

# Institutional determinants of public-private sector linkages\*

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## Abstract

We estimate the probability of public sector leadership – defined as Granger causality from public to private sector wages – in a pool of 18 OECD countries as a function of countries’ institutional features. We find that public-private sector causality results are quite heterogeneous across countries. So, we investigate whether this is related to differences in labor and product market institutions, and notably wage-setting institutions, across countries. Government involvement in collective bargaining, bargaining centralization and collective bargaining systems with predominant regional levels’ systems are positively correlated with the probability of finding public wage leadership. Among the factors that reduce its probability we can underline the impact of globalization and a level of collective bargaining closer to the company one.

**JEL Classification:** J30, J51, J52, E62, E63, H50, H6.

**Keywords:** Labor market institutions; government wages; private sector wages; causality.

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# 1 Introduction

Recent literature has documented the existence of linkages between public and private sector wages and employment (see for example Lindquist and Vilhelmsson 2006; Afonso and Gomes 2008; Lamo, Pérez and Schuknecht 2013, 2012a, 2012b). In particular Lamo, Pérez and Schuknecht (2012a) empirically analyze these linkages for a large number of OECD countries. They find that private sector wages exert a stronger influence on public wages than the other way around. However, there is also some evidence of feedback effects from public wage setting on private-sector wages in a number of countries (see Pérez and Sánchez-Fuentes, 2011). This has important implications for public wage policies, especially with regard to the EMU and small open economies, in that not only private but also public wage setting are important for overall wage and competitiveness developments. Wage spillovers from the public sector might lead to wage costs growing faster than productivity in the private (including the tradable) sector.

Therefore it is of substantial relevance to understand what are the factors behind public sector leadership and this is precisely what this paper investigates, namely the role of labor market and other country-specific institutions in explaining the probability of public sector wage leadership. To do that we estimate the probability of public sector leadership in a pool of 18 OECD countries as a function of countries' institutional features. Public sector leadership is simply defined as Granger causality from public to private wages and causality tests are implemented on public versus private wages using a variety of methods for the sake of robustness. We find that public-private sector causality results are quite heterogeneous across countries. So, we investigate whether this is related to differences in labor and product market institutions, and notably wage-setting institutions, across countries. Labor and product market institutions are measured using a set of standard OECD-based variables, a set of variables on wage-bargaining institutions in the euro area generated from the information collected within the European System of Central Banks Wage Dynamics Network (WDN), plus a measure of globalization and size of government (public employment ratio).

The rest of the paper is organized as follows. In Section 2 we explain in more detail the empirical strategy and data used. In Section 3 we present the main results and in Section 4 the main conclusions of the study.

## 2 Data and empirical strategy

In this paper we define public sector leadership as causality from public to private wages<sup>1</sup>. We test for public versus private sector wage leadership by implementing Granger causality tests in a VAR framework.<sup>2</sup> Granger causality is one of the concepts of causality most commonly used. In short, public wages Granger cause private wages if the former variable helps improving the predictions of the latter variable.

Granger-causality tests are usually implemented on stationary and stable data (detrended variables); we borrow the approach from Lamo, Pérez and Schuknecht (2013 and 2012b) who consider a variety of detrending methods, up to eleven, to remove fluctuations from a set of variables, among them the ones of interest in this paper, namely public and private wages.<sup>3</sup> They use a number of standard filters that are described in both papers. The underlying assumption to detrending filters is that aggregate cyclically-adjusted economic time series can be decomposed into a trend component  $T_t$ , the so-called cyclical component  $C_t$  that fluctuates around the trend, and an unpredictable random component  $\varepsilon_t$ , i.e. a given series  $y_t$  can be decomposed as  $y_t = T_t + C_t + \varepsilon_t$ . Most of the detrending filters take out the trend component from the original time series, so that both the cyclical and irregular components  $C_t + \varepsilon_t$  are taken as measure of the cycle.

In this paper we run causality tests using the 11 pairs of detrended public-private wages. In addition, we test Granger-causality between pairs of original variables (i.e. non detrended). In this later case we use a Wald test based on a lag augmented VAR, following Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996).<sup>4</sup> Formally, in all the cases mentioned, the causality tests can be implemented by means of the following model that contains public sector wages, private sector

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<sup>1</sup>The measures of wages in this paper is compensation per employee. Compensation per employee is computed using compensation of employees and employment data. Compensation of private sector employees is defined as total economy compensation of employees minus compensation of government employees. Compensation per private employee is defined as private compensation of employees divided by total employees minus government employment minus self-employment.

<sup>2</sup>Lindquist and Vilhelmsson (2004) and Lamo, Perez and Schuknecht (2012a) explore a different concept of public sector leadership, based on vector error correction models (VECM).

<sup>3</sup>The original data set, that is then detrended in the previously-mentioned papers is a standard OECD dataset.

<sup>4</sup>These authors show that a standard Wald test can be used to test linear constraints in this framework by just adding an extra lag in estimating the parameters of the process. This approach is quite appealing because the least-squared estimation may be applied to the levels of the  $VAR(p+1)$  model. To carry out the causality test it is not necessary to perform a VEC reparameterization of the process to account for cointegration, because the least-squares estimators of the relevant matrices do not change due to the reparameterization.

wages and expected prices,

$$\begin{bmatrix} w_t^{PU} \\ w_t^{PR} \\ E_t(p_{t+1}) \end{bmatrix} = C + \sum_{j=1}^p A_j \begin{bmatrix} w_{t-j}^{PU} \\ w_{t-j}^{PR} \\ E_{t-j}(p_{t-j+1}) \end{bmatrix} + \varepsilon_t \quad (1)$$

where  $C$  is a 3x1 vector of constant coefficients, each  $A_j$  is a 3x3 matrix,  $p$  the order of the VAR, and  $\varepsilon$  a 3x1 vector of random disturbances.  $w_t^{PU}$  denotes nominal wages in the public sector,  $w_t^{PR}$  nominal wages in the private sector, and  $E(p_{t+1})$  the expected price level in  $t + 1$ . If expected prices at time  $t + 1$  are proxied by actual prices at that time, the corresponding equation for public sector wages in (1) turns out to be

$$w_t^{PU} = C_1 + a_0^{PU} p_t + a_1^{PU} p_{t-1} + \dots + a_p^{PU} p_{t-p} + A_{PU}^1(L) w_t^{PU} + A_{PR}^1(L) w_t^{PR} + \varepsilon_1^{PU} \quad (2)$$

The way to obtain the observations for our dependent variable is the following. As in Lamo et al. (2013, 2012b), we run (2) for each one of the detrended wage measures (and the non-detrended approach), the two considered deflators and the 18 industrial countries in our sample (which yields up to 432 observations). In those instances where public sector wage leadership was statistically significant, i.e. public sector wages caused private sector wages, our dependent variable takes the value of 1 (183 observations), otherwise it is set to zero (249 observations). Clearly our dependent variable suffers from multicollinearity that could distort the standard errors of the estimates. To address this relevant issue we introduce controls for detrending methods and deflator used and in addition we estimate using robust variance and covariance à la Huber-White.

Independent variables include a set of standard OECD-based variables of labor and product market institutions, a set of variables on wage bargaining institutions in Europe, the US and Japan generated from the information collected within the European System of Central Banks Wage Dynamics Network (WDN), and a measure of globalisation. The fact that the OECD data base is not available for Greece and the WDN-based institutional data is not available for Canada and Norway reduces the maximum number of observations from 432 to 360. Table 1 lists the institutional variables and their sources. In addition Table 2 provides a number of descriptive statistics for all the variables included in the analysis.

### 3 Public sector leadership and wage setting institutions

The estimated coefficients shown in Table 3 yield the marginal effect of a change in independent variables on the probability of public/private wage causation. We show the results for several empirical specifications. In Column [1] we include the selected OECD labor market indicators, labeled as 1) to 4), the product market regulation index, labeled as 5), the KOF index of globalization, labeled as 6), an index of government involvement in collective bargaining, labeled as 8), and an index of coverage of high coverage by indexation mechanisms. Then in Column [2] we include some disaggregation on the type of bargaining mechanisms, by adding variables 10) to 14) on the dominant level of collective bargaining (sectoral, occupational, national, regional, company-level). Column [3], in turn, adds the public employment ratio (ratio of public to total economy employees) as an additional control. Finally, and for the sake of robustness check, we show in columns [4] and [5] the results for the same model but estimated for each deflator independently. In the latter respect, the estimations in columns [1] to [3] do include deflator dummies as well as detrending-method dummies, while the models in columns [4] and [5] do only include method dummies. However, the estimations do not include in any of the cases country dummies, given that these would at least partially capture the cross country institutional variation which we want to be reflected in the explanatory variables. The findings confirm the importance of certain labor market and other institutions in shaping public wage leadership. The following results can be highlighted.

First, some institutional features show a strong positive correlation with public wage leadership. Particular, they increase the probability of public wages Granger-causing private sector wages: (i) government involvement in collective bargaining; (ii) index of bargaining centralization; (iii) collective bargaining systems with predominant occupational and/or regional levels' systems. It is not surprising to confirm that the stronger the role of the government in collective bargaining the more importance public wage policies acquire. In addition, stronger bargaining centralization between negotiating parties – being state-sponsored and state-imposed one defining features – suggest a strong role for a wage negotiation benchmark, and this may most easily be in the public sector owing to the higher degree of unionization in that sector compared to the private sector. Also not surprisingly, more predominant wage bargaining at the regional level coincides with more public wage leadership. Social safety nets and inter-regional redistribution – more or less prevalent in all industrialized countries – may allow more of a public sector lead role as regions can externalize at least part of the costs (e.g., higher unemployment leading to more transfers). A result that

is admittedly counter-intuitive, though, is the one on occupational dominant level of collective bargaining being positively correlated with public wage leadership.

Second, as regards institutions that reduce the probability of public wage leadership, the following messages can be underlined. On the one hand, stronger exposure to competition, measured by the index of globalization, reduces the probability of public wage decisions influencing private sector outcomes. Indeed, increased competition would result in market forces being more dominant in wage setting. Markets also limit the leadership of public wages as market constraints are more binding and firms have less scope to accommodate other influences. On the other hand, a larger weight of the public sector is also negatively correlated with the likelihood of public sector wages causing private wages. In principle this result seems to be counterintuitive, but it could be rationalized on the grounds that smaller, typically more unionized public sectors and with greater monopoly power in certain sectors of activity, may be able to influence more the wage setting process than in the case of big, more diffusely associated public sectors. Finally, a prevalence of company-level wage setting is likely to focus negotiations on the specific (private) occupation or firm situation and therefore less likely to coincide with a strong lead role for the public sector. Indeed, the correlation between company-level wage bargaining and public wages causing private wages is negative, even though the coefficients are estimated with low precision. Stronger national and sectoral levels of collective bargaining are also associated with lower prevalence of public wage decisions on private sector ones, a result that can be interpreted against the background that the broader the coverage of wage agreements, the lower the pressure public sector unions can exert on it. As regards the negative sign also found for national and sectoral dominant wage setting schemes, this might be evidence that broader-scope agreements tend to internalize more the external effects of wage setting across all negotiating parties, and hence, weigh less on public sector dominance/leadership.

In the sample used (1980-2007) the following variables turned out to be non-significant or only significant in one of the model specifications. On the one hand, bargaining coordination that, ex-ante could be expected to capture a similar effect as bargaining centralization. Because of this, the influence of this variable might be captured by the latter variable of the dominant bargaining level dummies, among which multicollinearity is likely to arise. As regards union membership, ex-ante one may expect that higher union density might imply a strong role for a wage negotiation benchmark and this may most easily be in the public sector due to the higher degree of unionization; this intuition is not confirmed by the data. On employment protection legislation, one may guess that stricter legislation gives unions a stronger bargaining power in the private sector, independent

of public sector outcomes and, hence, one might expect a weaker influence of public wages; on different grounds, one may also theorize that stronger protection legislation reduces the comparative power of public sector employees, this being them typically holding per-life positions. The results of model [3] tend to be in line with the latter argument. Finally, neither the product market regulation index nor high coverage by indexation mechanism turned out to be significant in any of the empirical specifications. The latter result is not surprising if one considers that a higher degree of price indexation is less likely to be positively correlated with public than with private sector wage leadership, as private wages, by comprising about 80% of countries' wage bill, are a key driver of inflation (this, in turn, determines the next round of wages increases – wage price spiral).

## 4 Conclusions

The findings of the paper confirm the importance of certain labor market and other institutions in shaping public wage leadership. In particular, government involvement in collective bargaining, bargaining centralization and collective bargaining systems with predominant regional levels' systems are positively correlated with the probability of finding public wage leadership. Among the factors that reduce its probability one can underline the impact of globalization and a level of collective bargaining closer to the company one.

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Table 1: Institutional variables used in the analysis.

| Independent variable  | Source   |
|---|--|
| Index of bargaining coordination and centralization   | Ochel (2000) based on OECD   |
| Employment protection legislation   | Allard (2005) based on OECD labour market statistics database (lmsd) |
| Union membership/ employment  | Udnet based on OECD lmsd and Visser (2006)                           |
| Index of globalisation  | Dreher (2006)  |
| Product market regulation index   | Conway, Janod and Nicoletti (2005)                                   |
| Government involvement in collective bargaining   | DuCaju et al. (2008)   |
| High coverage of indexation (75-100%)   | DuCaju et al. (2008)   |
| Dominant level of collective bargaining: sectoral, occupational national, regional, company-level | DuCaju et al. (2008)   |

Table 2: Descriptive statistics.

| Variable   | N° obs. | Mean   | Variance | Skewness | Kurtosis |
|--|---------|--------|----------|----------|----------|
| <b>Dependent variable:</b>   |         |        |          |          |          |
| Public wage causality<br>(value 1 if public wages cause private wages) | 432     | 0.405  | 0.242    | 0.387    | 1.150    |
| <b>Independent variables:</b>  |         |        |          |          |          |
| <i>OECD labour market indicators</i>                                   |         |        |          |          |          |
| 1) Index of bargaining coordination                                    | 204     | 2.171  | 0.283    | -1.030   | 2.858    |
| 2) Index of bargaining centralisation                                  | 204     | 2.071  | 0.342    | -0.847   | 2.344    |
| 3) Employment protection legislation                                   | 204     | 1.828  | 0.625    | -0.230   | 2.220    |
| 4) Union membership/employment   | 204     | 42.040 | 331.994  | 0.325    | 2.359    |
| <i>Product market regulation index</i>                                 |         |        |          |          |          |
| 5) Product market regulation index                                     | 216     | 1.647  | 0.130    | 0.278    | 2.520    |
| <i>Other control variables</i>   |         |        |          |          |          |
| 6) KOF index of globalisation  | 216     | 70.362 | 92.202   | -0.660   | 2.560    |
| 7) Public employment ratio   | 216     | 0.169  | 0.004    | 0.657    | 2.392    |
| <i>WDN variables</i>   |         |        |          |          |          |
| 8) Government involvement in collec. barg.                             | 216     | 0.167  | 0.140    | 1.789    | 4.200    |
| 9) High coverage by index. mech. (76-100%)                             | 192     | 0.125  | 0.110    | 2.268    | 6.143    |
| 10) Dominant level of coll. barg.: sectoral                            | 192     | 0.688  | 0.216    | -0.809   | 1.655    |
| 11) Dominant level of coll. barg.: occupational                        | 192     | 0.188  | 0.153    | 1.601    | 3.564    |
| 12) Dominant level of coll. barg.: national                            | 192     | 0.063  | 0.059    | 3.615    | 14.067   |
| 13) Dominant level of coll. barg.: regional                            | 192     | 0.125  | 0.110    | 2.268    | 6.143    |
| 14) Dominant level of coll. barg.: company-level                       | 192     | 0.167  | 0.140    | 1.789    | 4.200    |

Table 3: Institutional determinants of public sector wage leadership

Method of estimation: Probit. Sample period: 1980-2007.

Dependent variable: takes the value 1 if public wages cause private wages.

|   | Model<br>[1]       | Model<br>[2]       | Model<br>[3]       | Model<br>[4]<br>Priv.cons.<br>deflator | Model<br>[5]<br>GDP<br>deflator |
|---|--------------------|--------------------|--------------------|--|---------------------------------|
| <b>OECD labour market indicators</b>                          |                    |                    |                    |  |                                 |
| 1) Index of bargaining coordination                           | -0.093<br>[1.22]   | 0.18<br>[1.52]     | -0.004<br>[0.03]   | 0.21<br>[1.27]                         | 0.08<br>[0.47]                  |
| 2) Index of bargaining centralization                         | 0.531<br>[6.08]**  |                    |                    |  |                                 |
| 3) Employment protection legislation                          | -0.068<br>[0.73]   | 0.256<br>[1.64]    | 0.535<br>[2.65]**  | 0.28<br>[1.27]                         | 0.216<br>[0.99]                 |
| 4) Union membership/employment                                | -0.006<br>[2.71]** | -0.005<br>[0.86]   | 0.003<br>[0.41]    | -0.005<br>[0.60]                       | -0.002<br>[0.19]                |
| <b>Product market regulation index</b>                        |                    |                    |                    |  |                                 |
| 5) Product market regulation index                            | -0.263<br>[1.21]   | 0.225<br>[0.85]    | -0.268<br>[0.75]   | 0.025<br>[0.07]                        | 0.644<br>[1.67]*                |
| <b>Other control variables</b>                                |                    |                    |                    |  |                                 |
| 6) KOF index of globalization                                 | -0.015<br>[3.91]** | -0.017<br>[2.63]** | -0.015<br>[2.06]** | -0.017<br>[2.36]**                     | -0.03<br>[2.79]**               |
| 7) Public employment ratio                                    |                    |                    | -4.129<br>[2.06]** |  |                                 |
| <b>WDN variables</b>  |                    |                    |                    |  |                                 |
| 8) Government involvement in<br>collective bargaining         | 0.328<br>[2.19]**  | 0.702<br>[3.80]**  | 0.874<br>[3.72]**  | 0.736<br>[3.19]**                      | 0.851<br>[3.25]**               |
| 9) High coverage<br>by indexation mechanisms (76-100%)        | -0.029<br>[0.20]   | 0.021<br>[0.07]    | -0.279<br>[1.04]   | -0.074<br>[0.18]                       | 0.141<br>[0.34]                 |
| 10) Dominant level of collective<br>bargaining: sectoral      |                    | -0.86<br>[4.51]**  | -0.91<br>[4.85]**  | -0.741<br>[2.67]**                     | -0.987<br>[4.90]**              |
| 11) Dominant level of collective<br>bargaining: occupational  |                    | 0.427<br>[2.18]**  | 0.475<br>[2.41]**  | 0.349<br>[1.33]                        | 0.728<br>[2.63]**               |
| 12) Dominant level of collective<br>bargaining: national      |                    | -0.394<br>[3.13]** | -0.402<br>[3.24]** | -0.271<br>[0.85]                       | -0.409<br>[4.29]**              |
| 13) Dominant level of collective<br>bargaining: regional      |                    | 0.35<br>[2.03]**   | 0.397<br>[2.15]**  | 0.16<br>[0.73]                         | 0.755<br>[2.90]**               |
| 14) Dominant level of collective<br>bargaining: company-level |                    | -0.212<br>[1.95]*  | -0.147<br>[1.24]   | -0.233<br>[1.46]                       | -0.244<br>[1.93]*               |
| <i>Number of observations</i>                                 | 360                | 360                | 360                | 180                                    | 180                             |

Notes: Robust z statistics in brackets: \* significant at 5%, \*\* significant at 1%.

The estimated coefficients shown in this table yield the marginal effect of a change in the independent variables on the probability of causation. The estimations include method dummies and deflator dummies.