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Government wages and labour market outcomes



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EXECUTIVE SUMMARY

The government wage bill represents a significant share of total public expenditures. Given its relevance, developments of government wages are likely to produce significant effects on the whole labour market, public finances and the overall economy. This paper looks at the interlinkages and interactions between government wages and the labour market.

A proper understanding of the interactions between government wages and labour market conditions for the private sector is currently of high relevance in the EU, as a number of Member States are facing the challenge of redressing public finances, while at the same time rebalancing their economies, and dealing with rising unemployment.

The aim of this paper is three-fold. First, it discusses the peculiarities of the objectives and constraints of the government as an employer and describes government wage formation across EU countries, looking at the main features of existing institutional settings and arrangements, the actors involved, and established practices. This is essential to better understand not only wage outcomes in the government sector, but also the scope for adjustment in the wage bill and the potential for and mechanism of wage spill-overs to the private sector.

Second, it compares the level of public wages with those in the private sector. The analysis aims at identifying the possible existence of “wage premia”, which are not explained by skills or other individual characteristics. As compared with existing analyses, the aim is to estimate wage premia for all EU countries in years for which survey data are available both before and after the crisis, and to discuss cross-country differences in wage premia in light of relevant country characteristics.

Third, the paper analyses the dynamic interactions between government and private wages. Short-term interactions are estimated by means of a structural VAR for all EU countries for which sufficiently long time series are available. Compared with existing analyses, dynamic interactions are analysed across the EU for time series comprising the post-crisis period. In addition, the long-term relation between manufacturing and government wage levels is analysed across a panel of EU countries in a co-integration framework. Results are discussed with reference to country-level structural and institutional characteristics that may influence the dynamic interactions between wages in the government and private exposed sector.

A number of relevant findings from the analysis can be summarised as follows:

- Wage setting institutions and practices in the government sector vary considerably across the EU along several dimensions, including the presence, scope and breadth of collective bargaining, the degree of centralization, the rights of governments and the modes of their representation, and union density. A key distinction is between countries in which government wages are mostly set by legislative decision and those where they are set by collective bargaining. While Eastern European and some Southern European countries tend to follow under the former category, Anglo-Saxon, Nordic and Continental European countries plus Italy belong to the latter.
- Average compensations per employee in the government sector are normally higher than in the private sector because the composition of employment is characterised by a higher incidence of high-skill employees. Even after controlling for the composition of employment, an hourly wage premium for the public sector is nonetheless observed in some countries (i.e., Cyprus, Ireland, Luxembourg, Spain, Portugal, Belgium, Italy), while negative public wage premia are generally observed in Eastern European countries.
- Correlation analysis indicates that the public wage premium is linked to job security in the private sector as measured by EPL indexes, possibly because higher compensations are needed to make public employment attractive when private employment is strongly protected. It also appears that

wage premia are more moderate in countries where the government sector employs a relatively large share of the labour force, most likely in light of the stronger bargaining power of the public employer.

- Structural VAR analysis permits to quantify the short-term interactions between government and private wage dynamics and identify potential direct and indirect channels of transmission. Results indicate that while private wages normally exhibit a significant response to government wages, government wages are much less reactive to shocks in private sector wages. This evidence would be consistent with government sector wage leadership in a number of EU countries. The impact of government wage shocks on private sector compensations is estimated to be strong especially in Italy, Portugal, Spain, France.
- A negative correlation is observed across countries between the response of private wages to government wage shocks and the extent of trade openness, corroborating the view that high exposure to trade reduces the scope for deviations of labour costs from those of foreign competitors, thereby raising the resilience of private sector wages to shocks originating from the government sector.
- Spillovers originating from strong dynamics in the wages paid in the non-tradable sector, notably the government sector, have been mentioned among the drivers of competitiveness losses in some EU and euro-area countries before the crisis. With a view to shed light and qualify this hypothesis, the relation between government compensations and labour costs in the tradable sector is analysed by means of a co-integration framework, which allows analysing long-run effects on wage levels. Across the whole panel of available EU countries, there is evidence of a significant long-term relation between government and manufacturing wage levels. However, by separating the analysis for countries with a relatively large and a relatively small government sector it appears that this long-run relation is much stronger for the former set of countries. It also appears that wage setting modalities may play a role for the long-run relation between government and manufacturing wages: in countries where government wages are to a greater extent determined via collective bargaining, manufacturing wages are more strongly linked to productivity.
- Recent years have been characterised by unprecedented episodes of wage restraint in the public sector and by a discontinuation of established collective bargaining practices in government wage setting in response to the emergency situation of public finances in a number of EU countries. The analysis shows that when dynamics in government wages are mainly driven by fiscal consolidation concerns, co-movements between government and private wages tend to be weaker, although a strong link is still found in countries with a large government size.

Limitations in the analysis need not be neglected, notably linked to limited availability of statistics on government compensations, imperfect cross-country comparability of data, and robustness of results with respect to the methodologies employed.

Despite the above limitations, the analysis sheds light on a number of elements that may deserve further attention in ongoing policy discussions.

For its sheer size as an employer, the government has a strong influence on the overall labour market. The analysis presented in this paper confirms that such influence can be quantitatively relevant and persistent, notably in countries less open to international trade and where government employment represents a high share of total employment.

In the years before the crisis, in a number of EU countries, imprudent and sub-optimal wage setting practices in the government sector may have been at the source not only of mounting public finance problems and fiscal pro-cyclicality in good times, but could have contributed to saw the seeds of competitiveness losses spreading to the tradable sector and feeding growing external imbalances. The

response to the current account and public finance crisis that materialised in a number of EU countries after 2008 included in some cases measures to correct government wage trends that are dictated by emergency considerations and are of unprecedented severity, often implying a discontinuation of established wage setting practices.

- From a forward-looking perspective, wage setting practices in the government sector should aim at avoiding the mistakes of the past while creating the conditions for enhanced public sector efficiency and preserving fiscal and macroeconomic stability.
- The documented presence of non-negligible public wage premia is a matter of concern as this may imply a persistently sub-optimal supply of skilled labour to the private sector, with consequences in terms of competitiveness and growth potential. While avoiding the emergence of such unjustified wage premia is certainly an objective in its own right, in light of recent pay freezes and cuts in a number of EU countries, looking forward it is also important to prevent the risk of excessively low pay in the government sector for key occupations and to ensure the minimum necessary quantity and quality of public services. From a public management perspective, adequate information on differences in the pay structure between the government and private sector, including wage premia estimates, could help from this viewpoint.
- From a dynamic viewpoint, the current retrenchment of government wage growth was a necessary ingredient of the policy strategy followed by EU countries that were mostly concerned with the debt crisis. Wage moderation in the public sector was functional not only to the reduction of fiscal deficits, but, in light of the relevant repercussions on the private sector labour market, also to the preservation of employment and the improvement of competitiveness in the private sector. While subdued government dynamics may still be needed looking forward in some EU countries, it is desirable that wage setting in the public sector exits from emergency mode, with a view to improve practices on a sustainable basis and better incorporate longer-term considerations.
- In the above respect, an adequate balance will have to be found between the efficiency gains permitted by better aligning government pay to productivity and labour market conditions and the need to ensure the respect of fiscal targets. While bargaining-based, decentralised wage setting modalities are more likely to deliver on the front of the alignment of wages with labour market conditions, the maintenance of adequate control from the centre on the overall government wage bill helps the achievement of budgetary targets. Further work to assess alternative ways to achieve a satisfactory trade-off between these objectives and evaluate best practices across EU countries seems deserved.

Government wages and labour market outcomes

1. INTRODUCTION

General government employment in the EU accounts for a considerable share of the labour force. Given its relevance, developments of government wages are likely to produce significant effects on the whole labour market, public finances and the overall economy. This paper looks at the interlinkages and interactions between government wages and the labour market.

A good understanding of the interactions between government wages and the labour market is of uttermost importance in the current context where a number of EU countries are at the same time consolidating public finances, rebalancing their economies, and dealing with rising unemployment.

Because of its sheer size, wage conditions set by the government sector may impact on incentives in the private sector as well. For instance, the same type of labour may have a higher remuneration in the government sector, thus inducing a shift of resources out of the private sector. The impact on incentives has microeconomic implications, as it affects for the allocation of labour and skills and overall economic efficiency, as well as macroeconomic implications on the front of adjustment and growth performance.

From a dynamic viewpoint, changes in government compensations may spill over to the private sector, with implications for employment and competitiveness. In particular, strong dynamics in the government wage bill may crowd out private sector employment, inflate labour cost conditions, and lead to competitiveness losses (e.g., Alesina and Perotti, 1997; Alesina et al., 2002; Ardagna, 2004).

Dynamic interactions may be present in the opposite direction as well, from the private to the government sector. Most notably, wage growth linked to productivity improvements in the private

sector will inevitably may spill over to the government sector due to labour mobility, which may imply a reduced capacity of governments to keep wage growth under control.

The aim of this paper is three-fold. First, it discusses the peculiarities, the objectives and the constraints of the government as an employer and describes government wage formation across EU countries, looking at the main features of existing institutional settings and arrangements, the actors involved, and established practices. This is essential to better understand not only wage outcomes in the government sector, but also the scope for adjustment in the wage bill and the potential for and mechanism of wage spill-overs to the private sector.

Second, it compares the level of public wages with those in the private sector. The analysis aims at identifying the possible existence of “wage premia”, which are not explained by skills or other observable individual characteristics. As compared with existing analyses, the aim is to estimate wage premia for all EU countries in years for which survey data are available both before and in the first years of the crisis, and to discuss cross-country differences in wage premia in light of relevant country characteristics.

Third, the paper analyses the dynamic interactions between government and private wages. Short-term interactions are estimated by means of a structural VAR for all EU countries for which sufficiently long time series are available. As compared with existing analyses, dynamic interactions are analysed across the EU for time series comprising the post-crisis period. In addition, the long-term relation between private and government wage levels is analysed across a panel of EU countries in a co-integration framework. Results are discussed with reference to country-level structural and institutional characteristics that may influence the dynamic

interactions between wages in the government and private sector.

Throughout the paper, the analysis refers to a definition of the public sector coinciding with the general government, with the exception of the assessment of the wage premium: in this case, survey data makes available a different distinction, namely that between employees working in entities with majority of public ownership and those working in the private sector.

The remainder of the paper is structured as follows. The next section reviews main aspects of wage setting in the government sector across EU countries. Section 3 illustrates some basic facts on government wages and employment in EU countries. Section 4 is devoted to the comparison of wages between the public and private sector by means of the estimation of wage premia. Section 5 focuses on the dynamic interaction between wages in the government and private sector. Section 6 concludes and discusses policy implications.

2. MAIN ASPECTS OF WAGE SETTING IN THE GOVERNMENT SECTOR

2.1. The government as an employer

The government has been for long the single largest employer in any developed economy. The long-term expansion of the government both in terms of expenditure and employment has been more on account of an expansion of the welfare state, i.e. the provision by the government of public goods and of merit goods, risk sharing and other income redistribution than on an expansion of sovereign functions, which used to be the backbone of a public administration.

Many of the government jobs are comparable to private sector ones and, as it is the case in some countries, some of those services can indeed be supplied by private suppliers even if heavily funded by the government, with education and health services being among the finest examples. Thus, in the presence of activities that may be performed both by public and private employees, spillovers linked to mobility between the two sectors are likely to occur.

Moreover, for a number of reasons, the government as an employer is different than a private company.

- First, the government supplies a very *particular type of goods and services*. The provision of public goods (including sovereignty tasks like defence, public order, judiciary, or regulation) or of merit goods takes usually place in a monopolistic regime with little room for market based competition. For this reason, the elasticity of demand for government services is likely to be low, which also implies a relatively low wage elasticity of labour demand. ⁽¹⁾
- Second, the *objectives, incentives and constraints* faced by decision makers in the government sector make the government a "one-of-a-kind" employer. Whilst the objective of a market-based employer is profit maximisation, politicians and bureaucrats may have a different objective function like the maximisation of social welfare (Gregory and Borland, 1999; Forni and Giordano, 2003) or that of maximising the chances of being re-elected (Alesina et al, 2001) or the amount of resources under the control of bureaucracies (e.g., Buchanan and Tullock, 1958). Also the constraints faced by public wage-setters are different: whereas market-based employers and decision makers are constrained by demand for the service they supply, politicians and bureaucrats may decide on the levels of government service provision, thereby affecting government labour demand directly, but are constrained by the government's fiscal space.
- Third, the government is likely to exert a strong influence on private sector not only in light of its sheer size as employer, but also because it *acts as a legislator* on the framework conditions under which labour relations occur, including wage setting. It can also impact on overall wage developments in the broad economy with a direct role when it comes to setting the statutory minimum wage and to promoting tripartite agreements or other kind

⁽¹⁾ See, e.g., Ehrenberg and Schwarz (1983), Freeman (1986). However, it also needs to be taken into account that some merit goods or transfers in kind are supplied by the government in competition with the private sector (e.g., health or childcare).

of agreements against which actual wage decisions are taken in the private as well as in the government sector.

2.2. Industrial relations in the government sector across EU countries: main characteristics

Wage determination in the government sector can differ substantially from standard bargaining in the private sector. This is not only because the government is a different type of employer, but also because the union structure and the institutional environment in which wage setting occurs do differ from those of the private sector. Moreover, the government employment relationship can differ from that of private sector employees. Indeed, in most EU countries, a special legal status exists for civil servants, with differences concerning issues like protection against dismissal and certain other rights and obligations of the parties.

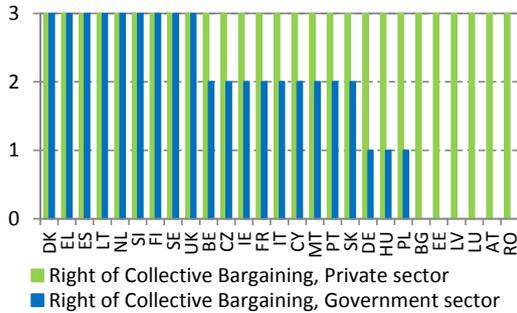
Differences across EU countries are found first of all for what concerns the *rights* recognised to public employees in terms of *collective bargaining and strike*.

In a number of EU countries, the rights of association, and especially of collective action and of strike, are more limited for public sector employees than for private sector employees, as Graphs 1 and 2 indicate.

Graph 1: Right of association: private and government sectors, 2011



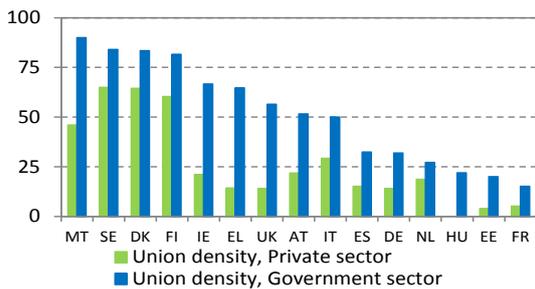
Graph 3: Right of collective bargaining: private and government sectors, 2011



(1) A value of 3, 2, 1 or 0 means: right to collective bargaining, right to collective bargaining with minor restrictions, right to collective bargaining with major restrictions, and no right to collective bargaining, respectively. The indicator refers to 2010 in the case of Bulgaria and Romania.
Source: Visser (2013).

The incentives for strike and industrial action can differ between the government and the private employer, and this may also underpin differences in legislation. Whereas the strike will reduce the revenues of the private employer, in the case of the government that is less likely to be an issue as the government is by and large financed by tax revenues. Obviously, these different costs could result in different bargaining outcomes.

Graph 4: Trade union density in private and government sectors in some EU countries (% of sector workforce), 2000-2011



(1) Data refer to the most recent observation available over 2000-2011.
Source: Masso and Espenberg (2012), Visser (2013).

In most EU countries ⁽⁴⁾, affiliation with trade unions is higher or even much higher in the government sector than in the private sector, even

⁽⁴⁾ Similar patterns of visibly higher membership in the government sector relative to the private one are also found in other economies in Europe and elsewhere, like the cases of Canada, Japan or the USA; see, e.g. Blanchflower (2007) and Visser (2013).

if that difference varies widely across countries (Graph 4 and Table 1).

Table 1: Trade union density in central government

< 15%	15-25%	25-40%	40-55%	55-70%	> 75%
CZ	FR	BG	BE	AT	DK
EE		HU	DE	IE	FI
LV		NL	IT	RO	
LT		PT		UK	
PL					
SK					

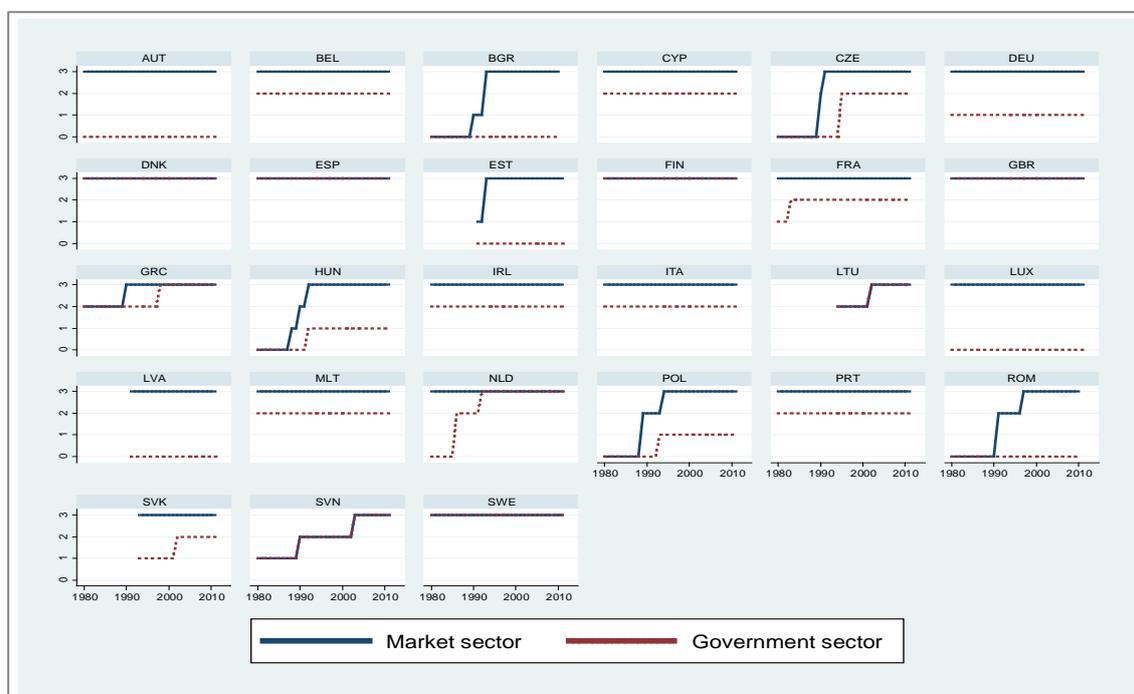
Source: Bordogna (2007).

Possible explanations for a higher union membership rate in the government sector are as follows.

- Higher union affiliation is normally found in bigger firms and employers. ⁽⁵⁾ This may be driven by the fact that the average costs of organising labour can fall as the size of the employer increases. Big employers may also benefit more from having a union to negotiate with, as that may allow lower transaction costs than bargaining individually with a plethora of employees.
- Given the dominance of structured career and pay schedules in the government sector, there is less room for differentiation and for bilateral employee-employer negotiations. The fact that individual gains or wage differentiation are difficult to obtain create incentives for union activity and collective action (European Commission, 2013).
- Given the specificity of some of the government posts and their inexistence in the private sector, the human capital that government employees acquire through experience may not be rewarded by a potential employer in the private sector, thereby reducing the outside options of government employees and increasing the bargaining power of the government. This may as well lead to higher unionisation in the government sector.
- In addition, unions may be more popular in the government sector as unions may influence the government through the ballot power as workers are also voters and thereby can

⁽⁵⁾ See Schnabel (2013) for a recent review of empirical literature on potential determinants of union membership.

Graph 5: Rights of collective bargaining across EU countries, 1980-2011



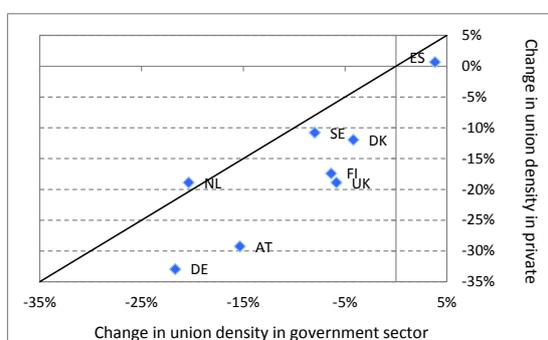
(1) Rights of collective bargaining in the market sector are defined and classified as follows: 3 = yes; 2 = yes with minor restrictions (e.g., registration, thresholds); 1 = yes with major restrictions (e.g., monopoly union, government authorization, limitations on content, major groups excluded); 0 = no. Rights of collective bargaining in the government sector are defined and classified as follows: 3 = yes; 2 = yes with minor restrictions (e.g., registration, thresholds, only military, judiciary and policy excluded – as per ILO convention); 1 = yes with major restrictions (e.g., monopoly union, government authorization, limitations on content, major groups excluded); 0 = no.

Source: Visser (2013)

influence the choice of government decision makers (e.g., Checchi and Lucifora, 2002).

Some trends characterise the *evolution over time* of some features of industrial relations in the government sector.

Graph 6: Evolution of union density in government and private sectors in EU countries between 1995-2000 and 2007-2011



(1) Change in union density is calculated as the change in union density between 2007-2011 and 1995-2000 as a percentage of the average union density over 1995-2000.

Source: Visser (2013).

- First, rights of collective bargaining in the market and government sector have been increasing over the last few decades mostly in the new Member States during the transition period, often leaving the gap in favour of the market sector unaffected. But rights of collective bargaining in the government sector have increased also in France and the Netherlands, and since the 1990s in Greece, closing in the latter two cases the initial difference with the market sector (Graph 5).
- Second, against a background of a general trend towards falling union density in most EU countries since the early nineties, union membership has been more resilient in the government sector, with some noteworthy

exceptions (e.g., Spain and the Netherlands) (see Graph 6).

2.3. Wage setting modalities in the government sector across EU countries

A key dimension of wage setting in the government sector is the *mechanism for decision-making*. Two main regimes can be identified.

- First, wages are mainly determined on the basis of *collective bargaining*.
- Second, wages are determined on the basis of *unilateral decision* by the government.

Table 2 summarises and characterises the wage setting process across EU countries on the basis of existing studies. It shows that in only slightly less than half of the countries does wage setting in the government sector take place predominantly on the basis of collective bargaining. ⁽⁶⁾

The differences between the two regimes are often nuanced, as it can be difficult to distinguish not only between bargaining, consultations and outright unilateral decisions, but also between the letter of the legislation and established practices. In many cases, the effective setting combines elements of the two regimes.

The government may decree on wages but only after extended consultations with an implicit or explicit agreement with workers' representatives (e.g., Austria). In addition, in certain countries, the outcomes of collective bargaining may need confirmation by government or parliament (e.g., Luxembourg, Hungary or Malta). These cases are classified in Table 2 as predominantly based on decision rather than bargaining, albeit decision by the government may be less unilateral than in other systems.

In other cases wage renewals can be the outcome of proposals by bodies that are independent from the government and including employees' representatives, with the UK's pay review bodies being one of the examples. For the sake of

categorisation, these cases are considered as predominantly bargaining in Table 2. ⁽⁷⁾

Table 2: Main dimensions of government wage setting in EU countries

	Predominant regime of wage determination: Bargaining (B) / Decision (D)	De jure indexation to past inflation?	De jure centralisation of wage updates across government sector?
BE	B	Yes	No
BG	D	No	No
CZ	D	No	No
DK	B	No	No
DE	B	No	No
EE	D	No	No
IE	B	No	Yes
EL	D	No	Yes
ES	D	No	No
FR	D	No	Yes
IT	B	No	No
CY	B	Suspended	Yes
LV	D	No	No
LT	D	No	No
LU	D	Yes	Yes
HU	D	No	Yes
MT	D	Yes	Yes
NL	B	No	No
AT	D	No	No
PL	D	No	No
PT	D	No	Yes
RO	D	No	Yes
SI	B	Suspended	Yes
SK	D	No	No
FI	B	No	No
SE	B	No	No
UK	B	No	No

Source: Bechter and Brandl (2013); Bordogna (2007); Bordogna and Pedersini (2013); EIRO (2009); EPSU (2009); Giordano et al (2011); Glassner (2010); Masso and Espenberg (2012); O'Connell (2012); OECD (2011).

At the same time, it is possible that negotiations come close to unilateral determination under certain conditions. That is the case when the government enters negotiations with a well-defined, enforceable and credible budget constraint, notably the approved budgetary allocation for the wage bill in the budget law for the relevant period of wage application. This was the case in a number of countries during the crisis: the seriousness of the fiscal distress led to a de-facto suspension of established practices based on a bargaining model (European Commission, 2013).

The presence of automatic or de-jure *wage indexation* is a second dimension along which wage setting modalities in the government sector can be classified. Statutory indexation concerns at present a minority of countries (Belgium, Luxembourg and Malta), with government wages

⁽⁶⁾ The de jure classification was followed herewith, as the practises may vary a lot more, not only across countries but also over time and as a function of specific agents or decision makers.

⁽⁷⁾ This is also the understanding of Glassner (2010), who considers the case of the UK 'pay review bodies' a form of de facto negotiation as unions can put forward their recommendations and demands. Note that not all wages in UK's public sector are determined by 'pay review bodies'.

indexation rules largely coinciding with those for the private sector wages in those cases.

A third dimension of wage setting is the extent to which there is *centralisation across levels of government*. Over the last two decades, government wage setting systems across Europe were concerned by a trend towards increasingly decentralised pay negotiations and a substitution of automatic, collective, seniority-based pay adaptation systems with more selective and discretionary systems based on merit and performance. The trend, analogous to the one taking place in the private sector, is mainly explained by the need to ensure the adaptation of pay structures to the productivity impact of technological and organisational change.

Table 2 summarises also information on whether or not there is very significant centralisation of the decision for the whole government sector across EU countries.

It is shown that only in a minority of EU Member States government wage setting is de jure centralised to a significant degree.⁽⁸⁾ A first and dominant dimension of decentralisation concerns differentiation in wage setting along the different government subsectors. The best example is when decentralisation is the result of a federal or decentralised structure of the state like in Belgium, Germany or Spain, although separate negotiations for central government on the one hand and regional and local government subsectors on the other hand can also be found in other, non-federal EU countries.

A further pattern of decentralisation is linked to administrative and managerial autonomy and the growing importance of more autonomous bodies and agencies playing a role in wage determination (European Commission, 2013). The UK is perhaps the most significant example on this respect.

Wage setting decentralisation can be combined with different degrees of coordination among different government players. In a number of EU countries, negotiations for local governments are centralised and carried out at national level (EPSU,

2009). Other cases where the government is represented by a single negotiating entity include negotiations for employees of the German länder until recently or the existence of a single negotiation agency in Italy (ARAN).

Wage setting coordination in some countries is the outcome of a two-tier wage setting system whereby wage increases are partially set at central level and partially by local administrations. In a number of countries, insufficient coordination of decentralised wage setting at local level coupled with the issue of “vertical imbalance” (i.e., local expenditures financed from the centre) translated into excessive wage dynamics at lower levels of government, leading to a response by the central government aimed at enhancing control (e.g., Italy, Spain).

2.4. A clustering of government wage setting systems across the EU

EU countries could be clustered in five main groups as far as size⁽⁹⁾ and government wage setting institutions are concerned.⁽¹⁰⁾

Nordic countries: Denmark, Finland and Sweden, which present prevalence of collective bargaining, room for decentralisation even if with strong elements of coordination at national level including the private sector. Collective bargaining in the public and private sectors share many characteristics. In these countries, union density in the government sector is very high and public employment rates are the highest in the EU.

Anglo-Saxon countries: the UK, Ireland, Italy, the Netherlands and Cyprus, which all share various characteristics with the previous group but in a less intense and non-uniform way. In the UK, wage setting is more scattered and decentralised with a role for bargaining but also an important role for pay review bodies. Ireland has similarities with the Nordic group, notably high union density in the public sector, a strong element of bargaining but in a centralised setting, but public employment is less important. Italy presents a dominance of bargaining and still significant union density and

⁽⁸⁾ A relevant distinction is that between de-jure and de-facto wage setting centralisation, the latter being affected also by the extent of coordination among bargaining parties.

⁽⁹⁾ Figures on the share of government employment are discussed in section 3.

⁽¹⁰⁾ The classification is partly based on European Commission (2013).

the share of public to total employment is lower than average. The Netherlands is characterised by a decentralised bargaining setting but with lower union density than the countries listed before. Cyprus can be classified in this group given the prevalence of bargaining and some decentralisation.

Central European countries: Austria, Belgium, Germany, Luxembourg, and to a certain extent, also Slovenia, with intermediate levels of trade union density, elements of collective bargaining but also of government role up to the point of having the possibility of unilateral determination of wage in some cases, with the intensity of the two aspects varying across the countries of the group. Decentralisation is foreseen but may not always be entrenched in common practice. Levels of union density are intermediate. Public employment rates are close to EU average.

Southern Europe: France, Greece, Spain and Portugal, with a leading role of the government, often in a centralised way (except in Spain). Union density varies considerably inside the group, being visibly high in Greece. Public employment rates are close but below the EU average (except in France, where it is above the average). Also Malta could be classified in this group.

Eastern Europe: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia, with somewhat less room for collective action and with a leading role for the government. Some room for decentralisation seems to exist, especially for the local government, but seems to be less relevant than in other groups. Government sector union density is low or very low in most of the countries. Public employment rates are below the EU average.

3. GENERAL GOVERNMENT EMPLOYMENT AND WAGES IN THE EU: SOME BASIC FACTS

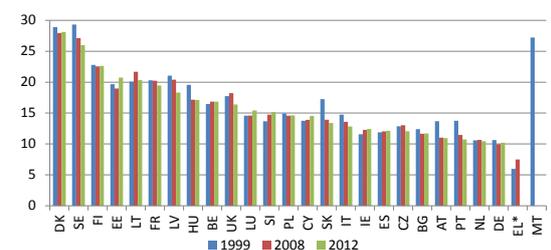
3.1. Government employment

Cross-country analysis of public employment and wages is impaired by issues of comparability because the boundaries of the public sector, which typically embraces general government plus publicly owned enterprises, vary from one country

to another. The use of smaller aggregates helps improving cross-country comparability but it does not solve problems of country- and time-coverage. The focus here is on general government. Figures on general government employment and wages stem from the System of National Accounts (SNA) and refer to public offices at all levels of government, non-market publicly owned hospitals, schools, and social security organizations. General government data do not include public or quasi-public corporations, even when all the equity of such corporations is owned by government units.

One alternative way of capturing the public sector is to use the classification by economic activity rather than by sector.⁽¹⁾ Some activities are exclusively performed by the government but this is not the case for all classes of economic activity, which creates discrepancies between the sector- and the activity-based classification. For example, the section "O" of the activity classification, which covers "public administration, defence and compulsory social security", does not coincide with the general government because it does not include non-market publicly owned hospitals and schools. At the same time, sections "P" and "Q" covering "education" and "human health and social work activities" respectively include also private units performing these activities.

Graph 7: General government employment as a share of the total labour force (%)



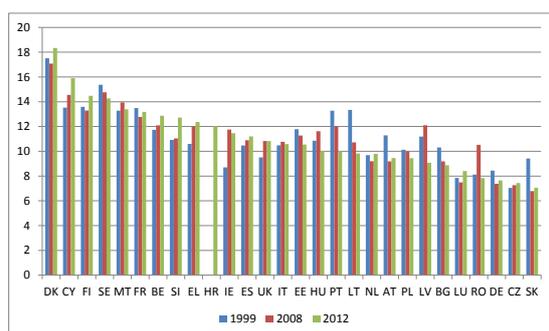
(1) Ranking based on 2012 data. 2012 data refer to 2010 in the case of DE, CY, LV, LT, AT, SI; 1999 data refer to 2000 in the cases of BG. Data from ILO LABORSTA for AT, BG, CY, DE, EL, LT, LV, MT, RO, SI and from OECD for all other countries. * It should be noted that, in the case of Greece, the broader public sector is much larger than general government with a high number of employees working in publicly owned enterprises.

Source: Own calculations based on data from OECD and ILO LABORSTA.

(11) The reference here is to the latest Statistical Classification of Economic Activities in the European Community abbreviated as NACE (Rev.2).

Graph 7 displays the share of general government employment to the total labour force, following the sector-based classification.⁽¹²⁾ In 2012, the general government in the EU employed, on average, 16 per cent of the total labour force, down from 16.7 per cent in 1999. Across the whole period from 1999 to 2012, the share has been above the EU average in Denmark, Sweden, Finland and Malta (before the crisis), but also in France and in the Baltics. By contrast, it has been well below-average in a number of new EU Member States, plus Austria, Germany, Ireland and in the Netherlands. In the case of Greece, the relatively small size of general government masks the fact that publicly owned firms not included in general government data employ as much as 12.8 per cent of the labour force.⁽¹³⁾

Graph 8: General government wage consumption bill as a share of GDP (%)



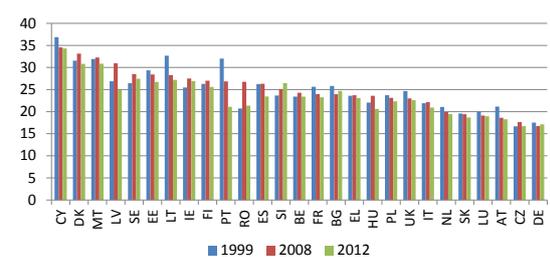
(1) Ranking based on 2012 data.
 Source: Own calculations based on data from DG ECFIN AMECO Database.

Graph 8 displays the share of general government wage spending to GDP. The average share has been constant in the EU over 1999-2012 at 11 per cent of GDP, but there are but important cross-country differences. The EU countries where government wage consumption is high relatively to GDP are the same where the government is a large employer, with the two exceptions of Belgium and Slovenia, where general government is not a large employer but still the ratio of the government wage consumption to GDP is above the EU average. During the crisis period, the strongest reductions in

⁽¹²⁾ Data on general government employment are taken from the OECD integrated with data from ILO LABORSTA when not available from the OECD. Labour force data are taken from Eurostat.
⁽¹³⁾ The figure for the share of the labour force employed in publicly owned enterprises refers to 2008.

the government wage bill took place in Portugal and Hungary, followed by Ireland and Greece, reflecting to a large extent these countries' effort to contain public spending in the midst of the crisis.

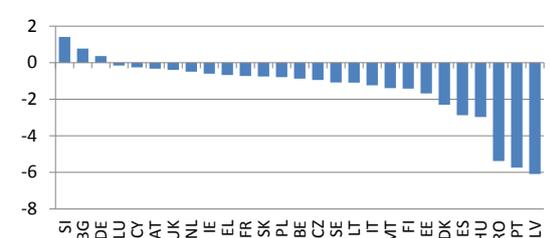
Graph 9: Share of general government compensations in total government spending (%)



Source: Own calculations based on data from DG ECFIN AMECO Database.

Not only does the general government employ a large portion of the labour force, but compensations of public employees represent a significant share of total government expenditures (Graph 9). In 1999, government wages in the EU were equal to an average of 25 per cent of total spending. They were well above-average in Denmark, Estonia, Cyprus, Lithuania, Malta and Portugal, hinting at the presence of scale economies in the provision of public goods and at the possibility that small countries use public employment as an insurance against systemic external risks (e.g., Rodrik, 2000).

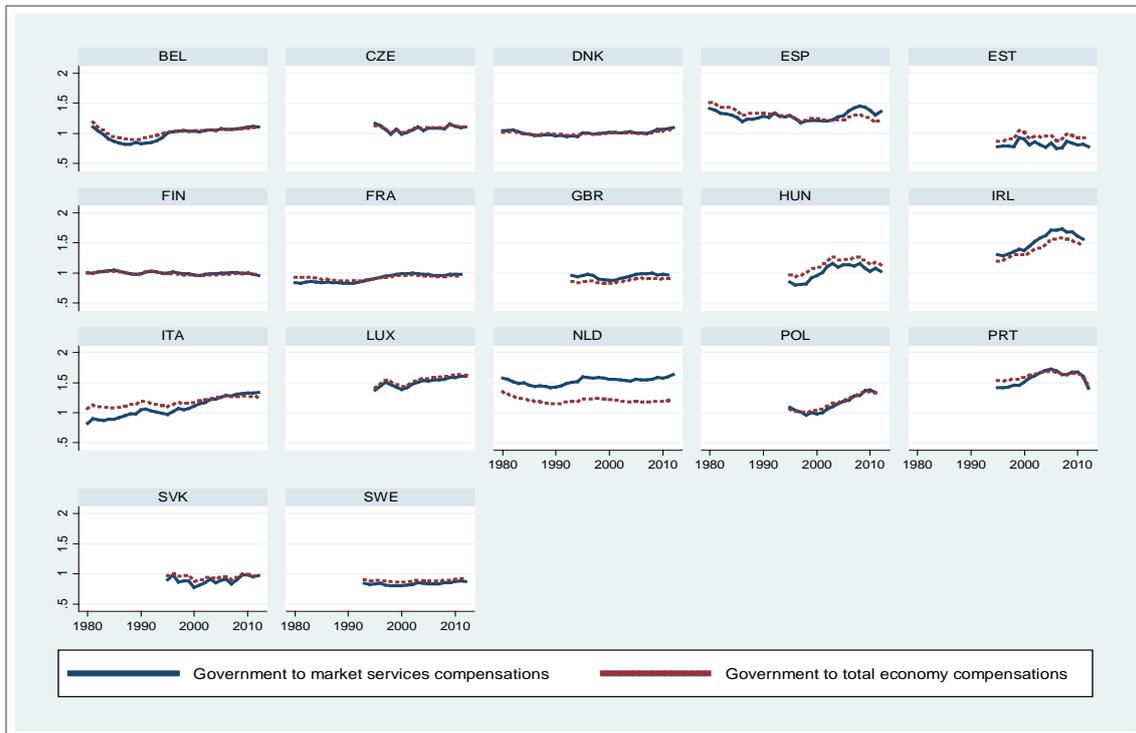
Graph 10: Change in the share of general government compensations to total spending 2008-2012



Source: Own calculations based on data from DG ECFIN AMECO Database

Over the 2008-2012 period, the EU27 average wage bill was downsized relatively to other spending items down to 23 per cent of total public spending. Latvia, Portugal, Romania, followed by Hungary, Spain, Denmark, and Estonia show the largest decreases (Graph 10).

Graph 11: Ratio of general government to private nominal compensation per employee (alternative definitions): 1980-2012



(1) Government compensations per employee are taken from OECD, total economy and market services compensations per employee from DG ECFIN AMECO Database.

Source: Own calculations based on data from OECD and DG ECFIN AMECO Database.

3.2. Government compensations

Graph 11 displays the ratio of nominal compensations per general government employee to nominal compensations in market services and in the total economy.⁽¹⁴⁾ In most countries, over the period 1980-2012, the ratio exceeded one, pointing to a positive government-private *wage gap*. The gap has been on average high and rising until the outbreak of the crisis mainly in Ireland, Italy, Spain, and Portugal.⁽¹⁵⁾

Simple ratios are imperfect measures of the public *wage premium*, as they do not account for the composition of the labour force⁽¹⁶⁾. Indeed higher

⁽¹⁴⁾ Data are calculated from OECD as the share of government final wage consumption expenditure to general government employment. Data on compensations per employee in non-market services and total economy stem from DG ECFIN AMECO Database.

⁽¹⁵⁾ Data on individual compensations of general government employees are not available for Austria, Bulgaria, Croatia, Cyprus, Germany, Greece, Latvia, Lithuania, and Slovenia.

⁽¹⁶⁾ A note on terminology: the term "gap" is used here to refer to the distance between the average government wage and

public wages may be justified by differences in the individual characteristics of public versus private employees concerning for example gender, age, education, type of occupation, etc. The next section is devoted to an analysis of the public wage premium indeed controlling for a number of observable individual characteristics.

4. ASSESSING THE PUBLIC WAGE PREMIUM

There is a large volume of literature that analyses the public-private wage premium using micro-data for a single EU country.⁽¹⁷⁾ Most of these studies conclude that there exists a marked pay differential between the two sectors. The wage premium in the public sector is generally found to be higher for

the average private wage; the term "premium" is instead used to refer to the distance that remains between the two, after having accounted for the characteristics of employees.

⁽¹⁷⁾ For a comprehensive review of the literature focusing on the euro area, see Giordano et al., (2011).

women than it is for men, and higher at the lower-end of the income distribution.

Only relatively few studies have examined the public-private wage premium in an international perspective, not least because of the difficulty in obtaining homogenous cross-country data. Brunello and Dustman (1997) look at Italy and Germany and find evidence of a public wage premium, which is higher in Italy (21 per cent) than in Germany (7 per cent). More recently, Lucifora and Meurs (2006) compare results across France, Great Britain and Italy and suggest that the public pay premium is smaller in the countries where pay formation is generally more regulated (e.g., France and Italy) and larger otherwise (e.g., Great Britain). Giordano et al. (2011) equally find a positive public-private wage premium, which is especially evident in Greece, Ireland, Italy, Portugal and Spain.

The existing literature has emphasised public sector wage premia as a manifestation of rents accruing to unions and politicians concerned by electoral motives (Gelb et al., 1991; Holmlund, 1993; Agenor, 1995; Rodrik, 2000, Matschke, 2003).

What was somehow neglected in most existing analyses is that the mere presence of a significant wage premium is incompatible with the assumption of labour mobility and market clearing over the medium-term: positive (negative) wage premia in the public sector would imply workers moving away from (into) private firms and into (away from) the government sector until wage differences become insignificant. Only recently, the persistence of public sector wage premia has been rationalised on the basis of imperfect labour matching (justifying limited labour mobility between the private and the public sector) and unilateral wage posting in the government sector as opposed to bargaining in the private sector (e.g., Quadrini and Trigari, 2008; Gomes, 2010).

Concerning the implications of significant wage premia, these primarily concern labour allocation and microeconomic efficiency, but have also relevant macroeconomic repercussions, in that the distribution of labour and human capital between the government and the private sector is relevant also from the viewpoint of countries' production

specialization patterns, and of their export and growth potential.

4.1. Stylised facts

Survey-based data from the European Structure of Earnings Survey (SES henceforth) are used here to assess the size of wage premia in the EU.⁽¹⁸⁾ The dataset provides data on hourly gross earnings and a description of individual characteristics including information on whether the individual works for the public or the private sector.⁽¹⁹⁾ Data for earnings by workers' characteristics are available for all EU27 countries, except Sweden.⁽²⁰⁾

As the survey data used in the analysis do not allow for the identification of general government employees, the definition of public sector wages differ from the one employed in the rest of this paper. Public employees are classified in this case as those employed in entities owned by the government (i.e., property share higher than 50 per cent), yet the agricultural sector and firms with less than 10 employees are excluded.

It is also important to note that SES data were not available after 2010 at the time the analysis was carried out. This limits the breadth of the analysis, as important measures aimed at freezing or reducing the public wage bill were introduced in 2011, 2012 in a number of EU countries.

Graph 12 displays data on the public-private wage gap, namely the percentage difference in hourly gross earnings between the public and the private sector, in this case without taking into account differences in individual characteristics. On average, public wages tend to be higher than private wages across the EU except for Denmark, Finland, Slovakia and Estonia (just in 2006) and Hungary (just in 2010). The difference across the two sectors is sizeable in Cyprus, Italy, Portugal, and slightly smaller in Belgium, Spain, Ireland, Luxembourg, Poland, Romania and Slovenia.

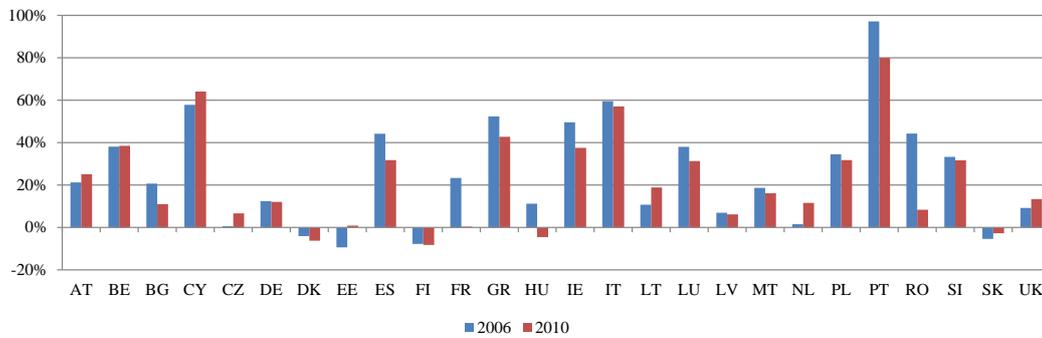
In 2010, there is evidence of a narrowing of the gap compared with 2006 in Bulgaria, Greece, Ireland, Portugal, Romania, Spain and, to a smaller

⁽¹⁸⁾ The data used do not include the agricultural sector and firms with less than ten employees.

⁽¹⁹⁾ For a full list of individual characteristics, see Box 1.

⁽²⁰⁾ Sweden is excluded from the sample because information distinguishing by type of labour contract is not available.

Graph 12: Average public-private hourly wage gap (% of hourly earnings in the private sector), evidence from individual survey-data.



Source: Own estimation based on SES.

extent, in Italy, Luxembourg, Malta, Poland, and Slovenia. Of course, such a change in the wage gap could be linked to changing composition of public employment rather than a variation of earnings received by the different categories of public employees.

Graph 13 displays the average wage difference between public and private employees accounting for broad categories of individual characteristics: gender, educational attainment, age, and type of contract. ⁽²¹⁾

Generally, the public wage differential is higher for women, except for Bulgaria, Greece, and Hungary. Moreover, the average difference tends to be higher for workers with primary and secondary education. The exception is represented by Belgium, Cyprus, Greece, Ireland, Italy and Spain, where highly skilled workers of the public sector appear to enjoy higher wages than the highly skilled working in the private sector. ⁽²²⁾ Older workers in the public sector receive on average a higher wage than those working in the private sector; and the differential is smaller greater for this age group than for younger workers. Clear exceptions in this case are Malta, the Netherlands, Spain and the UK. Finally, higher public wages are observed for the three types of

contracts considered (i.e., permanent, fixed-term contracts and apprentices). In 2006, the differential was especially high for fixed-term contracts but was significantly narrowed in 2010.

4.2. Estimating the public wage premium

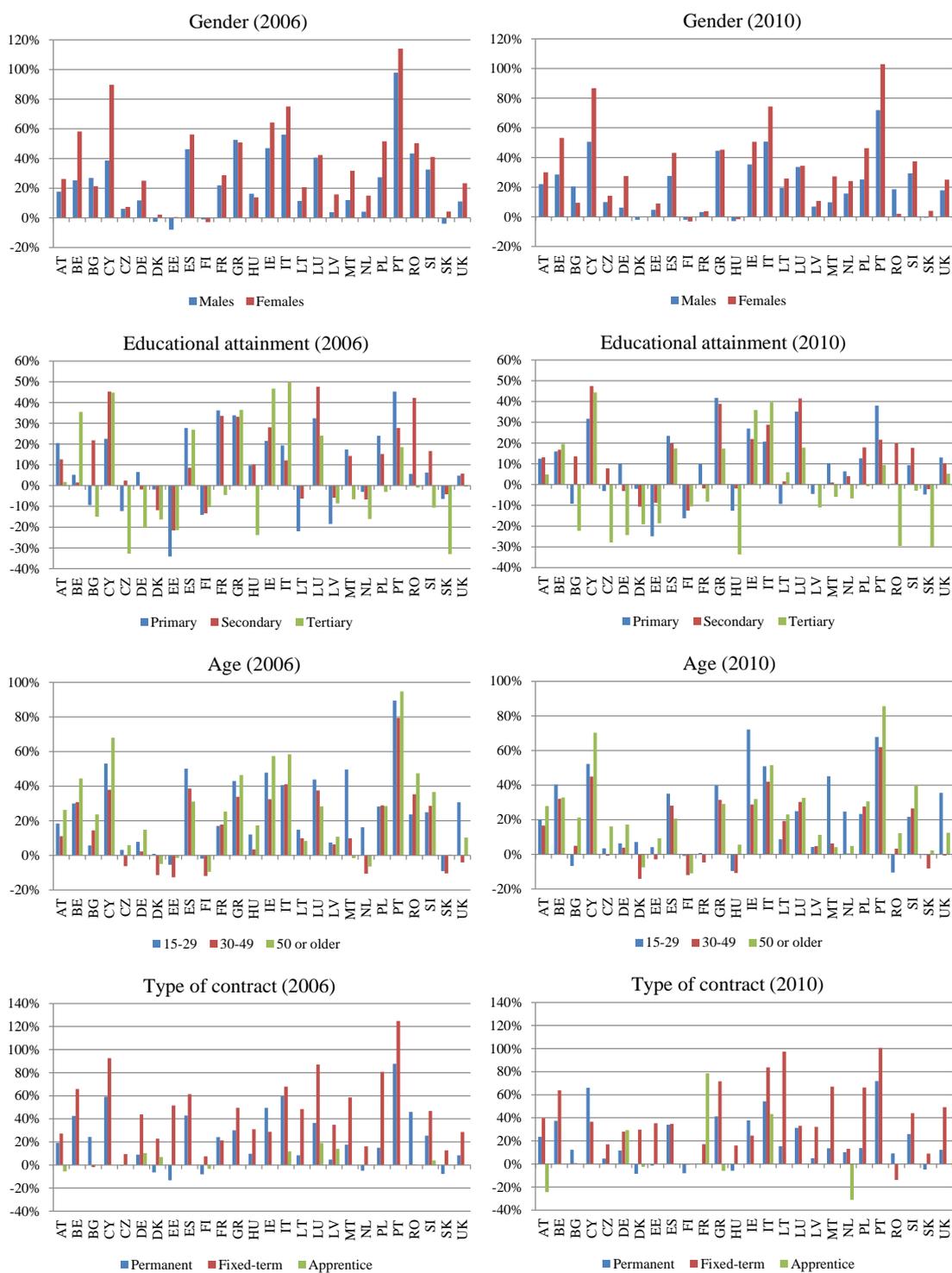
The wage premium is analysed by regressing the wage of the reference individual on dummies for the sector and other individual characteristics. Box 1 describes in detail the estimation technique and the results for the pooled regression on the basis of data relating to 2010. The unavailability of more up-to-date survey data does not allow incorporating the numerous changes to public wage levels that have been introduced in a number of EU countries over 2011-2013. It is found that, on average, the public wage premium in the EU is at 3.6 per cent. All individual characteristics yield the expected signs, with lower wages found for females, younger workers, low-skilled, apprentices and fixed-term contracts, the sector of wholesale, retail and food services, and occupations below the technician level.

Table 3 provides data on the 2010 wage premium in the public sector, by country and by gender. Hourly earnings are higher than in the private sector and above the EU average in Austria, Belgium, Cyprus, Germany, Greece, Ireland, Italy, Luxembourg, Poland, Portugal, Slovenia, Spain. The wage premium is negative in Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Latvia, and Slovakia. In the remaining EU countries, there is no substantial difference between public and private wage levels.

⁽²¹⁾ The figures provide a soft descriptive version of the public wage premium, as they account for broad features taken one a time.

⁽²²⁾ It should be noted however that for Belgium, Greece, Italy and Spain, there are no data available for the NACE sector "public administration, defence and compulsory social security", which limits cross-country comparability and could potentially bias the figures.

Graph 13: Average wage differences between the public and private sector (% of hourly private earnings), evidence from individual survey data.



Source: Own estimation based on data from SES.

Most interestingly, female public workers enjoy higher earnings only in Germany, Spain, Ireland, the Netherlands, Belgium, Italy, and Portugal but, on the whole, there is no clear-cut and broad-based evidence of a wage premium in favour of women working in the government sector, a result that is in contrast with most of the existing literature.⁽²³⁾

Table 3: Public wage premium in 2010: regression results by country and by gender

	Whole sample	Male	Female
BG	-0.093*	0.016	-0.261***
CY	0.209***	0.199***	0.186***
CZ	-0.048*	-0.027	-0.076***
DE	0.1***	0.083**	0.129***
DK	-0.14***	-0.155***	-0.123***
EE	-0.151***	-0.08**	-0.23***
ES	0.151***	0.131***	0.168***
FI	-0.069***	-0.071***	-0.066***
FR	-0.037**	-0.01	-0.054***
GR	0.083***	0.103**	0.066*
HU	-0.163***	-0.091**	-0.231***
IE	0.212***	0.196***	0.218***
LT	0.046	0.118**	-0.028
LV	-0.075***	-0.008	-0.139***
NL	-0.005	-0.059***	0.039**
PL	0.065**	0.085**	0.019
RO	-0.046	0.075	-0.237***
SI	0.056***	0.08***	0.022
SK	-0.101***	-0.047	-0.158***
UK	-0.013	-0.001	-0.017
AT	0.061***	0.067**	0.054***
BE	0.117***	0.104***	0.128***
IT	0.105***	0.059**	0.145***
LU	0.204***	0.226***	0.161***
MT	-0.011	0.002	-0.025
PT	0.119***	0.109***	0.12***
EU	0.036***	0.043***	0.029

(1) Estimation method: OLS. Sample: all EU countries but Sweden. *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively. For AT, BE, IT, LU, MT, PT there is no information on the aggregate "public administration, defence and compulsory social security".

Source: Own estimation based on data from SES.

Table 4 juxtaposes the size of the wage premium in 2006 and 2010. The definition of the public sector differs from one year to the other for a number of countries (i.e., France, Germany,

Greece and Spain), which partially impairs comparability between the two years.⁽²⁴⁾

Table 4: Public wage premium: regression results by country and by year

	2006	2010
BG	0.026	-0.093*
CY	0.183***	0.209***
CZ	-0.07***	-0.048*
DE	-0.016	0.013
DK	-0.132***	-0.14***
EE	-0.229***	-0.151***
ES	0.18***	0.162***
FI	-0.065***	-0.069***
FR	-0.075**	-0.023
GR	0.067***	0.089***
HU	-0.044*	-0.163***
IE	0.205***	0.212***
LT	0.022	0.046
LV	-0.106***	-0.075***
NL	-0.126***	-0.005
PL	0.09***	0.065**
RO	0.174***	-0.046
SI	0.046***	0.056***
SK	-0.09***	-0.101***
UK	0.036**	-0.013
AT	0.046**	0.061***
BE	0.124***	0.117***
IT	0.133***	0.105***
LU	0.23***	0.204***
MT	0.049***	-0.011
PT	0.197***	0.119***

(1) Estimation method: OLS. Sample: all EU countries but Sweden. *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively. For AT, BE, IT, LU, MT, PT there is no information on the 2010 aggregate "public administration, defence and compulsory social security".

Source: Own estimation based on data from SES.

Results indicate that the premium has been narrowing over time in Belgium, Italy, Luxembourg, Malta, Poland, Portugal and Spain. Conversely, it has increased in Austria, Cyprus, Greece, Ireland, and Slovenia. It should be stressed that these changes control for changes in the composition of the labour force in the two sectors.

Finally, table 5 provides evidence on the size of the public premium based on educational attainment. Despite the well-known evidence that public wage premia are higher for low-wage earners, which justifies frequently positive wage premia for low education workers, there are countries where also workers with high education

⁽²³⁾ Meurs and Ponthieux (2005) analysed the gender pay gap across 10 EU countries and conclude that the public sector is in general more favourable to women than to men.

⁽²⁴⁾ However, regressions run on the restricted sample with the same definition of public sector do not indicate that the omission of the NACE sector "public administration, defence and compulsory social security" has a large impact on results.

level receive a premium from working in the public sector (Austria, Belgium, Cyprus, Ireland, Italy, Luxembourg, Portugal, and Spain).⁽²⁵⁾ This evidence would suggest that indeed in a number of countries the public sector is attracting the highly skilled to the disadvantage of the private sector.

Table 5: Public wage premium in 2010: regression results by country and by educational attainment

	Low education	Medium education	High education
BG	0.126***	0.124***	-0.397***
CY	0.298***	0.166***	0.207***
CZ	0.093***	0.037	-0.301***
DE	0.245***	0.122***	-0.168***
DK	-0.073***	-0.089***	-0.207***
EE	-0.072*	-0.086**	-0.242***
ES	0.208***	0.166***	0.091***
FI	-0.11***	-0.049***	-0.082***
FR	0.064***	-0.017	-0.101***
GR	0.287***	0.149***	-0.019
HU	-0.035	-0.082**	-0.407***
IE	0.243***	0.175***	0.218***
LT	0.018	0.1**	-0.015
LV	0.008	0.004	-0.203***
NL	0.053**	0.034**	-0.097***
PL	0.162***	0.131***	-0.087**
RO	0.113**	0.17***	-0.422***
SI	0.113***	0.08***	-0.034*
SK	0.06***	-0.025	-0.284***
UK	0.035	-0.044	-0.002
AT	0.038	0.066**	0.046**
BE	0.08**	0.061***	0.134***
IT	0.159***	0.045*	0.1***
LU	0.193***	0.189***	0.216***
MT	0.023	-0.068	-0.024
PT	0.186***	0.082**	0.045**
EU	0.117***	0.065***	-0.066***

(1) Estimation method: OLS. Sample: all EU countries but Sweden. *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively. For AT, BE, IT, LU, MT, PT there is no information on the aggregate "public administration, defence and compulsory social security".

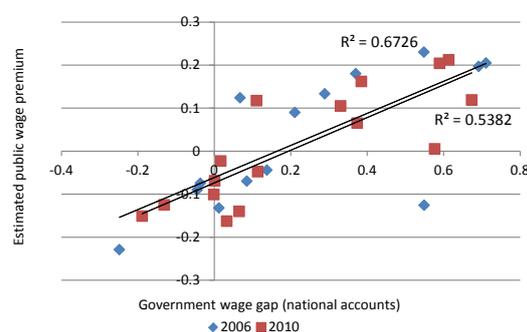
Source: Own estimation based on data from SES.

The estimated wage premium differs, as expected, from the public-private wage gap computed without controlling for individual characteristics, but maintains a strong correlation across countries. Graph 14 compares data on the estimated public premium with the general government-private wage gap (i.e., the simple percentage difference between nominal compensations per employee in government and in the market service sector) as

⁽²⁵⁾ It should be noted however that figures are not fully comparable across countries because in the case of many of them data on "public administration, defence and compulsory social security" is not available (e.g., Austria, Belgium, Italy, Luxembourg, Malta, Portugal).

calculated from national accounts data. It shows that the estimated public wage premium is considerably smaller than the simple wage gap, which confirms that the excess of public over private wages is linked, at least to a certain extent, to composition effects.

Graph 14: Correlation between the estimated public wage premium and the wage gap between government and private wages



Source: Own calculations based on data from OECD and data from SES.

Whilst there is some empirical research on the existence and size of public wage premia in the individual countries, there is comparatively less on their possible determinants. Cross-country correlations are computed between the estimated wage premia and a number of country characteristics to shed light on possible factors that may bear an impact on the premium. The variables that are taken into consideration are: i) rights of bargaining, rights of association and rights of strike in the public sector as defined in Visser (2013); ii) public sector union density; iii) private sector employment protection legislation; and iv) the size of general government as an employer.

High scores on rights of bargaining, association and strike in the public sector as well as in union density in the public sector are taken to indicate high bargaining power for government employees and are expected to be positively related to premia in that sector.

The indicator capturing employment protection legislation taken from the OECD and measuring the strictness of regulation on dismissals for open-ended contracts is likely to be positively related to the public wage premium for a different reason: the higher, the degree of job security provided in

the private sector, the higher the pay required to attract workers in the public sector.

Finally, the size of government as an employer, measured as the ratio of general government employment to the labour force in year 2008, has an a-priori ambiguous relation with the wage premium. On the one hand, a large public sector is more likely to act as a wage leader, being therefore able to set wages that differ from those prevailing in the private sector. On the other hand, the larger the government sector, the higher its monopsonistic power and the bargaining power it has in wage negotiations, and hence the lower the expected wage premium.

Table 6: Cross-country rank correlation between public wage premium and selected country institutions and characteristics

Rights of bargaining	0.133
Rights of association	0.200
Rights of strike	-0.074
Public sector union density	-0.139
Employment protection legislation	0.373*
Public employment to labour force	-0.472*

*: $p < 0.1$ or lower (correlations are calculated using pairwise deletion of observations with missing values). Results based on 26 observation points. Method: Spearman's rank correlation. Variables: Rights of bargaining, rights of association and rights of strike range from 0 (no right) to 3 (full rights", with intermediate values indicating rights with restrictions (Visser, 2013); public sector union density=net union membership as a share of wage and salary earners in the public sector (Visser, 2013); EPL= strictness of regulation on individual and collective dismissals for open-ended contracts (OECD, 2013); public employment to labour force = share of general government employees to total labour force in 2008 (OECD and Eurostat).

Source: Visser (2013) and OECD (2013).

Rank correlation results are shown in Table 6.⁽²⁶⁾ The reference year is 2010 for both the data on the premium and the institutional variables, where available.⁽²⁷⁾ The two indicators summarising right of bargaining and of association in the government sector are positively related with the wage premium as expected, but the relation is non-significant, while for the right-of-strike variable the relation has an unexpected negative sign. Union density in the public sector also appears to be negatively but insignificantly linked to the wage premium, a result that however confirms existing

⁽²⁶⁾ Given the limited number of observations, the interpretation of the results is merely tentative.

⁽²⁷⁾ It should be noted however that institutional variables are relatively time-invariant so that taking averages over a longer period of time including years before 2010 would not affect the ranking of countries.

findings.⁽²⁸⁾ In line with expectations, employment protection legislation delivers a statistically significant positive correlation. Finally, the public premium is negatively related to the importance of general government as an employer, which hints at the possible prevalence of monopsony and of bargaining power effects.

It is likely that the public premium is also related to the type of wage-setting in the government sector. It is expected that the incidence of positive public premia is lower when government wages are set through bargaining than when they are the result of legislative decisions, as defined in Table 1.2. This is because wages are more likely to be aligned to those set in the private sector when determined on the basis of a bargaining process where a multiplicity of actors participate with wage offers and demands linked to outside options and benchmarks defined in the private sector. The evidence seems to partly support this hypothesis. Among non-former-transition EU countries, with relatively more established traditions of autonomous industrial relations, the share of countries with a positive wage premium is 55% for those countries with a prevailing bargaining model, but of 70% for those countries with a prevailing "decision" wage setting model.

⁽²⁸⁾ Giordano et al (2011) analyse wage premia on a sample of euro area countries over 2004-2007 and do not find that they relate to unions' bargaining power.

Box 1: Testing for the public wage premium based on survey-based data

The European Structure of Earnings Survey (SES henceforth) provides survey-based data on hourly earnings in Euros ⁽¹⁾, which are here treated so as to obtain average earnings for individuals that share a set of common characteristics. Individual characteristics include: ownership of the firm or institution, gender, age group, educational attainment, job position, NACE sector group, and type of contract. The survey provides data for the years 2006 and 2010, and contains sample weights that make it comparable to the overall population. As concerns the distinction between the public and the private sector, this micro-dataset provides direct information on whether the surveyed employees work for the public or the private sector, circumventing problems associated with cross-country differences in the definition of the public sector. The SES provides information for EU27. ⁽³⁾

Categories are constructed for each non-binary dimension. For age, three groups are isolated: young workers (between 15 and 29 years of age), middle-age workers (between 30 and 49) and older workers (over 50 years). Levels of educational attainment are equally divided into three categories: lower education comprising workers with primary and secondary education (ISCED codes 0, 1, and 2), middle education for persons with upper secondary and post-secondary non-tertiary education (ISCED codes 3 and 4), and high education comprising individuals with first and second stage tertiary education (ISCED codes 5 and 6). The other classification is about job positions. These are based on the International Standard Classification of Occupations (ISCO) and divided into nine major groups. NACE codes are grouped into three big categories: the first includes mining, manufacturing, industry and construction; the second wholesale and retail trade, accommodation and food services activities; the third refers to the rest of services. Three types of contract are identified, namely permanent, fixed-term and apprentice. The resulting dataset provides for average hourly wages for combination of characteristics (e.g. gender, age group, etc.) reorganizing 107.781.401 individuals surveyed into 22.748 observations, corresponding to each of the combinations of characteristics. ⁽⁴⁾

The dependent variable consists of the average hourly earnings in natural log. The explanatory variables are dummies that refer to the different characteristics of individuals and that are expected to determine earning levels. Dummy variables capture whether the individual is working for the government or the private sector, gender, age group, educational attainment, sector of activity according to NACE codes, type of contract and type of job according to ISCO codes (except "Armed forces" that have been excluded from the analysis). The impact of individual characteristics is tested against a reference category, which is here represented by a male employee, working in the private sector, between 30 and 49 years of age, with secondary education, and on a permanent contract as a technician. The baseline estimation is as follows:

$$w_i = \alpha + \beta \cdot sector_i + \gamma X'_i + \varepsilon_i, \quad (1)$$

where i denotes each of the different combination of characteristics, and the variable "sector" takes the value 1 if the employee works in the public sector and zero otherwise. As the dependent variable enters in logs, the coefficient β can be interpreted as the percentage wage premium in the public sector. This equation is estimated by pooled OLS techniques, with country fixed effects (taking Slovenia as the reference country) and using sample employment weights provided by the SES to make the sample comparable with the total population. Standard errors are robust to heteroskedasticity.

⁽¹⁾ Hourly earnings refer to contracted gross hourly earnings and do not include 13th/14th month payment, bonuses and other annual payments in kind, which are otherwise included in annual earnings. This is a limit of the dataset because it may result in public wage premia being either over- or under-estimated.

⁽³⁾ Sweden is but excluded from the present analysis, as it did not provide information on the type of contract, which limits comparability with other countries.

⁽⁴⁾ Observations with less than ten individuals were discarded.

(Continued on the next page)

Box (continued)

Lower salaries are found for females, young workers, the low-skilled workers, apprentices, and fixed-term contracts, wholesale, retail and food services, workers at an ISCO job category below technician. By contrast, older workers, high educational levels and workers employed in the industry sector enjoy higher remunerations.

Table 1. Wage levels and individual characteristics: regression results, panel, 2010

Dependent variable: average hourly earnings (log)	Coefficient	Standard Error	t-statistic
Public	0.036	0.012	3.0
Gender	-0.174	0.009	-19.6
Young	-0.207	0.009	-21.8
Old	0.045	0.010	4.5
Low education	-0.101	0.009	-10.9
High education	0.168	0.013	12.6
Apprentice	-0.898	0.032	-27.6
Fixed-term contract	-0.141	0.009	-16.5
Industry	0.049	0.010	5.0
Service 1	-0.092	0.013	-7.3
Manager	0.442	0.019	22.8
Professional	0.014	13.520	0.0
Clerical	-0.204	0.010	-20.0
Sales	-0.287	0.016	-17.9
Agriculture	-0.448	0.014	-32.8
Craft	-0.256	0.013	-19.1
Plant	-0.288	0.015	-19.2
Elementary	-0.402	0.020	-20.4
Country fixed effects			
BG	-1.531	0.020	-75.6
CY	0.258	0.021	12.1
CZ	-0.536	0.013	-40.3
DE	0.709	0.015	48.7
DK	1.046	0.032	33.1
EE	-0.680	0.019	-35.0
ES	0.305	0.012	24.6
FI	0.668	0.015	45.6
FR	0.545	0.013	43.1
GR	0.166	0.016	10.3
HU	-0.759	0.018	-41.7
IE	0.812	0.017	48.6
LT	-1.087	0.017	-65.4
LV	-0.931	0.016	-56.7
NL	0.658	0.013	49.0
PL	-0.650	0.021	-31.7
RO	-1.320	0.021	-63.6
SK	-0.655	0.015	-44.0
UK	0.497	0.015	32.3
Constant	2.338	0.017	138.6
No. Obs.	22784		
R ²	0.9416		

Method: OLS (employment-weighted) with country-fixed effects (Slovenia used as reference country) and robust standard errors. Sample: 22784 observations (all EU countries except Sweden); as there is no information on the aggregate "public administration, defence and compulsory social security" in the case of AT, BE, IT, LU, MT, PT, these countries are excluded from the pooled regression. *Source:* Own estimations based on SES.

5. LINKAGES AND INTERACTION BETWEEN GOVERNMENT AND PRIVATE WAGES

5.1. Channels of interactions

The relationship between the two sectoral wages takes multiple shapes and may be driven by market forces and/or by institutional features of the wage setting process in each country. In a nutshell, changes in private wages can affect government wage growth via the following transmission channels:

- Wage bargaining in the private sector has a demonstration effect on public wage setters. Perez and Sanchez (2011) find evidence of signalling by the private sector already in the negotiation phase in France and Germany before the EMU period. Signalling may be motivated by, for example, envy effects (see, e.g., Maffezzoli, 2001; Ardagna 2007).
- Wage bargaining practices may explicitly or implicitly grant wage leadership to the private sector. Under the so-called Scandinavian wage determination model, the private (exposed) sector typically takes the lead and dictates bargaining outcomes to other sectors, including

the public sector (see, for a review, Lindquist and Vilhemsson, 2006 and Friberg, 2007, but also Traxler and Brandl, 2012; Ramskloger, 2012, 2013). Wage bargaining coordination via pattern-setting by the exposed sector is, for example, typical of countries such as Germany and Austria (see, for example, Soskice, 1990).

- There may also be established practices and institutional mechanisms that make public wages responsive to private wage settlements, for example when there is a formal rule for which the growth rate of private wages is automatically applied to public sector wages (see, for evidence on the Netherlands, Hartog and Oosterbeek, 1993).

The interaction can of course go both ways. Changes in government wages may affect private wage growth through a number of channels:

- Wage adjustment in the public sector induces cross-sector labour shifts and a change in the labour supply available to the private sector. As the supply of labour changes, so does the equilibrium wage of the *competitive* private sector.
- Changes in public wages affect the outside option of unionised private sector bargainers, thereby putting pressures on the bargaining process (Afonso and Gomes, 2008), even when public and private employment remain separate and there is no mobility across sectors.
- Adjustment to public wages may be fully compensated in government budgets by changes in labour taxation that alter labour costs in the private sector (Holmlund, 1993; Afonso and Gomes, 2008).⁽²⁹⁾

It is important to stress that co-movements between government and private wages may arise also in absence of direct links, driven by common factors. For example, public wages may be pro-cyclical and move similarly to private wages along

⁽²⁹⁾ However, the spill-over is likely to be mediated by the structure of wage-setting systems. Alesina and Perotti (1997) find that increases in labour taxation do not necessarily lead to higher wage demands by unions in highly centralised bargaining systems, as in such a case wage setters internalise the consequences from higher labour costs on employment.

the cycle.⁽³⁰⁾ Moreover, co-movements in aggregate wage series could be linked to common developments for what concerns the composition of the labour force. For the above reasons, in analysing the interaction between government and private wages, it is important to disentangle direct links from spurious co-movements, related to the action of third variables that have an effect on both wages.

In the analysis of the interplay between government and private wages it is also important to distinguish relations that hold between growth rates and levels. While wage growth in one sector is expected to be affected only temporarily by wage growth in the other sector, wage levels would be affected permanently. In the following, different techniques are used to analyse relations both in growth and in level terms.

5.2. Dynamic interaction between general government and market sector nominal compensations' growth

Co-movement between government and private wages does not necessarily imply causality. Structural Vector Auto-regression (SVAR) models represent a useful framework to estimate the joint dynamic behaviour of wage variables, as they allow analysing whether there is causality and in what direction it runs.

There is a wide and growing literature that has looked at the dynamic interaction between public and private wages using the VAR approach (see, e.g., Demekas and Kontolemis, 2000; Lindquist and Vilhelmsson, 2006; Friberg 2007; Lamo, Perez and Schuknecht, 2012; Perez and Sanchez, 2011). Some papers adopt a cointegrated VAR framework (VECM), which builds on the existence of a long-run relation between wage levels in the different sectors. Results differ not only depending on the country analysed and the specific sample, but also depending on the methodology adopted, notably the specification of the VAR.

An issue which has been analysed in depth in these studies is the presence of government versus private sector leadership in wage determination.

⁽³⁰⁾ For instance, Lane (2003) and Lamo et al (2007) find that public wages are pro-cyclical because of discretionary fiscal expansion in good times.

⁽³¹⁾ Determining whether government or private sector leadership prevails has relevance both for fiscal policy and for labour market outcomes. While government leadership may imply a decoupling of private sector wages from productivity with implications for competitiveness, private sector leadership may imply limited control of the government on the wages it pays, which are determined in the long-term by drivers originating in the private sector.

A few studies look simultaneously at groups of countries adopting a homogenous methodology. Lamo, Perez and Schuknecht (2012) estimate a VECM model on 18 OECD countries over the 1970-2006 period. The authors find long-run wage leadership by the private sector in the US, Canada, the UK, Sweden, Austria, Greece, Italy, Spain, and Portugal. The public sector exercises long-run leadership in Ireland, Norway, Denmark, Finland, Germany, France, the Netherlands and Belgium. In the short-run, private wages take the lead in Denmark, Finland, Germany, France, the Netherlands, and Belgium. Short-run public sector leadership is manifest only in Spain and the UK.

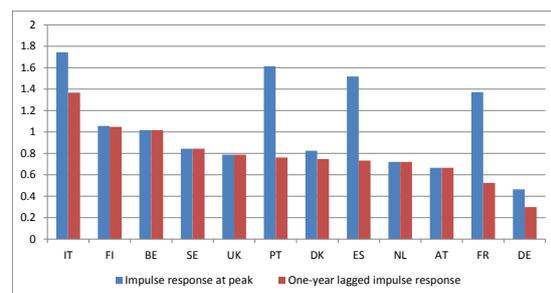
Along similar lines, Perez and Sanchez (2011) use a standard VAR framework to identify intra-annual interactions between private and public wages. ⁽³²⁾ The authors find strong evidence of signalling effects across the two sectors that are especially strong in France and Germany in the pre-EMU period.

The analysis described in Box 2 focuses on the short-run relations between wage growth in the government and in the private sector by applying the same SVAR approach to all EU countries for

which sufficiently long annual time series are available. Compared with existing analyses, the sample includes post-crisis years, as it ranges from 1980 to 2012. The SVAR model permits to capture the interactions among the main variables linked to wage growth. Government and private nominal wage growth are assumed to be related not only among themselves but also with inflation and the output gap, chosen as measure of cyclical conditions. All shocks are assumed to have only transitory effects, which permits to model a richer set of interactions among macroeconomic variables.

The identifying restrictions imposed on the VAR allow interpreting the shocks in the model and computing the response of wages to each type of shock. Following standard assumptions in the literature on fiscal policy (see, e.g., Fatas and Mihov, 2001; Blanchard and Perotti, 2002), it is assumed that government wages are predetermined, namely that they are not directly nor simultaneously affected by other macroeconomic variables, while reacting with lags.

Graph 15: Response of private nominal compensations growth to a 1% shock in government sector compensations' growth



(1)Based on exercise described in Box 1.2. The results are but not statistically significant for DK (response at peak only), France (response at peak only) and DE (one-year lagged response only).

Source: Own calculations.

Graph 15 reproduces the response of private compensations to a 1 per cent shock in general government compensations. The graph distinguishes between the response at peak and the response 1 year from the occurrence of the shock. In many cases, the peak effect and the effect after 1 year tend to coincide, indicating that the effects from the shock decay after the first year. Only in France, Italy, Spain, and Portugal, the effect at

⁽³¹⁾ Wage leadership is generally identified in the short run by looking at Granger causation, and in the long-term by looking at the adjustment to the long-term relation (the adjustment being fully achieved by the wage changes in the sector without leadership as determined by Granger causation). The majority of these studies focus on single countries. For the Swedish case, evidence of wage leadership by the private sector is reported in Lindquist and Vilhelmsson (2006), while Freiberg (2007) finds causation from the private to the government sector but no wage leadership over the longer term.

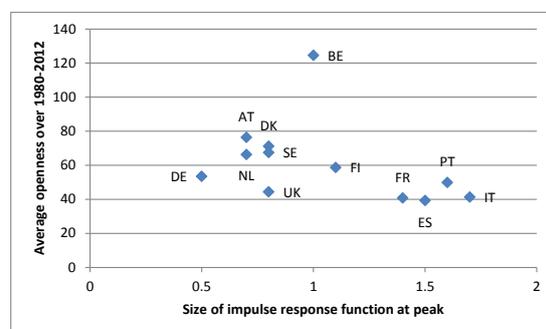
⁽³²⁾ The theoretical motivation derives from models such as Maffezzoli (2001) and Ardagna (2007), where it is suggested that spillovers between government and private sector wages occur as the outcome of the behaviour of sectoral unions with objectives defined not only in terms of absolute but also of relative wages.

peak is stronger than short-term effects. The greatest short-term response is estimated for Italy, followed by Finland and Belgium. The strongest at-peak reaction are found in Italy, Portugal, Spain and France, with private wages reacting by 1.7, 1.6, 1.5 and 1.4 per cent respectively in the face of a 1 per cent shock in general government compensations.

It should be noted however that the analysis is based on a number of identifying restrictions and that the SVAR framework does not allow accounting for non-time-variant variables such as actual institutional features of wage-setting and wage leadership practices in each country. By way of example, wage growth in Germany is highly coordinated thanks to the fact that the export sector is a pattern setter for all other sectors. There is thus no such thing as wage leadership by the public sector. Moreover, the culture of fiscal discipline and the existence of stringent fiscal rules is a further guarantee that public employees do not free-ride by asking for excessive wage increases (Soskice, 2007). The results from the SVAR are not necessarily in contradiction with this institutional set-up. First, the one-year lagged impulse response for Germany is insignificant. Second, the at-peak response is relatively weak compared with other countries and possibly also driven by second round effects via inflation; moreover, the impulse response of manufacturing wages does not necessarily imply changes in cost competitiveness (i.e., a change in the real effective exchange rate).

Existing analyses are relatively limited. Lamo, Perez and Schuknecht (2012) and Lamo, Perez and Sanchez-Fuentes (2013) find that public wages exert a stronger impact on private wages when the government is involved in the bargaining process, for high levels of bargaining centralization and coordination and for high levels of union membership, while it is weaker in cases of high openness to trade and in the presence of wage indexation.

Graph 16: Correlation between the peak response of private to government wages and trade openness



Source: Own calculations based on DG ECFIN AMECO Database and results from exercise described in Box 1.2

Graph 16 displays a cross-country scatterplot of the peak response of private sector wages to government wage shocks with the average degree of openness over the period 1980-2012.⁽³³⁾ The scatterplot broadly confirms the expectation that the response of private wages to a rise in the government wage is weaker in countries that are highly open to international trade.

The most persuasive explanation for such evidence is that in highly open economies not only prices but also labour costs in the private sector are less likely to deviate considerably from those prevailing on international markets.

⁽³³⁾ Openness is measured as the sum of exports and imports as a share of GDP.

Box 2: Private and government wage interactions over the business cycle

This box analyses the short-run interdependencies between private and government wages in a Structural Vector Autoregression (SVAR) framework.

In VAR models, each variable is assumed to be determined by its own past values and the past values of all other variables in the system, so that shocks in each variable produce effects on all other variables over time. For the purpose of this analysis the model is made of 4 variables: the growth rate of nominal compensation per employees of the government and the private sector, the growth of prices, and the output gap. All these variables are likely to be stationary over sufficiently long time periods, and are treated as such in the present analysis, which allows estimating the VAR with standard techniques. It also means that the response to shocks is expected to fade away over time.

The economic interpretation of the impulse response of each variable to shocks requires imposing restrictions on the system: in absence of such restrictions it would be impossible to identify the shocks, namely to pin down whether a particular shock originates, from government wages, private wages, price inflation, or the output gap. Following standard assumptions in the literature on fiscal policy shocks (e.g., Fatas and Mihov, 2001; Blanchard and Perotti, 2002), government sector wages are treated as predetermined with respect to macroeconomic shocks, meaning that spending on government wages is undertaken for reasons different from a reaction to macroeconomic conditions (the output gap, wage or price inflation), although variations in these variables can reverberate on government wages with lags. The output gap, private wages, and prices are assumed to potentially respond instead to the other variables also without lags. This corresponds for instance to the case of wage setters in the private sector updating their decisions as soon as government wages are changed or inflation picks up.

Formally the identification strategy described above corresponds to imposing structure on the residuals of the reduced form of the VAR by means of a Choleski factorization, which introduces a causal ordering in the contemporaneous relationship between the variables. In this case, reduced form of the VAR can be represented as follows,

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_t^{pub} \\ e_t^{ogap} \\ e_t^{priv} \\ e_t^{cpi} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{bmatrix} \begin{bmatrix} u_t^{pub} \\ u_t^{ogap} \\ u_t^{priv} \\ u_t^{cpi} \end{bmatrix}$$

Where e_t are shocks to the VAR equations, u_t are the uncorrelated structural shocks to each of the variables, *pub* denotes government wages, *priv* private wages, *cpi* the consumer price index, and *ogap* the output gap..

This representation imposes the following relationship between the variables:

- the consumer price index responds contemporaneously to a price level shock, to public and private wages shock and to an aggregate demand shock;
- private wages responds contemporaneously to a public wages shock and to an aggregate demand shock;
- the output gap responds contemporaneously to a public wages shock;
- government wages are supposed to respond to other variables only with lags.

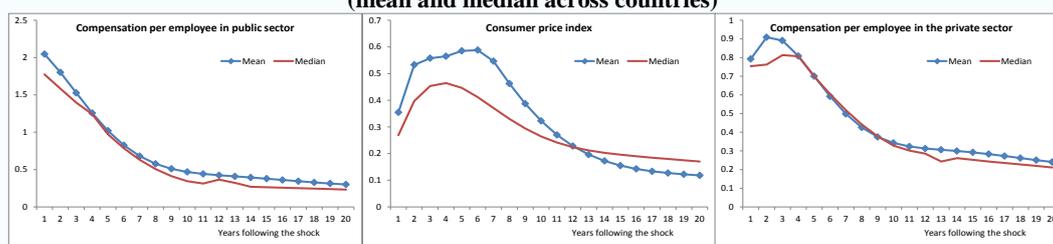
The SVAR is estimated for 12 EU countries using annual data. The countries covered are those for which sufficiently long time series are available: Austria (AT), Belgium (BE), Germany (DE), Denmark (DK),

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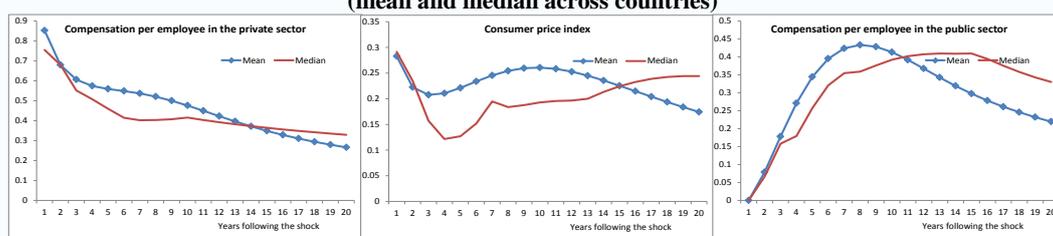
Box (continued)

Spain (ES), Finland (FI), France (FR), the United Kingdom (UK), Italy (IT), the Netherlands (NL), Portugal (PT), and Sweden (SE). The sample period is 1980-2012.¹

**Graph 1: Impulse response to a 1% increase in government sector wages
(mean and median across countries)**



**Graph 2: Impulse response to a 1% increase in private sector wages
(mean and median across countries)**



The SVAR estimated for each country is used to simulate the dynamic response of each endogenous variable to a one-time shock. Graph 1 shows the outcome that corresponds with the mean and the median impulse responses, while Table 1 reports the country specific responses after 1 year and the maximum response. The main findings are as follows:

- The response of private wages to a government wage shock is large and persistent. A 1% increase in government wages raises private wages by almost 1% on average. The response of private wages to a government wage shock is strong in Italy, Portugal and Spain, while it is relatively weak in Austria, Germany, the Netherlands. The increase of private wages following a government wage shock is persistent in France, Belgium, and Italy and fade out rather quickly in Austria, Germany, Finland, UK, and Sweden.
- The average response of government wages to a 1% positive shock in private wages is much lower (about 0.45%). With the exception of Austria, Belgium, Sweden, and the UK, government wages do not respond statistically significantly to a private wage shock.
- Consistently with the literature on fiscal SVAR (e.g., Fatas and Mihov, 2001; Blanchard and Perotti, 2002), a considerable persistence is found in the response of government wages to its own shocks. The dynamic response of government wages to a government wage shock varies considerably across

¹ General government compensations per employee are constructed from OECD as the ratio of government final wage consumption expenditure to general government employment, with the exception of data for DE where the compensation per employee is calculated as the ratio of compensations of employees to total number of wage and salary earners for the section "other services" in the Statistical Classification of Economic Activities in the European Community (NACE Rev.2). All other variables are taken from the DG ECFIN AMECO Database. Private compensations per employee are constructed as the ratio of compensations of employees to total number of wage and salary earners for the section "business economy" in the Statistical Classification of Economic Activities in the European Community (NACE Rev.2). The price level is measured by the Harmonized Consumer Price Index (HCPI) and the series has been extended backward by extrapolation using the growth rate of the national Consumer Price Index.

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Box (continued)

- countries. After one year, the response is the largest in the Portugal, Spain and Italy and the lowest in Germany and Austria.
- A government wage shock is inflationary and with an effect on CPI more persistent than that of a private wage shock. The maximum effect in the price level of about 0.6%-0.7% pp is achieved about 4-5 years after a public wage shock, and is of an order of magnitude similar to what found in the literature (e.g., Fatas and Mihov, 2001).

Table 1: Impulse responses to public and private wage shock

Response of public sector wages to a 1% shock to public sector wages												
Lags	AT	BE	DE	DK	ES	FI	FR	UK	IT	NL	PT	SE
1	1.1 *	1.8 *	0.8 *	1.8 *	2.9 *	1.6 *	1.3 *	2.1 *	2.9 *	1.6 *	4.6 *	2.0 *
Max	1.1 *	1.8 *	0.8 *	1.8 *	2.9 *	1.6 *	1.7 *	2.1 *	2.9 *	1.6 *	4.6 *	2.0 *
Lag where IRF is non significant	4	8	3	5	4	5	15	4	6	6	4	3
Response of consumer prices to 1% shock to public sector wages												
Lags	AT	BE	DE	DK	ES	FI	FR	UK	IT	NL	PT	SE
1	0.2	0.5 *	-0.1	0.3 *	0.4 *	0.3	0.1	0.8 *	0.4 *	0.5 *	-0.8	0.6 *
Max	0.2	0.7 *	-0.1	0.6 *	1.1 *	0.5 *	0.9 *	1.0 *	1.4 *	0.6 *	-0.1	0.6 *
Lag where IRF is non significant	1	16	1	7	5	5	20	8	10	6	2	2
Response of private wages to 1% shock to public sector wages												
Lags	AT	BE	DE	DK	ES	FI	FR	UK	IT	NL	PT	SE
1	0.7 *	1.0 *	0.3	0.7 *	0.7 *	1.0 *	0.5 *	0.8 *	1.4 *	0.7 *	0.8 *	0.8 *
Max	0.7 *	1.0 *	0.5 *	0.8	1.5 *	1.1 *	1.4	0.8 *	1.7 *	0.7 *	1.6 *	0.8 *
Lag where IRF is non significant	3	13	3	6	5	3	19	3	8	4	5	2
Response of private wages to 1% shock to private sector wages												
Lags	AT	BE	DE	DK	ES	FI	FR	UK	IT	NL	PT	SE
1	0.7 *	0.7 *	0.4 *	0.6 *	0.8 *	0.9 *	0.6 *	1.1 *	0.7 *	0.9 *	1.6 *	1.2 *
Max	1.0	0.7 *	0.5	0.6 *	0.8 *	1.4 *	0.6	1.1 *	0.7 *	0.9 *	1.6 *	1.6 *
Lag where IRF is non significant	10	7	2	3	3	5	5	7	3	4	4	14
Response of consumer prices to 1% shock to private sector wages												
Lags	AT	BE	DE	DK	ES	FI	FR	UK	IT	NL	PT	SE
1	0.2	0.4 *	0.5 *	-0.1	0.4	0.5 *	0.4 *	0.2	0.6 *	0.2	0	0.2
Max	0.9 *	0.4 *	0.7	0.2	0.4	0.7	0.4 *	0.4	0.6 *	0.2	0	0.6
Lag where IRF is non significant	9	:	2	1	1	4	6	1	3	1	1	1
Response of public wages to 1% shock to private sector wages												
Lags	AT	BE	DE	DK	ES	FI	FR	UK	IT	NL	PT	SE
1	0	0	0	0	0	0	0	0	0	0	0	0
Max	0.8 *	0.8 *	0.5	0.4	0.3	1.4	0	1.0	0	0.3	0	1.5 *
Lag where IRF is non significant	10	10	1	1	1	1	1	6	1	1	:	16

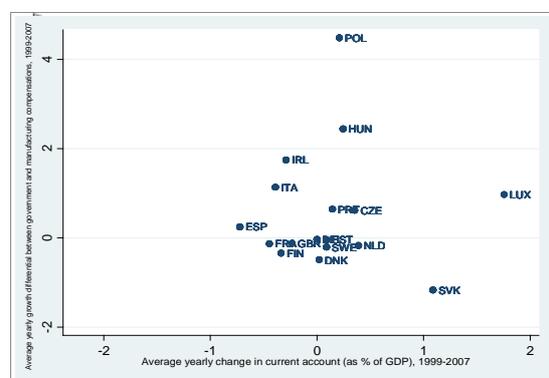
- **Note:** Impulses response function based on SVAR estimated for each country and Choleski identification indicates that the impulse response function (IRF) does not die out.

5.3. The influence of government wages on labour costs in the tradable sector: short and long-run effects

The relation between government and private wages is often analysed with reference to the possible implications for labour cost conditions in the tradable sector, competitiveness, and external balance (e.g., Alesina and Perotti, 1997; Alesina et al, 2002; Ardagna, 2004).

Government wage dynamics in specific euro-area countries have been identified among the factors underlying competitiveness losses in the pre-EMU period (e.g., Blanchard, 2007). Wage growth in the government sector could have played a role also in the accumulation of external imbalances in EMU years, before the crisis. The scatterplot in Graph 17 relates changes in the current account balance and the difference in the growth rate between the compensations per employee in the government and in the manufacturing sector in the period between the establishment of EMU and the crisis. It appears that deteriorations in current account balances were somewhat more marked in countries where government wages were growing at faster pace than manufacturing wages. Although such a correlation should not be interpreted as causation, it speaks in favour of a possible link between relative wage growth and the accumulation of macroeconomic imbalances.

Graph 17: Changes in current account balances and wage growth difference between the government and manufacturing sector, 1999-2007



Source: Own calculations based on OECD and DG ECFIN AMECO Database

With a view to analyse more systematically the short and long-run effects of government wages on

the tradable sector, a cointegration approach is developed linking manufacturing wages to a number of determinants, including compensations in the government sector. The long-run relation is estimated in levels using dynamic ordinary least squares (DOLS), while the Error Correction Mechanism (ECM) representation allows estimating the short-run relation between wage growth, shocks in explanatory variables, and the deviation from the dynamic long-run relation.

Estimates are performed on the whole sample of countries for which data are available over the 1980-2013 period. This has not only the advantage of gaining degrees of freedom and of increasing robustness of results, but allows investigating the role of framework conditions in driving the impact of government on manufacturing wages by means of opportune sample splits. Box 3 illustrates the estimation methodology and discusses results in detail.

Over the whole sample, it is found that a large share of the variance of manufacturing compensations are explained by variables usually employed in the estimation of wage equations (i.e., the price level, labour productivity, the unemployment rate), but also by government compensations. Moreover, the significant and negative value for the error correction term in the ECM equation supports the hypothesis of cointegration among the variables, namely that there is a stable long-run relation among manufacturing and government wages, and the remaining explanatory variables; it also suggests that deviations from such a long-term relation are only temporary and get automatically corrected.⁽³⁴⁾

Government wages appear to exert a statistically significant effect over manufacturing wages both in the long and the short run. The elasticity of manufacturing wages with respect to government wages is estimated to be in the order of 0.3-0.4, a result broadly in line with the one obtained in analogous studies (e.g., Afonso and Gomes, 2008).⁽³⁵⁾

⁽³⁴⁾ It is also found that the reaction of (real) manufacturing wages to government wages is symmetric insofar as it is unaffected by the fact that government wages may either increase or decrease.

⁽³⁵⁾ The size of the short-run effects of government on manufacturing wages is different from the one estimated

Box 3: The long-run relation between manufacturing and general government compensations per employee: size and institutions matter

The long-run relationship between manufacturing and government wages is analysed in a panel cointegration framework on an unbalanced panel of the 17 EU countries over the 1980-2013 period. ⁽¹⁾ The long-run relation should be interpreted as an equilibrium rather than a causal relation.

The long-run wage equation is specified as:

$$\ln w_{it} = \alpha_i + \beta_1 \ln wp_{it} + \beta_2 \ln pr_{it} + \beta_3 u_{it} + \beta_4 \ln cpi_{it} + \varepsilon_{it} \quad (1)$$

where i and t index country and time respectively, w denotes the level of nominal compensation per employee in the manufacturing sector; wp is the level of nominal compensation per general government employee; pr is real value added per person employed in the manufacturing sector; u is the unemployment rate; cpi is the consumer price index, and ε is the error term. ⁽²⁾ All variables are in logs except for the unemployment rate. Compensations in the manufacturing sector are expected to be positively related to government wages, prices and labour productivity and negatively related to unemployment. Cointegration is tested using dynamic ordinary least squares (DOLS) with one lag and one lead for each regressor and fixed country effects. ⁽³⁾

Given equation (1), the short-run (error-correction) wage equation is specified as follows:

$$\Delta \ln w_{it} = \delta_i + \theta_1 \Delta \ln wp_{it} + \theta_2 \Delta \ln pr_{it} + \theta_3 \Delta u_{it} + \theta_4 \Delta \ln cpi_{it} + \gamma \hat{\varepsilon}_{it-1} + \varepsilon_{it} \quad (2)$$

where $\hat{\varepsilon}$ is the lagged error correction term.

Table 1 shows the results of the long-run (Column 1) and short-run (error-correction) wage equation (Column 2) estimated on the whole sample. With the exception of the unemployment rate, all the variables exhibit the expected sign and are statistically significant. The ECM equation shows that deviations from the long term relation are corrected over time (as indicated by the negative and significant coefficient of the error correction term), which is supportive of co-integration among the variables. Moreover, the short-term response of manufacturing wage growth has the expected sign for all the variables and is significant also for the unemployment rate. It is found that every 1 per cent increase in general government compensations is associated, in the long-run, with a 0.4 per cent increase in manufacturing compensations. Short-run effects are slightly weaker at almost 0.25 per cent.

It is assumed that the greater the importance of the government sector as an employer, the more likely that changes to government wages affect average conditions on the market in the presence of cross-sector mobility. In order to test for the operation of this market-based channel, the EU sample is split in two groups: countries in which the average share of government to total employment is above the whole sample's median and countries where it is below the median. Table 2 provides results for the two groups. It is found that manufacturing and government compensations share a significant long-run relationship especially in large government sectors: for each 1 per cent rise in government wages, manufacturing compensations grow by 0.7 when the government is a large employer, but by only 0.2 per cent when it is a small employer.

It is possible that the wage setting modality in the public sector matters for the relationship of manufacturing with government wages. To test for this hypothesis, the sample is split between countries where government wage setting takes place via collective bargaining and where government wages are set by legislative decisions. Countries are classified based on the predominant wage determination regime, as defined in Table 2. Table 3 displays the results. Whilst there is no major difference across the two regimes in the short-run,

⁽¹⁾ Austria, Bulgaria, Croatia, Cyprus, Germany, Greece, Latvia, Lithuania, Malta, Romania, and Slovenia are not included in the sample because OECD data on general government compensations are unavailable for 1980-2012.

⁽²⁾ Nominal compensations per employee in the manufacturing sector are calculated as the ratio of total compensations to manufacturing employment; nominal compensations per employee in the general government are calculated as the ratio of government wage consumption expenditures to government employment; productivity is gross value added at 2005 prices per person employed; the consumer price index is the national consumer price index for all times (2005=100). The data source is the DG ECFIN AMECO Database, except for general government compensations per employee, which are taken from the OECD.

⁽³⁾ Fixed effects are necessary because some variables are expressed as index numbers and are thus not comparable across countries and because of the need to control for time-invariant country-specific factors.

(Continued on the next page)

two empirical exercises are based on different assumptions and their results are thus not comparable.

Box (continued)

manufacturing wages appear to be considerably less reactive to productivity over the long-run in countries where public wages are set by the government. This result could be linked to the fact that public sector wages set unilaterally by the government are less likely to reflect market forces, and thus more likely to weaken the link between manufacturing wages and labour productivity.

Table 1: Long-run and short-run relation between manufacturing and general government compensations per employee, EU countries 1980-2013

	(1)	(2)
	Dynamic long-run relation	Error Correction Model
Dependent variable: log of manufacturing compensation per employee, level (long-run relation) and change (ECM)		
Δ log government compensations p.e.		0.249*** [7.117]
Δ log productivity in manufacturing		0.188*** [5.426]
Δ unemployment rate		-0.00162* [-1.578]
Δ log consumer price index		0.693*** [19.51]
Log of consumer price index	0.687*** [9.410]	
Log of government compensations p.e.	0.435*** [7.968]	
Log of productivity in manufacturing	0.209*** [9.004]	
Unemployment rate	0.0057*** [3.421]	
Error correction term		-0.122*** [-3.140]
Constant	-1.087*** [-7.009]	0.00715*** [3.273]
Observations	407	407
R-squared		0.631
Number of countries	17	17

Robust t-statistics in brackets: *** p<0.01, ** p<0.05, * p<0.1

Estimation method: dynamic OLS with fixed effects and Newey West standard errors and ECM with standard errors robust with respect to heteroskedasticity and non-independence within country clusters. Sample: EU countries, except AT, BG, CY, DE, EL, HR, LT, LV, MT, RO, SI.

Table 2: Long-run and short-run relation between manufacturing and government compensations per employee, conditional on the size of the government sector, EU countries 1980-2013

	(1)	(2)	(3)	(4)
	Dynamic long-run relation		Error Correction Model	
	Large government sector	Small government sector	Large government sector	Small government sector
Dependent variable: log of manufacturing compensation per employee, level (long-run relation) and change (ECM)				
Δ log government compensations p.e.			0.214*** [4.186]	0.288*** [8.236]
Δ log productivity in manufacturing			0.193*** [4.037]	0.178*** [3.411]
Δ unemployment rate			-0.00193** [-2.456]	-0.00137 [-1.177]

(Continued on the next page)

Box (continued)

Δ log consumer price index			0.638*** [9.429]	0.709*** [17.90]
Log of consumer price index	0.416*** [4.695]	0.938*** [11.09]		
Log of government compensations p.e.	0.679*** [10.65]	0.204*** [3.706]		
Log of productivity in manufacturing	0.172*** [5.724]	0.214*** [5.181]		
Unemployment rate	0.00983*** [5.592]	0.00318 [1.436]		
Error correction term			-0.176** [-3.022]	-0.150** [-2.401]
Constant	-1.018*** [-6.271]	-3.082*** [-11.37]	0.0128*** [4.651]	0.00308 [0.995]
Observations	193	214	193	214
R-squared			0.514	0.740
Number of countries	8	9	8	9

Robust t-statistics in brackets: *** p<0.01, ** p<0.05, * p<0.1

Estimation method: dynamic OLS with fixed effects and Newey West standard errors and ECM with standard errors robust with respect to heteroskedasticity and non-independence within country clusters. Sample: EU countries, except AT, BG, CY, DE, EL, HR, LT, LV, MT, RO, SI.

Table 3: Long-run and short-run relation between manufacturing and government compensations per employee, conditional on government wage setting model, EU countries 1980-2013

	(1)		(2)		(3)		(4)	
	Dynamic long-run relation		Error Correction Model		Bargaining		Decision	
	Bargaining		Decision		Bargaining		Decision	
Dependent variable: manufacturing compensations, level and change (log)								
Δ government compensations p.e.					0.360*** [6.745]		0.215*** [5.980]	
Δ productivity in manufacturing					0.156** [3.324]		0.218*** [4.935]	
Δ unemployment rate					-0.00210* [-2.199]		-0.00155 [-1.405]	
Δ consumer price index					0.629*** [6.781]		0.705*** [24.51]	
Consumer price index	0.458*** [5.945]	0.705*** [7.019]						
Government compensations p.e.	0.528*** [9.669]	0.481*** [5.083]						
Productivity in manufacturing	0.241*** [11.28]	0.0941** [2.191]						
Unemployment rate	0.00676*** [3.875]	0.00166 [0.621]						
Error correction term					-0.146*** [-3.670]		-0.142** [-2.891]	
Constant	-0.753*** [-5.667]	-2.367*** [-6.757]			0.00593* [1.905]		0.00639** [2.456]	
Observations	224	183			224		183	
R-squared					0.637		0.643	
Number of countries	8	9			8		9	

Robust t-statistics in brackets: *** p<0.01, ** p<0.05, * p<0.1

Estimation method: dynamic OLS with fixed effects and Newey West standard errors and ECM with standard errors robust with respect to heteroskedasticity and non-independence within country clusters. Sample: EU countries, except AT, BG, CY, DE, EL, HR, LT, LV, MT, RO, SI.

The relation goes both ways but when testing the relationship in the other direction it is found that the long-run elasticity of government wages with respect to manufacturing wages is of 0.8, thus much stronger than the elasticity of manufacturing with respect to general government wages.⁽³⁶⁾ This seems consistent with wage leadership by the export sector, as in the so-called Scandinavian model of inflation, which is in fact more common than leadership by the government sector, as found also in the existing literature (Perez and Sanchez, 2011).

By splitting the sample in two groups, in such a way as to isolate countries with a relatively large government sector from those where the government accounts for a smaller share of employment, it is found that in the long-run government compensations exert an impact on manufacturing labour costs that is considerably larger where the government sector is above the sample's median (i.e., the elasticity being 0.7 versus 0.2 estimated for countries with a relatively small government sector). In the short-run, instead, there is no distinctive difference between a large and a small government employer (i.e., elasticity in the order of 0.2-0.3 in both cases).

Results show that the long-run effect of government wages in countries characterised by a "decision" system is marginally stronger than that observed in countries with wage setting modalities corresponding to a bargaining model, while no meaningful difference is found in the short term. It is also to notice the weaker relation between manufacturing wages and productivity in countries characterised by a "decision" wage setting system, which is probably linked to the fact that in such a case the influence of government on manufacturing wages is more likely to induce a certain degree of misalignment between compensations in the manufacturing sector and productivity.

⁽³⁶⁾ Results of the response of government to manufacturing wage levels and growth rates are not shown. The wage equation include general government compensations per employee as dependent variable and, as regressors, compensations per employee in manufacturing, a proxy for labour productivity in the government sector, the consumer price index and the unemployment rate.

5.4. Government compensations and fiscal consolidation episodes

Most euro area countries have been recently engaged in an effort to reduce and rationalise the public wage bill. As compared with previous episodes of fiscal consolidations, where the reduction in the wage bill was mainly achieved by means of freezes or a reduced growth rate in hiring and compensations, the impact of the crisis on the state of public finances in a number of EU countries required more drastic measures.

Between 2008 and 2013, freezes and cuts in the government wage bill were widespread across the EU. In addition to freezes and reduction in the real value of government compensations, nominal cuts in earnings received by government employees took place especially in Croatia, Estonia, Ireland, Greece, Hungary, Latvia, Lithuania, Portugal, Romania, Spain. In some countries, nominal cuts concerned only selected categories of employees. In several instances, the cuts were concentrated on specific indemnities or benefits (including bonuses for Christmas and other holydays); in some countries, the cuts were implemented in a progressive fashion, with stronger cuts for higher-income employees.

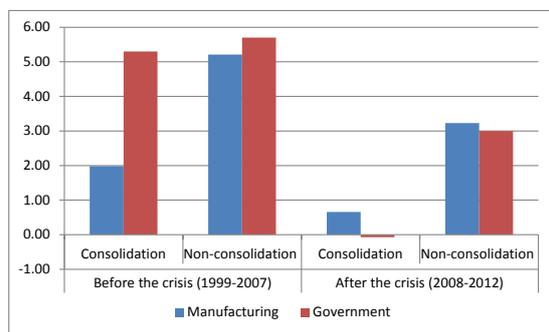
The exceptional public finance circumstances have coincided in some instances with a change in established wage setting practices, especially with increased reliance on unilateral action by the government including in countries with established social dialogue and collective bargaining traditions (e.g., European Commission, 2013).

The emergency measures taken by EU governments to contain government wage expenditure after the crisis have also fallen more extensively and effectively on wage rather than on employment levels compared with analogous consolidation episodes before the crisis.

Graph 18 reports the average annual percentage change in government and manufacturing compensations per employee before and after the crisis, under alternative fiscal scenarios, i.e., with and without presence of major fiscal consolidation episodes. By convention, episodes of fiscal consolidation are defined as those where the structural primary balance improves by at least 1.5 per cent of GDP in 1 year or at least 3 per cent in 3

years, with a minimum of 0.5 per cent improvement in each year. Such a definition permits to isolate both cases of "cold-shower" consolidation episodes and more gradual consolidation episodes.

Graph 18: Average annual percentage change in government and manufacturing compensations under alternative fiscal conditions, EU countries, 1999-2007 and 2008-2012



(1)Fiscal consolidations are defined as a change in the structural balance of at least 1.5 % of GDP in one year or of at least 3 % of GDP over a three year period, with at least 0.5% improvement in each year. Sample: EU countries (excluding AT, BG, CY, DE, EL, LT, LV, MT, RO, SI).
Source: Own calculations based on OECD and DG ECFIN AMECO Database

The graph shows that before the crisis general government compensations have generally been growing faster than compensations in the manufacturing, independently of whether countries were going through fiscal consolidation or not. Conversely, starting with the 2008-2009 crisis, compensations per employee in the government sector grew at a slower pace as compared with those in the manufacturing sector, most notably during fiscal consolidation episodes.

It is likely that under conditions of fiscal distress not only wage setting practices in the government sector are affected, but that also the interplay between government and private sector wages is altered, an aspect that is neglected in the previous analyses.

With a view to shed light on this possibility, Table 7 displays correlations between government wage growth and manufacturing wage growth under alternative fiscal conditions, and differentiating between countries with large and small public sectors; the underlying assumption that the size of

government would matter especially during fiscal consolidation.

Table 7: Correlation between government and manufacturing compensations' growth under alternative fiscal conditions, EU 1980-2012

Consolidation	0.3993*
Non-consolidation	0.8205*
Consolidation	
Large public employer	0.8100*
Small public employer	0.1986
Non-consolidation	
Large public employer	0.7950*
Small public employer	0.8291*

(1) Pearson correlation coefficients. Sample: EU countries (excluding AT, BG, CY, DE, EL, LT, LV, MT, RO, SI) over 1980-2012 (1995-2012 in the case of CZ, EE, HU, SK). Fiscal consolidations are defined as a change in the structural balance of at least 1.5 % of GDP in one year or of at least 3 % of GDP over a three year period, with at least 0.5% improvement in each year. For the years where structural balance data are not available in the AMECO database, the primary cyclically-adjusted budget balance is used. Countries are split according to their government size on the basis of the average share of government over total employment (countries with an average value above the median being classified with a large government sector).
Source: Own elaboration based on data from OECD and Devries et al (2011).

In line with expectations, the evidence suggests that government and manufacturing wages are less closely correlated in periods where major consolidations take place. This is easily explained by the fact that during consolidations government wage dynamics are mainly dictated by the objective of reducing government deficits, and therefore less likely to co-move with those of private wages, which instead would be rather driven by market forces. However, the evidence also shows that in countries with a relatively large government sector the correlation remains strong also during episodes of fiscal consolidation. This finding corroborates and better qualifies the previous evidence that the repercussions of government wages to the tradable sector are stronger in countries where the government employs a large fraction of the labour force.

6. CONCLUSIONS

A proper understanding of the interactions between government wages and labour market conditions in the private sector is currently of high relevance in the EU, as a number of Member States are facing the challenge of redressing public finances, while at the same time rebalancing their economies, and dealing with rising unemployment.

This paper has reviewed wage setting practices in the government sector in the EU, has analysed wage differentials between government and private sector occupations, and investigated the dynamic interactions between public and private sector wages.

A number of relevant findings from the analysis can be summarised as follows:

- Wage setting institutions and practices in the government sector vary considerably across the EU along several dimensions, including the presence, scope and breadth of collective bargaining, the degree of centralization, the rights of governments and the modes of their representation, and union density. A key distinction is between countries in which government wages are mostly set by legislative decision and those where they are set by collective bargaining. While Eastern European and some Southern European countries tend to follow under the former category, Anglo-Saxon, Nordic and Continental European countries plus Italy belong to the latter.
- Average compensations per employee in the government sector are normally higher than in the private sector because the composition of employment is characterised by a higher incidence of high-skill employees. Even after controlling for the composition of employment, an hourly wage premium for the public sector is nonetheless observed in some countries (i.e., Cyprus, Ireland, Luxembourg, Spain, Portugal, Belgium Italy, while negative public wage premia are generally observed in Eastern European countries). Still, the results refer to 2010 and may not incorporate the effects of the cuts introduced in a number of EU countries over 2011-2013.
- Correlation analysis indicates that the public wage premium is linked to labour market institutions (e.g., job security in the private sector as measured by EPL indexes), possibly because higher compensations are needed to make public employment attractive when private employment is strongly protected. It also appears that wage premia are more moderate in countries where the government sector employs a relatively large share of the labour force, most likely in light of the stronger bargaining power of the public employer leader, being therefore able to set.
- SVAR analysis permits to quantify the short-term interactions between government and private wage dynamics and to identify potential direct and indirect market-based channels of transmission. Results indicate that while private wages normally exhibit a significant response to government wages, government wages are much less reactive to shocks in private sector wages.. The impact of government wage shocks on private sector compensations is estimated to be strong especially in Italy, Portugal, Spain, and France.
- A negative correlation is observed across a number of EU countries between the response of private wages to government wage shocks and the extent of trade openness, corroborating the view that high exposure to trade reduces the scope for deviations of labour costs from those of foreign competitors, which raises the resilience of private sector wages to shocks originating from the government sector in countries in which there is not an explicit practice of wage leadership exercised by the private (exposed) sector.
- Spillovers originating from strong dynamics in the wages paid in the non-tradable sector, notably the government sector, have been mentioned among the drivers of losses in competitiveness in some EU and euro-area countries before the crisis. With a view to shed light on and qualify this hypothesis, the relation between government compensations and labour costs in the tradable sector is analysed by means of a co-integration framework, which allows also analysing long-run effects on wage levels. Across the whole panel of available EU

countries, there is evidence of a significant long-term relation between government and manufacturing wage levels. However, by separating the analysis for countries with a relatively large and a relatively small government sector it appears that this long-run relation is much stronger for the former set of countries. It also appears that wage setting modalities may play a role for the long-run relationship between general government and manufacturing wages: in countries where government wages are to a greater extent determined via collective bargaining, manufacturing wages are more strongly linked to productivity.

- Recent years have been characterised by unprecedented episodes of wage restraint in the public sector and by a discontinuation of established collective bargaining practices in government wage setting in response to the emergency situation of public finances in a number of EU countries. The analysis shows that when dynamics in government wages are mainly driven by fiscal consolidation concerns, co-movements between government and private wages tend to be weaker, although a strong link is still found in countries with a large government size.

Limitations in the analysis need not be neglected, notably linked to limited availability of statistics on government compensations, imperfect cross-country comparability of data, and robustness of results with respect to the methodologies employed.

Despite the above limitations, the analysis sheds light on a number of elements that may deserve further attention in ongoing policy discussions.

For its sheer size as an employer, the government has a strong influence on the overall labour market. The analysis presented in this paper confirms that such influence can be quantitatively relevant and persistent, notably in countries less open to international trade and where government employment represents a high share of total employment.

In the years before the crisis, in a number of EU countries, imprudent and sub-optimal wage setting practices in the government sector may have been

at the source not only of mounting public finance problems and fiscal pro-cyclicality in good times, but could have contributed to saw the seeds of competitiveness losses spreading to the tradable sector and feeding growing external imbalances. The response to the current account and public finance crisis that materialised in a number of EU countries after 2008 included in some cases measures to correct government wage trends that are dictated by emergency considerations and of unprecedented severity, often implying a discontinuation of established wage setting practices.

- From a forward-looking perspective, wage setting practices in the government sector should aim at avoiding the mistakes of the past while creating the conditions for enhanced public sector efficiency and preserving fiscal and macroeconomic stability.
- The documented presence of non-negligible public wage premia is a matter of concern as this may imply a persistently sub-optimal supply of skilled labour to the private sector, with consequences in terms of competitiveness and growth potential. While avoiding the emergence of such unjustified wage premia is certainly an objective in its own right, in light of recent pay freezes and cuts in a number of EU countries, looking forward it is also important to prevent the risk of excessively low pay in the government sector for key occupations and to ensure the minimum necessary quantity and quality of public services. From a public management perspective, adequate information on differences in the pay structure between the government and private sector, including wage premia estimates could help from this viewpoint.
- From a dynamic viewpoint, the current retrenchment of government wage growth was a necessary ingredient of the policy strategy followed by EU countries that were mostly concerned with the debt crisis. Wage moderation in the public sector was functional not only to the reduction of fiscal deficits, but, in light of the relevant repercussions on the private sector labour market, also to the preservation of employment and the

improvement of competitiveness in the private (exposed) sector. While subdued government dynamics may still be needed looking forward in some EU countries, it is desirable that wage setting in the public sector exits from emergency mode, with a view to improve practices on a sustainable basis and better incorporate longer-term considerations.

- In the above respect, an adequate balance will have to be found between the efficiency gains permitted by better aligning government pay to productivity and labour market conditions, and the need to ensure the respect of fiscal targets. While bargaining-based, decentralised wage setting modalities are more likely to deliver on the front of the alignment of wages with labour market conditions, the maintenance of adequate control from the centre on the overall government wage bill helps the achievement of budgetary targets. Further work to assess alternative ways to achieve a satisfactory trade-off between these objectives and evaluate best practices across EU countries seems deserved.

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