector employment or total employment)		
Volatility of the wage premium	0.294** (0.14)	0.320** (0.14)
Urbanization rate	0.006 (0.01)	0.006 (0.01)
GDP per capita	-0.035 (0.13)	-0.074 (0.14)
Trade openness	-0.166 (0.16)	-0.164 (0.17)
Government size	-2.226*** (0.71)	-2.469*** (0.75)
Sargan overidentification test p value	0.174	0.197
Second stage regression (dependent variable: output volatility)		
GDP per capita	0.054 (0.10)	0.092 (0.11)
Trade openness	0.266** (0.13)	0.255** (0.13)
Government size	0.503 (1.00)	0.581 (1.00)
Private employment	0.985*** (0.35)	
Total employment		0.914*** (0.32)
N	27	27
r ²	0.647	0.655

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ standard deviation in the parentheses. Volatility of the public sector wage premium is defined as a standard deviation of a ratio of compensation per employee in public and private sectors. Constant included, but not reported.

and Zylberberg (2002) who look at a panel of OECD countries and find that each additional public sector job is offset by one and a half jobs lost in the private sector.

3.2. Robustness checks

To test the sensitivity of the findings, alternative definitions of the public sector wage premium are used as a dependent variable. The 2SLS estimates are summarized in Table 4.⁴

Table 4. Estimated relationship between volatility of the public sector wage premium and output volatility (2SLS) alternative definitions of the public sector wage premium

	(1)	(2)	(3)
First stage regression (dependent variable: volatility of the private sector employment)			
Volatility of the wage premium	0.331*** (0.11)	0.364** (0.13)	0.414*** (0.10)
Urbanization rate	0.006 (0.01)	0.008 (0.01)	0.009 (0.01)
GDP per capita	-0.096 (0.11)	-0.002 (0.13)	-0.064 (0.10)
Trade openness	-0.101 (0.15)	-0.143 (0.15)	-0.045 (0.14)
Government size	-1.507* (0.73)	-1.968*** (0.69)	-1.134 (0.67)
Sargan overidentification test p value	0.123	0.133	0.126
Second stage regression (dependent variable: output volatility)			
GDP per capita	0.0003 (0.09)	0.025 (0.09)	0.013 (0.08)
Trade openness	0.196* (0.12)	0.227* (0.12)	0.212* (0.11)
Government size	-0.404 (0.79)	0.002 (0.81)	-0.198 (0.70)
Private employment	0.611** (0.26)	0.788*** (0.27)	0.696*** (0.21)
N	27	27	27
r ²	0.699	0.696	0.702

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ standard deviations in the parentheses. Volatility of the public sector wage premium is defined as a standard deviation of a ratio of (1) compensation per hour; (2) wages and salaries per employee; (3) wages and salaries per hour in both sectors. Constant included, but not reported.

Since the interaction between public and private sector wages could also be affected by changes in hours worked, a ratio of compensation per hour in public and private sectors is used as an alternative definition of the public sector wage premium. The estimates (column 1) confirm the robustness of the main findings. In fact, fluctuations in hourly wage premium

⁴ Estimates of robustness check for OLS regressions as well as alternative 2SLS specifications are available upon a request.

seem to have even more pronounced effect on the volatility of the private sector employment. In columns (2) and (3) wages and salaries are used instead of compensation measures. Overall, the estimates reconfirm the robustness of the relationship between the public sector wage premium, the private sector employment and the output volatility.

3.3. Determinants of the public sector wage premium volatility

Considering the economic importance discussed in previous sections, this section uses cross-country variation in the volatility of the public sector wage premium to explore the factors that might explain it.

When choosing the set of covariates which might determine the volatility of the public sector wage premium we follow Campos et al. (2017) who highlight main arguments on why public sector wage premium might differ from country-to-country: (a) differences in the size of the public sector; (b) differences in wage setting institutions and practices; and (c) fiscal consolidation efforts.

Previous literature has shown that smaller governments with a higher degree of monopolistic power in the provision of certain goods and services tend to have higher public sector wage premiums (Kollintzas et al., 2015). The size of governments might also play a role in explaining the volatility of the public sector wage premium. Wages in the smaller governments with uncompetitive wage settings could be less responsive to the changes in productivity and hence add to the fluctuations of the public sector wage premium. Figure 2 provides some stylized evidence that larger governments (defined as public sector employment share in total employment) tend to have the lower volatility of the public sector wage premium in the sample of 27 EU countries.

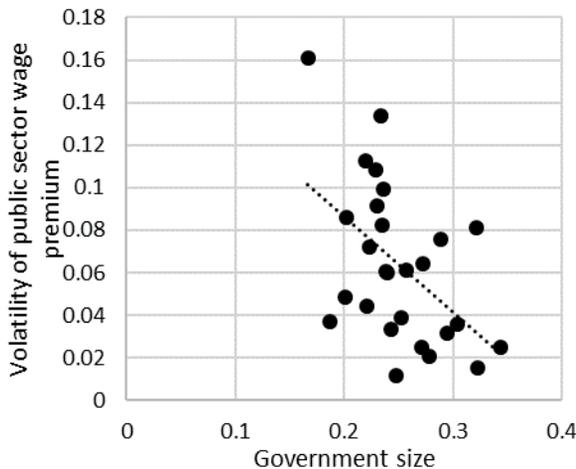


Figure 2. Government size and the volatility of the public sector wage premium (source: author’s calculations using Eurostat data)

Notes: volatility of the public sector wage premium is calculated as a standard deviation of a ratio of compensation per employee in public and private sectors. Government size is defined as public sector employment share in total employment.

Table 5. Estimated relationship between volatility of the public sector wage premium and output volatility

	(1)	(2)	(3)	(4)
Government size	-0.077*** (0.03)			
Collective bargaining		-0.473* (0.25)	-0.489* (0.27)	
Centralization		0.348 (0.25)	0.391 (0.25)	
EPL			-0.036 (0.28)	
Consolidation effort				0.047 (0.03)
N	27	26	27	27
r ²	0.244	0.212	0.557	0.130

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ standard deviation in the parentheses. Volatility of the public sector wage premium is defined as a standard deviation of a ratio of compensation per employee in public and private sectors. Government size is defined as public sector employment share in total employment. Constant included, but not reported. Definitions and sources of other variables available in the Table 1A.

Based on previous findings on the determinants of the public sector wage premium several variables reflecting wage setting practices and institutions were also added to the regressions. These include prevalence of the collective bargaining in the public sector; centralization in public sector wage setting; and stringency of employment protection.

Finally, consolidation efforts which governments of various EU countries took as a response to the recent economic crisis is another potential determinant of fluctuations in the public sector wage premium. To take this into account we follow Campos et al. (2017) and define fiscal consolidation efforts as a difference of cyclically adjusted primary balance (CAPB) between 2012 and the minimum from the period 2007–2012.⁵

Due to a limited number of observations, we test each set of variables separately. Findings are summarized in Table 5.

First, in column (1), the negative relationship between the government size and the volatility of the public sector wage premium is confirmed i.e. countries with larger governments have lower fluctuations in the public sector wage premium. A 1 percentage point increase in public sector employment share is translated into 0.077% decrease in the public sector wage premium volatility.

Columns (2) and (3) present the coefficient estimates for variables related to the wage setting practices and institutions.⁶

Similar to the findings in Campos et al. (2017) there is little evidence on the role played by the wage-setting institutions in explaining the public sector wage premium. One exception is the variable that reflects whether the predominant regime of wage setting in the public sector is

⁵ Countries undertook the consolidation efforts at different periods in time, therefore the flexibility in the definition of fiscal effort.

⁶ We test EPL separately because inclusion of it significantly reduces the number of observations.

collective bargaining as opposed to a unilateral decision which enters the regression significantly. The estimates suggest that collective bargaining in the public sector reduces the fluctuations by approximately 50%. This finding reinforces Gomes (2015) argument that more procyclical public sector wage setting scales down the differences in how public and private sector wages react to productivity shocks which in turn reduce the public sector wage premium (and its volatility). Although the coefficient for centralization bears the expected sign, it is insignificant.

Finally, the estimates in column (4) show that fiscal consolidation does not significantly affect the volatility of the public sector wage premium.

The findings are robust with respect to other definitions of the public sector wage premium (not reported, but available upon a request).

Conclusions

Using the data for EU member states over the period 1995–2016 this study investigates whether fluctuations in the public sector wage premium increase the volatility of the private sector employment and therefore amplify the output volatility. This study adds to existing literature by focusing on the volatility instead of the magnitude of the public sector wage premium.

The findings suggest that countries with more volatile public sector wage premium tend to have higher fluctuations in the private sector employment which in turn amplifies the business cycle volatility. In addition to providing support for previous evidence on the adverse effects of public sector wage premium, these findings highlight the necessity to consider not only the size but also the volatility of the public sector wage premium.

Given these economic implications, this study also explores the factors that contribute in explaining the cross-country variation in the volatility of the public sector wage premium.

Overall, findings suggest that the volatility of the public sector wage premium tends to be larger in countries with smaller governments (which might apply more monopolistic wage setting).

Wage setting practices and institutions do not appear to be significant factors in explaining the public sector wage premium. The only exception is the prevalence of collective bargaining in the public sector. The volatility of the public sector wage premium is approximately 50% lower in those countries where collective bargaining is the predominant regime for public sector wage setting as opposed to the unilateral decision. This finding supports the notion that more procyclical public sector wage setting may be beneficial in terms of economic stability.

There are various limitations to the study, therefore the findings should be treated as indicative evidence instead of unequivocal truth. First of all, as a consequence of choosing a rather homogenous sample, the number of observation used in the empirical analysis is rather small. Furthermore, the definition of the public sector wage premium does not take into the consideration that characteristics of the employees in each sector could differ. In the light of the above, further studies could look into the explore the problem by employing the conditional public sector wage premium.

Disclosure statement

The author declares that he does not have any competing financial, professional, or personal interests from other parties.

References

- Acemoglu, D., & Zilibotti, F. (1997). Was Prometheus unbound by chance? Risk, diversification, and growth. *Journal of Political Economy*, 105(4), 709-751. Retrieved from <http://www.jstor.org/stable/10.1086/262091>
- Afonso, A., & Gomes, P. (2008). *Interactions between private and public sector wages*. ECB Working Paper No. 971. Retrieved from <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp971.pdf?8f9d6a8ad5e9012e61231badcea948b2>
- AMECO. (n.d.). Retrieved from http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm
- Alesina, A., Ardagna, S., Perotti, R., & Schiantarelli, F. (2002). Fiscal policy, profits, and investment. *American Economic Review*, 92(3), 571-589. <https://doi.org/10.1257/00028280260136255>
- Algan, Y., Cahuc, P., & Zylberberg, A. (2002). Public employment and labour market performance. *Economic Policy*, 17(34), 7-66. Retrieved from <http://www.jstor.org/stable/1344671>
- Badinger, H. (2009). Fiscal rules, discretionary fiscal policy and macroeconomic stability: an empirical assessment for OECD countries. *Applied Economics*, 41(7), 829-847. <https://doi.org/10.1080/00036840701367556>
- Badinger, H., & Reuter, W. H. (2017). The case for fiscal rules. *Economic Modelling*, 60, 334-343. <https://doi.org/10.1016/j.econmod.2016.09.028>
- Boeing-Reicher, C. A., & Caponi, V. (2016). Public wages, public employment, and business cycle volatility: evidence from U.S. metro areas. *IZA Discussion Papers*, 9965.
- Campos, M. M., Depalo, D., Papapetrou, E., Perez, J. J., & Ramos, R. (2017). Understanding the public sector pay gap. *IZA Journal of Labor Policy*, 6(1), 1-29. <https://doi.org/10.1186/s40173-017-0086-0>
- Caponi, V. (2017a). The effects of public sector employment on the economy. *IZA World of Labor* 2017(332), 1-10.
- Caponi, V. (2017b). Public employment policies and regional unemployment differences. *Regional Science and Urban Economics*, 63, 1-12. <https://doi.org/10.1016/j.regsciurbeco.2016.11.005>
- Debrun, X., Pisani-Ferry, J., & Sapir, A. (2008). Government size and output volatility: should we forsake automatic stabilization?. *IMF Working Paper* 08/122.
- Easterly, W., Islam, R., & Stiglitz, J. E. (2001). Shaken and stirred: explaining growth volatility. In B. Pleskovic & N. Stern (Eds.), *Annual World Bank Conference on Development Economics*. Washington, DC.
- European Commission. (2014). Government wages and labour market outcomes. *European Economy Occasional Papers* 190. Retrieved from http://ec.europa.eu/economy_finance/publications/occasional_paper/2014/pdf/ocp190_en.pdf
- EUROSTAT. (n.d.). Retrieved from <https://ec.europa.eu/eurostat/data/database>
- Fatas, A., & Mihov, I. (2003). The case for restricting fiscal policy discretion. *The Quarterly Journal of Economics*, 118(4), 1419-1447. <https://doi.org/10.1162/003355303322552838>
- Gali, J. (1994). Government size and macroeconomic stability. *European Economic Review*, 38(1), 748-756. [https://doi.org/10.1016/0014-2921\(94\)90009-4](https://doi.org/10.1016/0014-2921(94)90009-4)
- Gomes, P. (2015). Optimal public sector wages. *The Economic Journal*, 125(587), 1425-1451. <http://doi.org/10.1111/ecoj.12155>
- Hallerberg, M., & Strauch, R. (2002). On the cyclicity of public finances in Europe. *Empirica*, 29(3), 183-207. <https://doi.org/10.1023/A:1020299609077>
- Holm-Hadulla, F., Kamath, K., Lamo, A., Perez, J. J., & Schuknecht, L. (2010). *Public wages in the Euro area. Towards securing stability and competitiveness*. ECB Occasional Paper Series No. 112. Retrieved from <https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp112.pdf>
- Kollintzas, T., Papageorgiou, D., & Vassilatos, V. (2015). A model of market and political power interactions for Southern Europe. *CEPR Discussion Paper* 10 359.
- Lamo, A., Pérez, J. J., & Schuknecht, L. (2013). The cyclicity of consumption, wages and employment of the public sector in the euro area. *Applied Economics*, 45(12), 1551-1569. <https://doi.org/10.1080/00036846.2011.631895>

- Lane, P. (2003). The cyclical behaviour of fiscal policy: evidence from the OECD. *Journal of Public Economics*, 87(12), 2661-2675. [https://doi.org/10.1016/S0047-2727\(02\)00075-0](https://doi.org/10.1016/S0047-2727(02)00075-0)
- Lane, P., & Perotti, R. (2003). The importance of composition of fiscal policy: evidence from different exchange rate regimes. *Journal of Public Economics*, 87(9-10), 2253-2279. [https://doi.org/10.1016/S0047-2727\(01\)00194-3](https://doi.org/10.1016/S0047-2727(01)00194-3)
- OECD. (n.d.). Retrieved from <https://data.oecd.org/>
- Quadrini, V., & Trigari, A. (2007). Public employment and the business cycle. *Scandinavian Journal of Economics*, 109(4), 723-742. <https://doi.org/10.1111/j.1467-9442.2007.00517.x>
- Ramey, G., & Ramey, V. A. (1991). *Technology commitment and the cost of economic fluctuations*. NBER Working Papers 3755, National Bureau of Economic Research, Inc. <https://doi.org/10.3386/w3755>
- Ramey, G., & Ramey, V. (1995). Cross-country evidence on the link between volatility and growth. *American Economic Review*, 85(5), 1138-1151.
- World Bank. (n.d.). Retrieved from <https://data.worldbank.org/indicator>

Appendix 1

Table A1. Sources and definitions of the variables

Variable	Source
GDP per capita: GDP Chain linked volumes (2010), euro per capita	Eurostat
Public sector wage premium: Compensation of employees total; Compensation of employees public (NACE sectors O, P and Q public services, healthcare and education); Number of employees total; Number of employees in public sector; Hour worked total; Hour worked total in the public sector; Compensation of employees in the private sector calculated as a difference between the total compensation of employees and that of public sector; Compensation per employee computed by dividing compensation of employees with the number of employees; Compensation per hour computed by dividing compensation of employees with the number of hours worked; All of the computations mentioned above were also performed for wages and salaries;	Eurostat
Trade openness: Imports and exports as a % of GDP	Eurostat
Government size: Total government expenditure or public sector employment share in total employment	Eurostat
Urbanization rate: Urban population as % of total population	World Bank
Collective bargaining: Predominant regime of wage setting in the government sector is collective bargaining as opposed to unilateral decision	EC (2014)
Centralization: There is de jure centralization of wage updates across the government sector as opposed to decentralization.	EC (2014)
EPL: Employment protection legislation index. Version 2 of this indicator is the weighted sum of sub-indicators concerning the regulations for individual dismissals (weight of 5/7) and additional provisions for collective dismissals (2/7). It incorporates 12 detailed data items.	OECD
Consolidation efforts: Consolidation effort is differences in CAPB between 2012 and the minimum from the period 2007–2012.	Ameco