Public-Private Wage Differentials and Interactions Across Countries and Time

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ABSTRACT: We compile a novel database on average public and private sector wages and public-private wage differentials, which we use to analyze how average public-private wage differentials vary according to gender and skill level as well as over time. We further examine the dynamic relationship between public and private wage levels and the implications for inflation. On average, public-sector workers earn around 10 percent more relative to comparable private sector workers, with the premium being higher for women, low-skilled workers, and in developing countries. The average public sector wage premium varies counter-cyclically, increasing during economic downturns, and increases prior to elections. Both private sector wages and inflation respond positively to changes in public wages, albeit with significant heterogeneity in the effects across countries reflecting differences in labor market characteristics and prevailing macroeconomic conditions.

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I. Introduction

The size and composition of the public wage bill spending have been the subject of research by economists for many decades and has generated debate on many issues including on the size of the government, the fiscal implications of higher public wage spending, its impact on inclusive growth, the efficiency of the wage determination process, and the fiscal rigidities introduced by large wage bill spending (IMF, 2016). The continued interest in public wage spending is unsurprising considering its relatively large share in total government spending across all countries, ranging from 7.4 percent of GDP in developing countries to 10.2 percent in advanced countries.[1] A comprehensive evaluation of the size of wage bill spending needs to also consider the competitiveness of public wages with private sector wages since competitive public wages are needed to attract and retain adequately skilled staff for the efficient delivery of public services.

A public wage premium (deficit) is said to exist when public sector wage levels are high (low) relative to levels for comparably skilled private sector workers. While country-level estimates of the public wage premium are widely available, the information is somewhat scattered and so a comprehensive evaluation of whether, and how, public and private wage levels differ across countries is lacking.[2] Furthermore, these estimates are often static, providing a measure of the public wage premium at a particular point in time, thus ignoring how it has evolved over time. This paper aims to contribute to filling these gaps in the literature through the compilation and analysis of two comprehensive datasets that allow a more detailed analysis of the pattern of public-private wage differentials across countries and over time, including across economic and political cycles. Furthermore, the evidence on the implications of changes in public wages for private sector wages and inflation is extremely limited.[3] We contribute to the existing literature by estimating the effects of public wage changes on private wages and inflation and examine how they vary according to cross-country differences in labor market institutions and regulations and prevailing macroeconomic conditions.

The paper is structured as follows. In Section 2, we briefly review theoretical and empirical issues pertaining to the estimation and analysis of the public wage premium. In Section 3, we describe the criteria used in compiling a cross-country dataset on micro-econometric estimates of the public wage premium for 86 countries (26 advanced, 37 emerging, and 23 developing countries). We then use this dataset to analyse the pattern of the public wage premium across countries at different stages of development, and how it varies by skill level and by gender. Section 4 describes how we use country-level administrative data to construct two time-series datasets on average public and private wages. The first comprises data at the annual level, and covers

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[1] These figures correspond to spending by the general government, and thus may underestimate total wage bill spending by the much wider public sector which, in many countries, also includes various types of non-budget entities and state-owned enterprises.

[2] Existing studies typically focus on analysis of the premium for a specific country or a group of (typically advanced) countries.

[3] A few studies investigate the impact of increases in government employment on private employment, real output and private consumption (Linnemann, 2009; Pappa, 2009). Bermperogloua, Pappa and Vella (2017) investigate the impact of economic shocks on the aggregate government wage bill, but the focus of their analysis is on economic activity rather than on private wages and prices.

43 countries (14 EMDEs, and 29 AEs) over the period from 1995 to 2020. The second comprises quarterly data covering 32 countries (7 EMDEs and 25 AEs) for the period 1990: Q1-2022: Q2. We use these datasets to analyse the evolution of relative average public and private sector wages and examine how this is affected by economic and electoral cycles. This section also investigates the effects of public wage shocks on private wages and inflation and examines how these relationships vary with labor market characteristics and prevailing macroeconomic conditions. Section 6 concludes.

II.   Background on Public-Private Wage Differentials

A. Theoretical Evidence

In theory, public sector wages can be higher or lower relative to those prevailing in the private sector for workers with similar socioeconomic characteristics and comparable skills. The theoretical literature has identified a range of factors that can determine whether a public sector wage premium or deficit is likely to exist, and the empirical literature has tried to validate the importance of some of these channels.

Public wage premium. To the extent that the public sector is motivated by political considerations rather than profit maximization, public sector wages will ultimately depend on the ability of public sector workers to compete over the allocation and size of the public budget (Gunderson, 1989; 1979; Mueller, 1998). Differences across sectors in institutional settings—e.g., pay regulation, unionisation, and collective bargaining coverage— are therefore likely to affect relative wage levels. Evidence suggests that the degree of unionisation in the public sector tends to be higher than in the private sector (Lucifora and Meurs, 2006; Perez and Sanchez, 2010; Giordano et. al., 2011; Dickson et. al., 2014). This potentially leads to greater bargaining power which exerts upward pressure on the wages of public sector workers (Holmlund, 1993). This bargaining power is reinforced by the fact that public sector employees deliver politically sensitive public services whose disruption can be politically damaging (Borjas, 1980), and may be particularly strong during an election year when public sector unions can threaten to withdraw key public services to undermine an incumbent's re-election prospects (Rogoff 1990; Akhmedov and Zhuravskaya 2004). The empirical literature is generally supportive of the effects of the political cycle on total wage spending, with the impact being more marked in low-income and emerging countries (Shi and Svensson 2006; Drazen and Eslava 2010; Cahuc and Carcillo 2012; Eckardt and Mills 2014; Gaspar et. al., 2017). In addition, to the extent that labor demand in the public sector is relatively inelastic, with the public sector being unable to easily substitute other inputs for their employees, public sector unions can bargain for higher wages without triggering significant reductions in employment (Ashenfelter and Ehrenberg, 1975; Gunderson, 1979). Finally, wage setting practices in the public sector may reflect other public policy objectives such as promoting gender equity, poverty reduction, and income equality, which increase wage levels for some public sector groups compared to the private sector (Alesina et. al., 2000; Chatterjiet. al., 2007).

Public wage deficit. The theory of compensating differentials suggests that public sector employees may receive lower wages as they often enjoy other non-pecuniary or pecuniary benefits such as a higher degree of job security, longer holidays, and generous pension schemes (Bellante and Link, 1981; Moore and Raisian, 1991). Public wages may also be lower for certain professions or specific groups of the labor force in which the public sector has a monopsony power (Mueller, 1998; Campos et. al., 2017). For instance, the public sector is likely to be a large employer of workers with tertiary education, especially in developing countries. Finally, public wages could be affected by macro-economic policy objectives, often being used as a policy tool to constrain overall wage inflation, to support fiscal consolidation efforts, as well as to enhance a country's competitiveness (Gregory, 1990).

Reflecting differences in the importance of the above channels, in principle public-private wage differentials can be expected to vary across countries and over time. These include differences in the wage setting mechanism, the importance of trade unions in the public and private sectors, the relative size of the public sector in the economy, the extent to which the government prioritizes policies that promote equal pay, and the openness of the economy to international trade (Rattsø and Stokke, 2019).[4]

B. Empirical Estimation of Public-Private Wage Differentials

Empirical analyses of public-private wage differentials typically compare individual data on wages in the public and private sectors using labor force or household survey data for a single country or group of similar countries. The standard empirical approach to estimating public-private wage differentials for comparably skilled workers is to include a dummy variable for the public sector in a Mincerian semi-logarithmic wage regression model (Mincer, 1974):

$$Y = \alpha + \beta \cdot X + \gamma \cdot pub + u$$

where Y is the log individual wage, α is an intercept term, X is a vector of variables capturing individual characteristics that affect wage levels, pub is a binary variable taking the value 1 if the individual works in the public sector (0 otherwise), and u is assumed to be a random error term. The wage variable is typically based on information from reported gross labour earnings. The parameter γ provides an estimate of the average public-private wage differential, which is positive for a public wage premium and negative for a public wage

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[4] The literature also discusses various channels through which changes (or "shocks") to public sector wages and employment can be transmitted to private sector wages and thus impact the public-private wage differential (Pissarides, 1988; Afonso and Gomes, 2014)., including: (i) by affecting the search direction of the unemployed, changes in public wages exert pressures on private wage bargaining; (ii) by raising the average level of productivity—due to a relative scarcity of labor supply directed towards the private sector in a context of diminishing marginal productivity of labor—changes in public wages can lead to an increase in private wages; and (iii) by exerting pressure on private wages when changes in public wages are financed by higher taxation. Changes (or differences) in the structure of the economy, such as an increase in the share of the relatively high-skilled manufacturing sector, may also affect the evolution (and pattern) of the public wage premium.

deficit. Individual characteristics (X) include variables such as education, work experience (often proxied by age), a rural-urban or city indicator (e.g., to control for cost-of-living effects), and gender. An alternative approach used in the literature is to estimate separate relationships for public and private sector workers (Blinder, 1973; Oaxaca, 1973):

$$Y_{pub} = \alpha_{pub} + \beta_{pub} \cdot X_{pub} + u_{pub}$$
$$Y_{priv} = \alpha_{priv} + \beta_{priv} \cdot X_{priv} + u_{priv}$$

Differences in mean wages can then be written as:

$$\bar{Y}_{pub} - \bar{Y}_{priv} = \hat{\beta}_{pub} \cdot \left(\bar{X}_{pub} - \bar{X}_{priv}\right) + \left[\left(\hat{\alpha}_{pub} - \hat{\alpha}_{priv}\right) + \left(\hat{\beta}_{pub} - \hat{\beta}_{priv}\right) \cdot \bar{X}_{priv}\right]$$

The first term is also known as the "endowment effect", while the second term is often referred to as the public "wage premium" as it captures differences in public and private wages that cannot be explained by differences in individual characteristics. As above, individual characteristics (X) include variables such as education, work experience, a location indicator, and gender. Studies typically allow for non-linear effects of education and experience on wages by including squared terms for these explanatory variables or the logs of dependent and independent variables.

Studies also sometimes attempt to control for differing job conditions (such as hours worked or overtime) by including hours of work as an additional explanatory variable or using the log of the average hourly wages as the dependent variable. Some studies allow the premium to differ across gender, skill-levels, or income groups by including interaction terms between the public sector dummy and these individual characteristics in a single Mincerian equation or by estimating Mincerian regressions separately for each group.

III.   Meta-Analysis of Wage Premium Estimates

A. Database Construction

As the basis for our meta-analysis, we compile a cross-country database on public-private wage differentials (the "public wage premium") from estimates found in existing studies that use micro-level data using either labor force or household survey. In compiling our data, we adopt the following criteria.

i.   We focus on studies from 1991 onwards that estimate the public wage premium using the empirical methods that we described earlier, excluding studies that merely report mean wage ratios without controlling for individual characteristics using regression analysis.

ii.   We exclude studies that include occupation as an additional control but do not appropriately correct for endogeneity due to occupation selection by individuals since such estimates may lead to serious misinterpretation of the premium estimates (Angrist and Pischke, 2009).

iii. We focus on studies that define the public sector in terms of the general government—i.e., excluding state-owned enterprises—and studies that compare wages in this sector to those of *wage-employed workers* in the private sector—i.e., excluding self-employed workers).[5]

iv.   We limit the sample to studies that use data on workers whose ages are between the legal minimum working age and the retirement age.

v.   To ensure comparability across the premium estimates, we emphasize studies that cover a large set of countries and use comparable underlying data, variables, and estimation techniques, but complement these with some single-country studies that follow similar estimation strategies (e.g., Finan et. al., 2015).[6]

We also compile cross-country data on the public sector wage premium by gender and by skill.[7] For the gender-specific premium, we follow the same criteria described above and used in compiling data on the average premium. For the skill-specific premium—since the concepts and definitions of "skills" differ across studies—we take the following approach:

i.   Where possible, we base our skill-specific premium dataset on studies that classify workers' skills using UNESCO's International Standard Classification of Education (ISCED). A premium estimate for workers with up to primary education (ISCED-1) and those without formal education (ISCED-0) are defined as a premium for low-skilled workers. A premium estimate for workers with at least secondary education (ISCED-3) are referred to as a premium for high-skilled workers.[8]

ii.   Where skill premium estimates based on educational differences are not available, we use estimates of the premium by occupational groups—where workers are grouped according to ILO's International Standard Classification of Occupations (ISCO); elementary workers (ISCO-9) are treated as being low-skilled, while managers, professionals, and technicians (ISCO-1, 2, and 3) are treated as high-skilled.

iii. We also use estimates from studies that adopt their own classification of low- versus high-skilled workers.

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[5] However, the empirical results from relevant studies confirm that the inclusion of state-owned enterprise employees does not significantly change average wage premium results. Note that controls for individual productivity-enhancing characteristics (and some other household characteristics) should, to some extent, correct for any bias in the studies that include self-employed workers in their samples.

[6] These studies include a number of studies undertaken by the International Monetary Fund using country Labor Force Surveys; European Central Bank studies for European countries (Giordano et. al., 2011; de Castro et. al., 2013) that use harmonised survey data from the European Union Statistics on Income and Living Conditions (EU-SILC) and the European Structure of Earnings Survey (EU-SES); and studies for Latin American countries (Panizza, 2001; Panizza and Qiang, 2005; et. al., 2011) using official household surveys from the Economic Commission for Latin America and the Caribbean (ECLAC).

[7] We take the premium estimates by gender from the same sample of studies from which the average estimate was compiled.

[8] In the case where information on a premium for workers with at least secondary education (ISCED-3) is not available, it is substituted by a premium for workers with at least lower secondary education (ISCED-2).

Annex Table 1 summarises the data sources, methodologies, and country coverage. Table 1 (Panel A) summarizes the distribution of our data by country groups—according to income-level and region—and across two time periods (1991-2000 and 2001-2014). The database comprises 208 premium estimates and spans 86 countries—of which 26 are advanced, 37 are emerging, and 23 are low-income and developing countries. Around two-thirds of countries appear at least twice, with 29 countries appearing only once. In terms of regions, the coverage includes Latin America & the Caribbean (LAC), Sub-Saharan Africa (SSA), Central & Eastern Europe (CEE), Developing Asia & the Pacific (AP), Commonwealth of Independent States (CIS), and Middle East & Northern Africa (MENA). The relatively high coverage of advanced economies (AEs; 26 out of a possible 35) likely reflects the greater availability of labor force and household surveys. The distribution across time periods shows that the number of premium estimates is higher over the later 2001-2014 period, most likely reflecting increasing data availability.

Table 1. Distribution of Countries in Meta-Database by Country Regional and Groups

Panel A. By Income-level

	# of years				# of countries observed during	
	1	2-3	4-6	Total	1991-2000	2001-2014
Total	**30**	**36**	**20**	**86**	**27**	**78**
AEs	5	17	4	26	4	26
EMs	10	15	12	37	17	31
LIDCs	15	4	4	23	6	21
Among EMs and LIDCs:						
CEE	1	7	2	10	0	10
CIS	3	0	2	5	1	5
AP	4	3	0	7	2	7
LAC	4	4	11	19	17	12
MENAP	3	2	0	5	1	4
SSA	10	3	1	14	2	14

Panel B. By Gender and Skill-level

	# of years			Total	# of countries observed during	
	1	2-3	4-6		1991-2000	2001-2014
Gender-specific premium estimates						
Total	**32**	**21**	**7**	**60**	**20**	**44**
AEs	11	11	0	22	2	22
EMs	12	8	6	26	15	13
LIDCs	9	2	1	12	3	9
Skill-specific premium estimates						
Total	**33**	**19**	**8**	**60**	**19**	**43**
AEs	10	11	0	21	1	21
EMs	14	7	6	27	15	12
LIDCs	9	1	2	12	3	10

Source: IMF staff calculations.
Note: The analysis in panel A is based on 208 countries, while that of panel B is based on 113 and 116 countries, in the case of the distribution by gender and skill level, respectively.

For the estimates by gender and skill levels, the coverage is somewhat narrower and spans only 60 countries, with a distribution (by income and region) that is comparable to that of the average premium estimate. Figure 1 presents the most-recent country-specific wage premium estimates for advanced (Panel A) and emerging

and developing countries (Panel B).[9] Among AEs, Scandinavian countries tend to feature, on average, a negative premium (i.e., a public wage deficit), although negative deficits are also observed in some developing countries, including CIS and a subgroup of CEE countries. However, most LAC and SSA countries exhibit a large positive wage premium.

Figure 1. Public-Private Sector Wage Premium
(in percent)

A. Advanced Countries

B. Developing and Emerging Countries
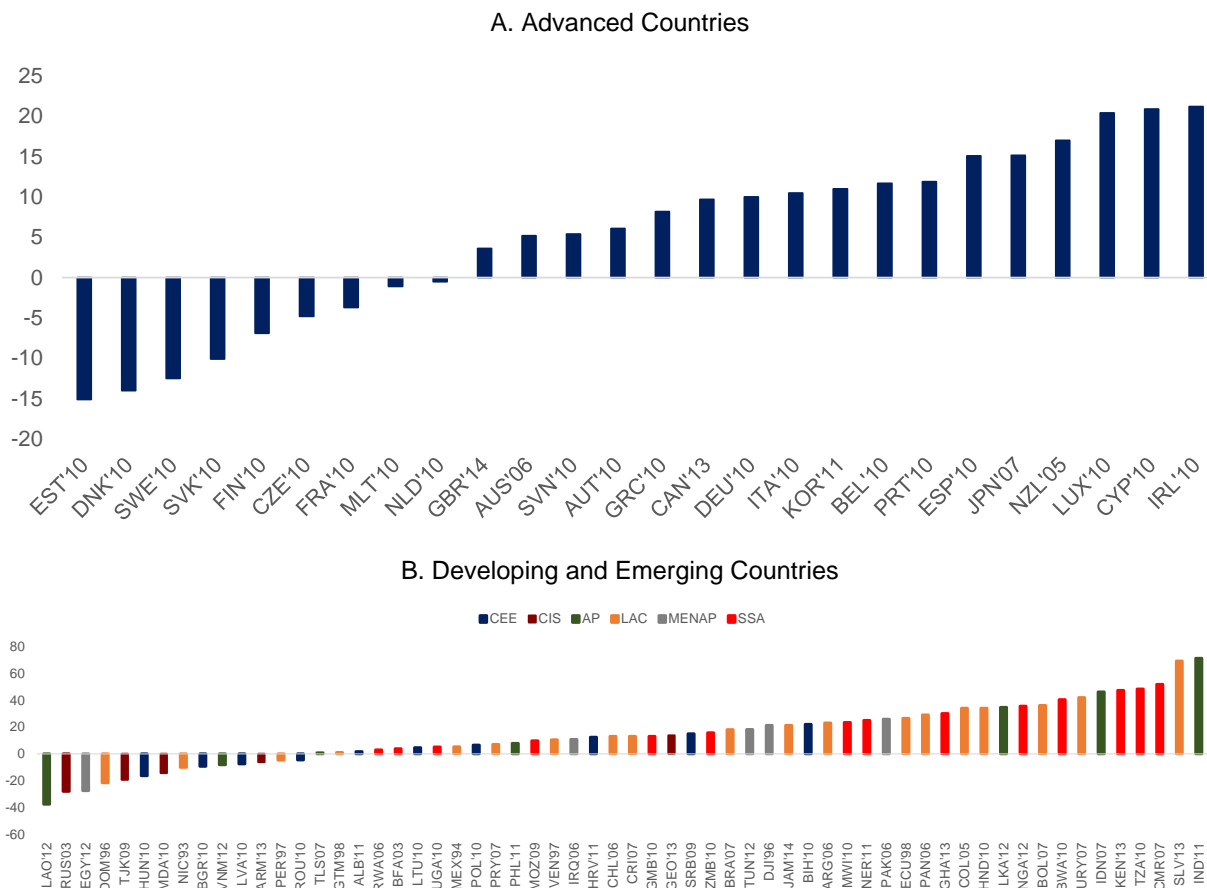
Source: IMF staff calculations.
Note: Premiums for the most recent year. The average premium is 5.2% for AEs, 13.3% for EMs, and 14.8% for LIDCs.

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[9] Note that since we focus on published work this may result in a selection bias, e.g., it may be that only studies with a statistically significant and sizeable premium or deficit are published. We should therefore view our analysis as applying to the universe of such studies.

B. Descriptive Analysis

B.1. Average public-private wage premium

Table 2 summarizes the distribution of the average public wage premium across country income groups.[10] Over the last two decades, the cross-country average public wage premium amounted to approximately 10 percent. However, there is large heterogeneity across country groups, with the premium being, on average, lower in AEs (5.4 percent) compared to emerging economies (11.7) and LIDCs (12.8 percent). A similar ranking is observed when using median estimates of the premium or when focusing on estimates for more recent years.

Table 2. Average Public Wage Premium, by Income-Group

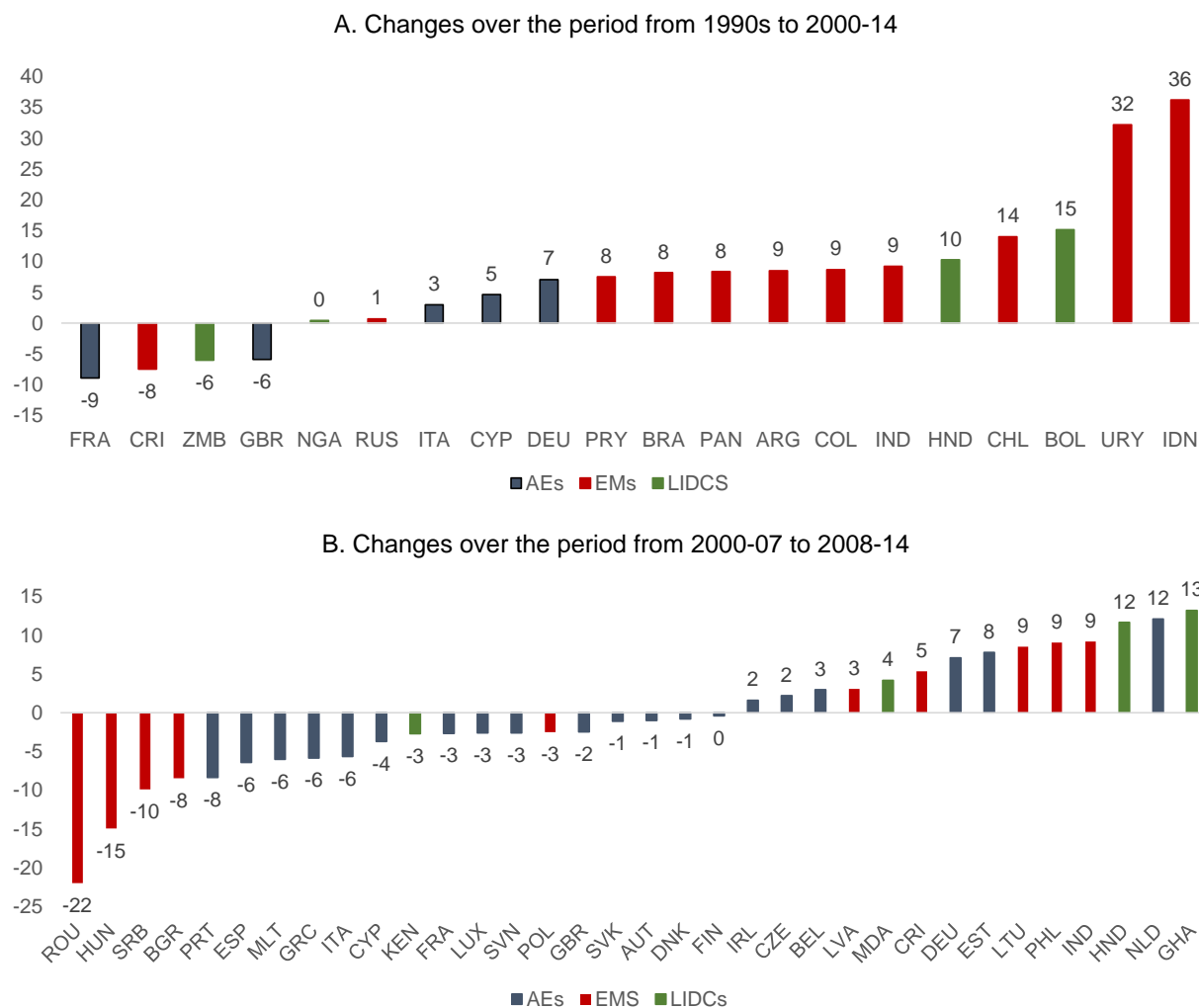|	All years		Most recent year		# countries
	Mean	Median	Mean	Median	
All	10.1	9.7	11.2	10.5	86
AEs	5.4	7.2	5.2	7.2	26
EMs	11.7	10.6	13.3	12.4	37
LIDCs	12.8	18.4	14.8	15.8	23

Source: IMF staff calculations.
Note: The two "all year" columns take the within-country average (over time), and then calculate the cross-country summary statistics.

A comparison between the premium observed in the most recent year and the overall average premium (shown in Table 2) can be suggestive of any time trend in public wage premium estimates. In AEs, both the average and median estimates of the premium are relatively stable over time. While in both EMs and LIDCs the average premium appears to have increased over time, for LIDCs the median decreases. However, the comparison over time may be confounded by compositional changes in the countries included in the sample for each period, especially given the relatively small number of country estimates that are available in the 1990s (i.e., the earlier period). We therefore also undertake an analysis of trends using only countries that appear in the following periods: 1990s and 2000-14, and 2001-2007 and 2008-2014. If more than one premium estimate for a specific country is available during a single period, we take the average across the estimates and use it in the analysis of the trend. Figure 2 presents the changes in the premium estimates between different periods and suggests that most of the included countries (16 out of 20 countries) experienced an increase between the 1990s and the 2000-14 periods (Panel A). On average, the increase in the premium amounted to around 7.3 percentage points over this period, while the median shows an increase of about 7.8 percentage points. This reinforces the observed increase in the average premium (average across all countries) shown in Table 2. Figure 2 (Panel B) repeats the analysis focusing on the change in the premium between the 2001-07 and 2008-14 periods. The results suggest that most AEs (14 out of 20 AE countries) have experienced a decline in the premium over time, while most LIDCs have seen their premium increase. For EMs, the trend is somewhat

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[10] Such estimates are often interpreted as lower bounds since they are typically based on gross wages and ignore relatively generous non-monetary and non-wage benefits, such as healthcare and pensions, that public employees often receive over and above their salary income (IMF, 2016), as well as the stronger employment protection in the public sector.

inconclusive, with Eastern European countries showing a declining premium and Baltic countries experiencing an increase in the premium.

Figure 2. Changes in Public-Private Sector Wage Premia Over Time
(in percentage points)
A. Changes over the period from 1990s to 2000-14

B. Changes over the period from 2000-07 to 2008-14

Source: IMF staff calculations.
Note: The mean (median) change in the premium is 7.3 (7.8) and -0.4 (-1.1) percentage points in Panels A and B, respectively.

B.2 Gender-specific wage premium

Table 3 presents evidence on the gender-specific public wage premium. The premium—for working in the public sector—is smaller for men than for women. The results are mainly driven by the difference in the premium across gender in LIDCs, where the average premiums are 12.6 and 17.6 percent for men and women, respectively, compared to a much smaller difference of just above 1.6 percentage points in both AEs and EMs.

Restricting the sample to the most recent year estimates, the gap between male and female premiums remains large for LIDCs and is negligible for AEs and EMs. The results remain largely unchanged when using median estimates of the premium.

Table 3. Gender-Specific Public Sector Wage Premium Estimates

Mean		All years			Most recent year			# countries
		Men	Women	Diff	Men	Women	Diff	
All		6.3	8.6	-2.4	6.9	7.9	-1.0	60
	AEs	4.9	6.5	-1.6	4.5	5.0	-0.4	22
	EMs	4.6	6.3	-1.7	7.2	6.5	0.7	26
	LIDCs	12.6	17.6	-5.0	10.5	16.5	-5.9	12

Source: IMF staff calculations.
Note: The two "all year" columns take the within-country average (over time), and then calculate the cross-country summary statistics. The results are robust to using medians.

Overall, the findings for LIDCs are consistent with greater gender pay equality in the public sector and likely partly reflect gender pay discrimination in the private sector (Weichselbaumer and Winter-Ebmer, 2005). The scatter plots of the gender-specific premium estimates are shown in Figure 3 and suggest that the average is not driven by outliers. The results indicate that, in most LIDCs, female public employees enjoy a larger wage premium than their male counterparts. In comparison, in most AE, there is no significant difference in the premium between females and males in the public sector. However, the results in Figure 4 suggest that a higher premium for female workers was evident in AEs during the period from 2001 to 2007, although it seems to disappear in the latter period. Finally, no clear pattern exists among EMs.

Figure 3. Gender-Specific Public Sector Wage Premium Estimates, By Country Groups
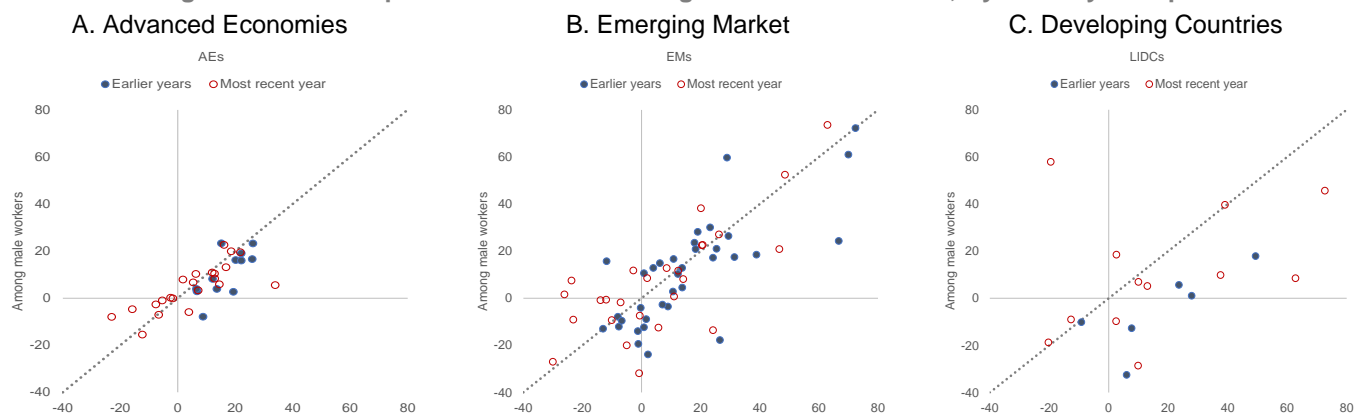
A. Advanced Economies   B. Emerging Market   C. Developing Countries

Source: IMF staff calculations.
Note: For observation below the 45-degree line (dashed), the female premium exceeds the male premium.

Figure 4. Gender-Specific Public Sector Wage Premium Estimates, 2000-2014
(in percent)

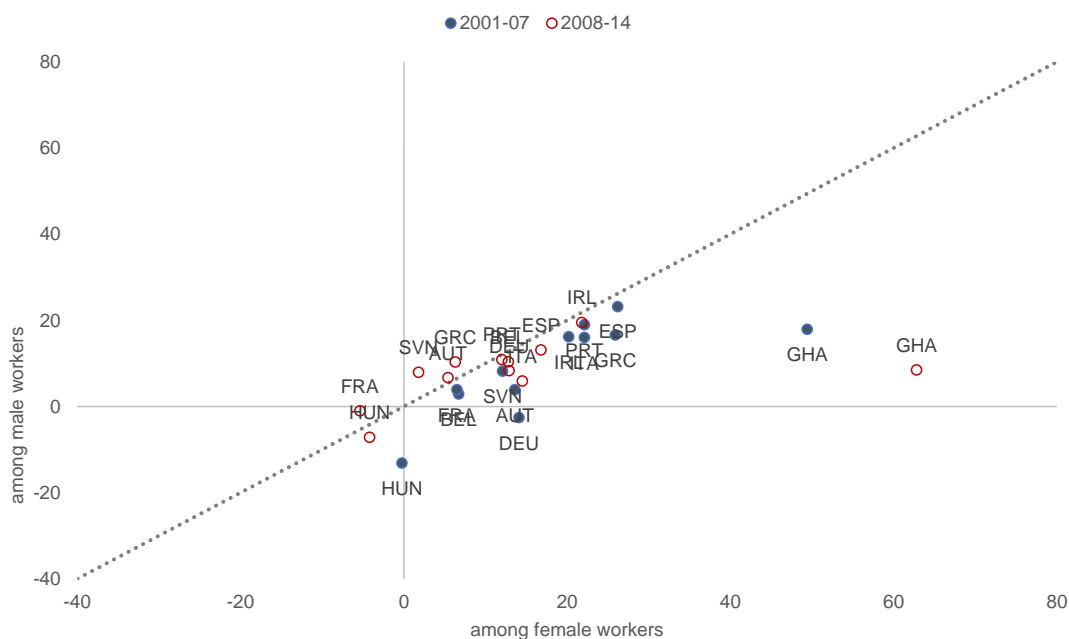Source: IMF staff calculations.
Note: For observation below the 45-degree line (dashed), the female premium exceeds the male premium.

B.3 Skill-Specific Wage Premium

The average public wage premium is also significantly higher for low-skilled workers than for high-skilled workers, and the premium gap between the two different skill groups is much larger in LIDCs (Table 4). Overall, the average public wage premium for high-skilled workers ranges between -0.3 to 2.7 percent in our data, while that of low-skilled workers ranges from 6.0 to 11.1 percent. The relatively large premium for low-skilled workers is even more apparent using estimates from more recent years, with relatively large premiums observed in both AEs and LIDCs. These results are robust to using median values and are consistent with the public sector having monopsony power over highly educated workers who may not have many attractive outside opportunities in the private sector, especially in developing countries. A comparison of all-year estimates with recent-year estimates also suggests that the difference between the premium of low-skill workers and that of high-skill workers has increased over time, and it is driven to a large extent by a rising low-skill public wage premium. This is also borne out by Figure 5, which shows an increase in the share of countries where the low-skill premium exceeds the high-skill premium.

Figure 6 compares the premium estimates before and after the financial crisis for advanced economies—only a few EMs and LIDCs have observations over this period. The results show that high-skilled workers in AEs tend to enjoy a higher public wage premium relative to that of low-skilled workers during the pre-crisis period. However, during the post-crisis period, the premium for high-skilled workers in the public sector declined

substantially while that of low-skilled workers has either remained unchanged or has even increased in some countries. This highlights the importance of controlling for the economic cycle when undertaking analysis on public-private wage differentials.

Table 4. Skill-Specific Public Sector Wage Premium Estimates

Mean		All years			Most recent year			# countries
		High	Low	Diff	High	Low	Diff	
All		1.6	7.6	-6.1	0.7	10.3	-9.6	60
	AEs	2.7	7.7	-4.9	0.1	11.0	-10.8	21
	EMs	1.5	6.0	-4.5	1.7	7.2	-5.5	27
	LIDCs	-0.3	11.1	-11.4	-0.7	16.3	-16.9	12

Source: IMF staff calculations.
Note: The two "all years" columns take the within-country average (over time), and then calculate the cross-country summary statistics. The results are robust to using medians.

Figure 5. Skill-Specific Public Wage Premium Estimates
(in percent)
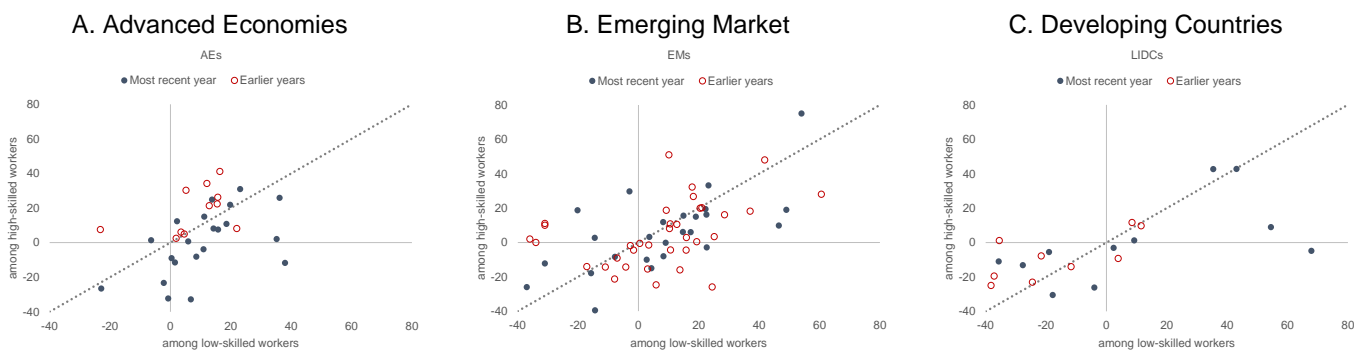
A. Advanced Economies   B. Emerging Market   C. Developing Countries

Source: IMF staff calculations. For observations below the 45-degree line (dashed), the premium for low-skilled workers exceeds the premium for high-skilled workers.

Figure 6. Skill-Specific Public Wage Premium Estimates, Before and After the 2008 Financial Crisis
(in percent)
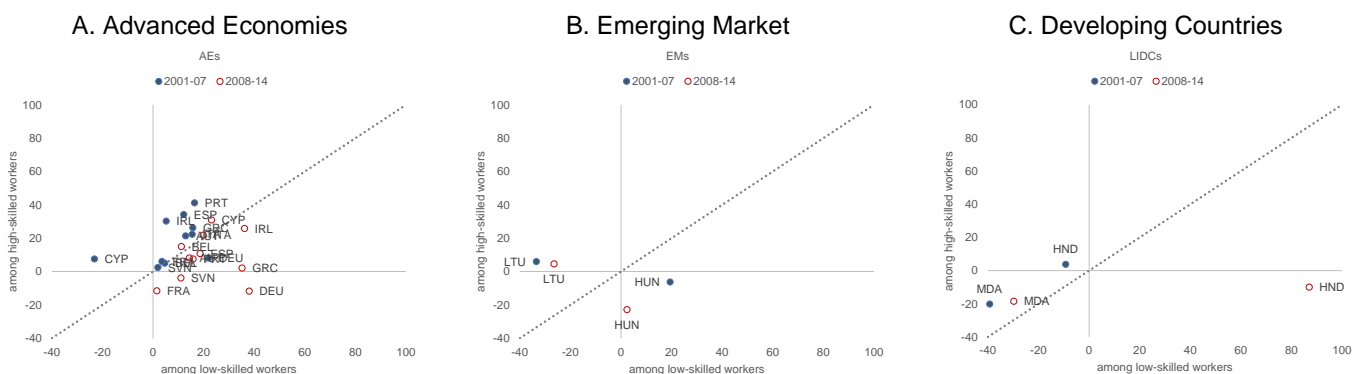
A. Advanced Economies   B. Emerging Market   C. Developing Countries

Source: IMF staff calculations. For observations below the 45-degree line (dashed), the premium for low-skilled workers exceeds the premium for high-skilled workers.

IV.   Public-Private Pay Differentials and Their Drivers Over Time

A. Database Description

We compile two datasets on average compensation per employee—separately for the public and private sectors—using data on total employment and total compensation of employees compiled according to the System of National Accounts (SNA).[11] In each case, we compute nominal compensation per worker by taking the ratio of total compensation of employees and total employment. The coverage (across countries and time) and the data sources for each of these datasets are as follows:

1. *Annual dataset:* we obtain data from the United Nations Statistics Division Database. The data covers 43 countries (14 EMDEs and 29 AEs) over the period from 1995 to 2020.
2. *Quarterly dataset:* we obtain data from the OECD quarterly database of national accounts. The data covers 32 countries (7 EMDEs and 25 AEs) over the period from 1990: Q1-2022: Q2.

Our definition of the public sector is standard and uses the activity classification given in sections O, P and Q of ISIC Rev. 4.[12] This encompasses the group of non-market entities that incur expenditures on services that are rendered to the general public, primarily for the benefit of individual households. There are several advantages for using these data, at least in the context of our analysis. First, the category of total compensation of employees in SNA allows to capture not only wages and salaries, but also other types of remuneration, including bonuses, gratuities, income in kind, allowances, and retroactive wage payments among others. It is also reported on a gross basis, prior to deductions for employees' contributions to income tax, employment insurance, and pension funds. It thus provides a measure of the true cost of labor. Second, the SNA provides a framework whereby countries compile and present data consistently according to a standard international classification of economic activities, allowing not only for a clear breakdown of public and private sectors, but also one that is comparable across countries and over time. The private sector is also defined using the activity classification given under ISIC Rev. 4. Within this definition, we adopt two different approaches in computing our measure for private compensation per worker. The first is standard and encompasses all activities that are carried out by private organization. However, one concern when using aggregate data is that the average

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[11] The System of National Accounts (SNA) is an internationally accepted set of guidelines for the compilation of national accounts. Once a year, countries prepare estimates on an SNA basis in response to a questionnaire used by the Organization for Economic Co-operation and Development (OECD). Data on employment levels and total compensation are compiled according to the same classification of economic activities, and thus can be matched exactly to allow for systematically computing average pay by sector.

[12] This includes public administration and defense, as well as health and education services. ISIC is a standard classification of economic activities arranged so that entities can be classified according to the activity they carry out. The categories of ISIC at the most detailed level (classes) are delineated according to what is, in most countries, the customary combination of activities described in statistical units and considers the relative importance of the activities.

employee under this wider definition of the private sector tends to have a relatively lower skill level than a public sector employee. One way to control for differences in average skill levels across sectors (and countries) in this case would be to focus on the private manufacturing sector rather than on the overall private sector. For this reason, and for the remainder of this analysis, the private manufacturing sector is our preferred measure for the private sector, and similar measures of average compensation have been used in previous studies. To the best of our knowledge, however, our database constitutes the largest and most comprehensive available to date.

Figure 7 (panel A) presents the distribution of the ratio of average public to private compensation per employee for advanced and emerging and developing countries. On average, the public-private pay ratio is around 1.12, which suggests a pay differential of 12 percent—roughly in line with the average public-private wage premium of 10 percent estimated using micro data in the previous section. The ratio is substantially higher in EMDEs (median of 1.34) than in AEs (median of 1.06) and varies significantly within each country-income group. Figure 7 (panel B) presents the median ratio of public to private pay overtime for each country-income group. Between 1997 and 2007, the ratio increased, on average, among EMDEs, mostly due to a rapid and large increase in public pay over that period. In both AEs and EMDEs, the ratio increased between 2008 and 2010, starting at the onset of the global recession and financial crisis, largely due to a relatively larger decrease in average compensation in the private sector (by around 4 percent), compared to the decline in average compensation in the public sector (less than 1 percent decline). The recovery in private compensation between 2011 and 2016 has subsequently led to a gradual decrease in the public to private pay ratios across both income groups. More recently, the ratios have continued their decline due to larger increases in private wages following the recovery from the COVID-19 pandemic and subsequent economic downturn.

Figure 7. Ratio of Average Compensation in the Public Sector to Average Compensation in the Private Sector (1995-2020)

A. Distribution of Pay Ratios

B. Time Evolution of the Pay Ratio
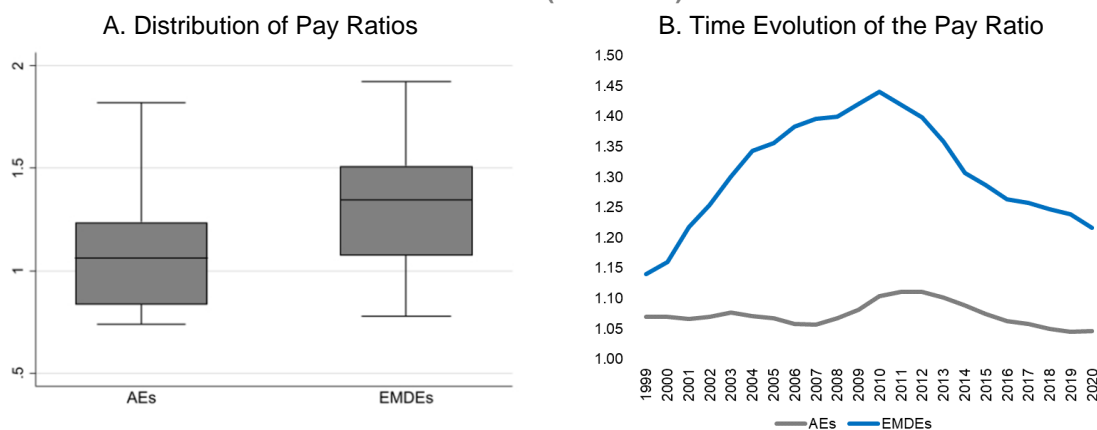
Source: IMF staff calculations, based on data from the United Nations Statistics Division. In panel A, Lower and upper boundaries represent the 25th and 75th percentiles. The line inside the box represents the 50th percentile.

B. The Impact of Economic and Political Factors on Public-Private Wage Differentials

A wide range of studies have investigated the relationship between public wage policy and economic and political cycles, with most findings suggesting that it tends to be pro-cyclical (Lane, 2003; Shi and Svensson, 2006; Eckardt and Mills, 2014; Gaspar et. al., 2017; Endegnanew, Soto, and Verdier, 2017). Other findings also highlight that such procyclicality mostly reflects that of public wage levels rather than public employment, and that it tends to be larger than that of total public spending (Lane, 2003; Holm-Hadulla et. al., 2012). Furthermore, these relationships are found to be particularly prominent in developing and transition economies (Eckardt and Mills, 2014). Existing studies also find that political cycles matter for fiscal policy, although the evidence is somewhat inconclusive on that front. In developing economies, Schuknecht (2000) finds that the electoral cycle is associated with increases in public expenditures, but the impact on government spending on wages and salaries was found to be rather small and statistically insignificant. On the other hand, Eckardt and Mills (2014) finds that total government spending on wages and salaries tends to be more responsive than total government expenditures to electoral cycles—and that this impact is more pronounced in eastern and central European countries than in western European ones—which is consistent with the latter group having stronger fiscal checks and balances. Other studies, including Cahuc and Carcillo (2012), also find evidence for pro-cyclicality (political and economic) of total government spending on wages in the case of OECD countries.

A main shortcoming is that most studies that investigate the relationship between public wage policy and economic and political cycles focus on total government spending on wages and salaries (as a percent of GDP) and on the level of public wages as variables of interest. One, however, can argue—at least from a policy perspective—that the interest ought to be in how these cycles ultimately affect public-private pay differentials (which also considers the response of private), mostly because the wage determination process in the public sector often involves systematic comparisons with the private sector. Our newly compiled database allows us to address this shortcoming in the literature.

Our aim is to estimate the relationship between economic and political factors and the public-private pay ratio using the annual data that we compiled for average compensation per employee in the private and public sectors over 1995 to 2020. The remaining variables are obtained from the IMF's International Finance Statistics (IFS) and World Economic Outlook databases. The specification is as follows:

$$y_{it} = \alpha + \beta\, EC_{it} + \lambda\, PC_{it} + \gamma\, z_{it} + \delta\, T_{it} + f_i + \varepsilon_{it} \tag{1}$$

where the dependent variable is the log of the ratio of average public pay to average private manufacturing pay.[13] The variables denoting EC_{it} and PC_{it} are binary—equal to 1 in periods of economic slack or recession (zero otherwise) for EC, and an election year binary variable in the case of PC. We use the output gap (in percent of real potential output) to define the binary variable indicating recessions and expansions. Inflationary expectations are defined as the inflation forecast in the IMF Spring issue of the World Economic Outlook for the previous year. The vector z_{it} contains conditioning variables to help capture the impact of other factors that may affect the dynamics of public-private wage differentials across countries and time: the ratio of public to private employment, inflation expectations, and a measure of economy-wide productivity (real output per worker).[14] We also include country-fixed effects f_i, and a linear and quadratic time trends in the regressions.[15] The coefficient β measures the percent change in the pay ratio during periods of economic slack (i.e., in recessions), while λ measures how it changes ahead of election years (relative to non-election years).

The results indicate that public-private pay differentials are affected by both electoral and economic cycles. First, we find that the pay ratio behaves in a counter-cyclical manner, increasing by about an extra 3 percent during recessions compared to non-recession years (Figure 8, LHS). This could suggest that average public compensation per worker either falls by less than average private compensation per worker during "bad" economic times or possibly even increases. Our finding is robust to different specifications, where we use a transition function of the state of the economy instead of a recession dummy (see Auerbach and Gorodnichenko, 2013). It is also robust to defining the recession dummy as periods of negative growth rather than as periods that correspond to negative output gaps.

We also find that the public-to-private pay ratio varies over the political cycle, mostly due to average compensation per worker in the government sector rising ahead of elections (Figure 8, RHS). However, this effect is only prevalent in emerging and developing countries (EMDEs). In particular, the pay ratio in EMDEs increases by around 2 percent more, on average, during election years relative non-election years. The fact that these effects only matter in EMDEs suggests that they are effectively mitigated in higher-income countries by stronger institutions and governance. Previous studies also find that government total spending on wages and salaries increases by around 0.5 percentage points during election years—and that this effect is most prominent in EMDEs—albeit, due to data limitations, they could not establish whether this is due to increases in public wages or public employment. Our findings suggest that public sector wage policy appears to be a tool—

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[13] See definitions for these variables in Section II A.

[14] The employment ratio can be a potentially important determinant of the public premium. Expectations about inflation help capture the fact that forward-looking workers and employers may build higher inflation into future wage contracts through collective bargaining processes so that wage increases are higher during periods of high inflationary expectations. Since the degree of unionisation is typically stronger in the public than in the private sector, relative public wages could also increase more during such periods. Real output per worker can help control for the impact of changes in productivity and the skill base in the private sector over time, which help increase relative private wages.

[15] For hypothesis testing, we use standard errors that are clustered at the country level, robust to heteroscedasticity and autocorrelation, and based on a non-parametric block bootstrap procedure (Bertrand et. al., 2004; and Kilian and Kim, 2009).

at least in some countries— for influencing voting behavior, consistent with findings from other studies (see, Robinson et. al., 2006).

Figure 8. The Economic and Political Cyclicality of Public-Private Pay Differentials
(in percent)

A. Impact of Recessions on the Pay Ratio

B. Impact of Election Years on the Pay Ratio

Source: IMF staff estimates.
Note: Statistical significance is based on clustered standard errors (at the country level), calculated using a non-parametric block bootstrap procedure with 2000 replications, and are robust to heteroscedasticity and autocorrelation. (*) (**) and (***) indicate significance at the 10, 5 and 1 percent levels.

V.   Macroeconomic Effects of Changes in Public Sector Wages

How do wage developments in the public and private sectors affect each other? According to the Scandinavian model of wage determination (Strom, 1997), the private tradable-goods sector is the leader in the wage setting process in the wider economy, with its wage developments largely influencing those in the non-traded sector (e.g., including the public sector). On the other hand, these predictions of are at odds with stylized facts in many countries that public wages tend to grow at a faster pace than wages in the private sector, and this can have potentially negative implications on cost competitiveness. From this perspective, a better understanding of how wages in both sectors interact with each other can help improve our understanding of the wage-setting mechanism in the economy, which can have important policy implications. The empirical evidence on these wage interactions is relatively mixed with no clear consensus on which sectoral wages help determine the economy-wide wage setting process. Some studies find evidence for a significant impact of public wages on private sector wages (Friberg 2007; Perez and Sanchez, 2010; Afonso and Gomes, 2014). Others find that the private sector tends to lead the wage-setting process (Lindquist and Vilhelmsson, 2006; Lamo et. al., 2008). Camarero et. al. (2014) finds mixed evidence, namely that the public sector helps determine wages in the economy in some countries (e.g., Germany, Belgium, and Greece), while the opposite holds true in others

(e.g., Spain and Ireland). Lamo et. al. (2013) also find considerable heterogeneity in the wage setting mechanism across OECD countries.[16]

Another important question is how changes in average public wages affect the macroeconomy. Standard economic theory has long held that—outside extreme hyperinflations—inflation has little to do with fiscal policy (Friedman, 1956). Aside from standard New Keynesian models which predict that expansionary fiscal policy can be inflationary, a newer class of theoretical models—most notably the fiscal theory of the price level— posit that changes in fiscal policy can be important drivers of inflation because they can affect the real value of public debt and this in turn can drive up prices (Cochrane, 2022). Within this framework, an increase in public wages that leads to an increase in the value of debt can be inflationary if investors believe that the government will not accumulate the surpluses needed to repay it or that they require a higher return to hold such debt. The general perception is that an important way that public wage dynamics can feed into the macroeconomy—and into consumer prices in particular—is potentially through their impact on affecting the likelihood and the severity of an economy-wide wage-price spiral. For instance, automatic wage indexation and cost-of-living adjustment (COLA) clauses tend to be particularly associated with the emergence of such spirals. Wage agreements involving large groups of workers are also thought to be associated with similar ripple effects. For example, when large and powerful public sector labor unions negotiate higher wages, these can have important spillover effects on private sector wages and result in price inflation.
Overall, there are at least two considerations that help explain how (and to what extent) public wage shocks transmit into the macroeconomy by, for example, exacerbating (or attenuating) a wage-price spiral:

1. *Structural factors related to labor market institutions and regulations.* How (and to what extent) public wage increases affect private sector wages depends on, for example the labor market and institutions that govern wage bargaining and wage determination in the economy, as well as the amount of influence the government has in affecting the wage setting mechanism, among other factors.
2. *Prevailing macroeconomic conditions.* The likelihood of an economy entering a wage-price spiral depends in part on macroeconomic conditions. For instance, workers' bargaining power tend to be typically greater when labor demand is strong and labor markets are tight. Similarly, firms may have more pricing power when aggregate demand is strong.[17] Spillovers are also expected to be larger when inflation and its expectations are high and when unemployment is low (Carstens, 2022).[18]

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[16] Differences in findings potentially reflect, at least partly, the sample period, the wage measures used, the sample of countries under consideration, and the empirical methods, among other factors.

[17] Reflecting the degree of competition in product markets, firms with higher markups could raise prices when private wages increase, while those without such market power may hesitate to do so. Strategic considerations in price-setting are also relevant.

[18] The credibility of monetary policy is also an important consideration. A more credible monetary policy, with a commitment to maintaining a low and stable rate of inflation can clearly be more successful in anchoring long-run inflation expectations and this in turn reduces incentives to demand higher nominal wages and set higher prices. While workers may still seek wage increases to catch up with past inflation, the feedback between wages and prices will be weaker and more short-lived, since agents expect inflation to return to target.

A. Empirical Strategy

Overall, and given the theoretical considerations discussed in the previous section, whether (and to what extent) changes in average public wages translate into changes in private wages and inflation are ultimately empirical questions. To answer them, we estimate impulse responses using Local Projections (Jordà 2005). The Local Projections (LP) framework is flexible enough to accommodate panel structures and non-linearities and does not constrain the shape of the impulse response functions, making it less sensitive to misspecification errors compared to VARs. Local projections have been used extensively in the literature for the purpose of estimating the effects of fiscal policy (Auerbach and Gorodnichenko 2013), shocks to excess credit (Jordà et. al., 2013), the pass-through from international oil price shocks (Kpodar and Abdallah, 2022), among others. The baseline specification, over different horizons ($h = 0, . . ,H$), is as follows:

$$y_{i,t+h} = \alpha_i^h + \gamma_t^h + G_0^h y_{i,t} + G_1^h y_{i,t-1} + \cdots + G_p^h y_{i,t-p} + \beta_p^h PW_{i,t} + D^h z_{i,t} + \varepsilon_{i,t+h}^h \qquad (2a)$$

where y is a vector stochastic process containing the following variables: the consumer price index, the unemployment rate, private compensation per employee, the nominal effective exchange rate, and the central bank policy rate. PW is the log of average compensation per employee in the public sector. The vector z contains control variables, including the ratio of employment in the public and private sectors.[19]
We include country-fixed effects to control for unobserved country-level heterogeneity across countries in the sample, and year-fixed effects to capture common global shocks such as shifts in international commodity prices (including oil) or the global business cycle, among others. Another advantage of estimating impulse responses using the LP method—over those from VARs—is its flexibility in dealing with non-linearities and state dependency (Ramey and Zubairy, 2018). Moreover, compared to an estimation strategy whereby one would split the sample into two country groups based on some factors or characteristics, the joint estimation allowed by the LP framework also leads to gains in efficiency. To investigate the potential heterogeneity in the effects, we modify the baseline specification in (2a) to allow them to vary according to country-level factors, including the state of the economy, the size of the public sector, and labor market institutions and regulations. The modified specification is as follows— where D_{it}—either a binary indicator denoting the factors or a transition function of the factors as in Auerbach and Gorodnichenko (2013)—is interacted with the public wage variable.

$$y_{i,t+h} = \alpha_i^h + \gamma_t^h + G_0^h y_{i,t} + G_1^h y_{i,t-1} + \cdots + G_p^h y_{i,t-p} + \beta_1^h D_{i,t} PW_{i,t} + \beta_2^h (1 - D_{i,t}) PW_{i,t} + D^h z_{i,t} + \varepsilon_{i,t+h}^h \qquad (2b)$$

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[19] According to standard theory, reflecting the potential importance of job flows across public and private sectors and the fact that workers in these sectors are normally paid at their marginal products, the ratio of wages in both sectors is closely tied to the public to private employment ratio (Fernández-de-Córdoba 2012). We find evidence for this relationship in our data. We also find that the degree of substitutability between public and private employees is higher among developing economies.

We use quarterly data over the period from 1990: Q1-2022: Q2 for a sample of 32 countries, of which 25 are advanced countries, and 7 are emerging countries—for a total of around 3250 observations. For the employee compensation variables, we use the quarterly database that we described earlier in detail. The remaining variables are obtained from the IMF's International Finance Statistics (IFS) database. In estimating the impulse responses, we include 4 lags of each variable. Prior to estimation, we transform all variables into log first differences (except for the interest rate variable, which we first-difference only). Finally, for hypothesis testing, we use standard errors that are clustered at the country-level and robust to heteroscedasticity and autocorrelation, and then we report 90 percent confidence intervals.

To identify shocks to average public wages, we impose restrictions on the contemporaneous responses of the variables. Strict exogeneity in this case is not required. A much weaker—and more defensible assumption—is that changes in public compensation per employee—which imply changes in government spending on compensation of employees—are predetermined with respect to macroeconomic variables. That said, changes in average public pay are assumed not to respond to realizations of macroeconomic variables within the same quarter. In practice, this is implemented by imposing a recursive identification strategy where domestic retail energy prices are ordered first. The identification strategy closely follows the one used by Blanchard and Perotti (2002) and has been extensively used in studies that estimate the impact of fiscal shocks on real output and, more recently, in estimating the impact of these shocks on inflation (Jørgensen and Søren, 2022).[20]

B. Empirical Findings

B1. The Dynamic Interactions Between Public and Private Wages

The impulse responses presented in the figures are with respect to a one percent shock in public wages and are accumulated so that the effects are shown on the levels of the variables (wages and consumer prices). Our findings suggest that the effects of public wage shocks on private sector wages are stronger in countries where the public sector (as share of total employment) is relatively large (Figure 9). In particular, a one percent increase in average public wages leads to around 0.45 percent increase in average private sector wages (peak response) in countries with a larger level of public employment. The impact is also persistent, lasting for up to 15 quarters after the shock. This effect is significantly smaller (at around 0.07 percent) and very short-lived in countries where the public sector is relatively small.[21] These findings suggest that the size of the public sector potentially has implications for the role of the sector in driving wage determination in the private sector. This is, for example, the case of Nordic countries in Europe where the incidence of collective bargaining is relatively strong. Labor markets in these countries tend to be characterized by both high union density and high public

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[20] While the analysis in Jordà (2005) does not explicitly discuss the distinction between structural and reduced form impulse responses, the impulse responses in his study are obtained using similar identification (Jordà 2005, pp. 175).

[21] We use the ratio of public employment to total employment as a measure for the relative size of the public sector. To isolate estimate for larger versus smaller public sector countries, we use the transition function suggested in Auerbach and Gorodnichenko (2013). We do not find evidence that the size of the public employment matters for the impact of private wages shocks on average public wages.

employment (relative to the EU average) and, for the most part, the public sector takes the lead in the annual bargaining rounds which help set wages in other sectors.

Figure 9. The Response of Private Wages to Public Wage Shocks
(in percent by size of the public sector)
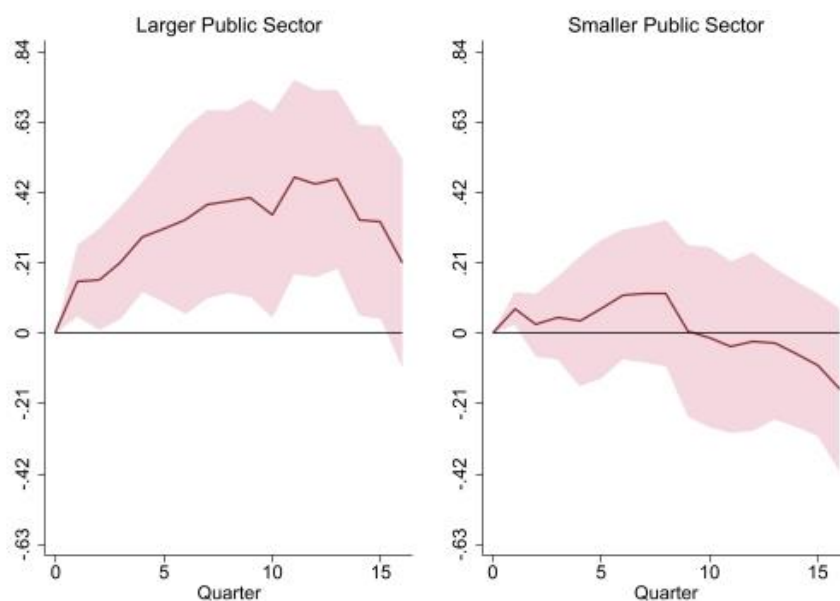
Note: IMF staff calculations. The year of the shock is t=0; the shock represents a 1 percent increase in average public wages. The shaded area represents 90 percent confidence intervals.

On the other hand, our findings also suggest that shocks to average private sector wages exhibit stronger effects on average public wages in countries that are more competitive and more open to trade (Figure 10). A one percent increase in average private wages leads to around a 0.27 percent increase in public sector wages in countries that are more open to trade. The impact is also persistent, remaining positive and significant over the entire horizon following the shock. In contrast, the effect is smaller (at around 0.10 percent) in countries that are relatively less open to trade, and the effect is very short-lived being significant for only two quarters after the shock. This implies that in more open economies, public sector wages are potentially primarily determined by fundamentals originating in the private sector with a limited influence by government on the wage the setting mechanism. This is broadly consistent with the predictions from the Scandinavian model of wage leadership, and are in line with the findings in Campos, et. al. (2017), which also suggest that observed pay gap differentials are explained by the degree of exposure to international competition.

Figure 10. The Response of Public Wages to Shocks in Private Wages
(in percent by degree of openness to trade)
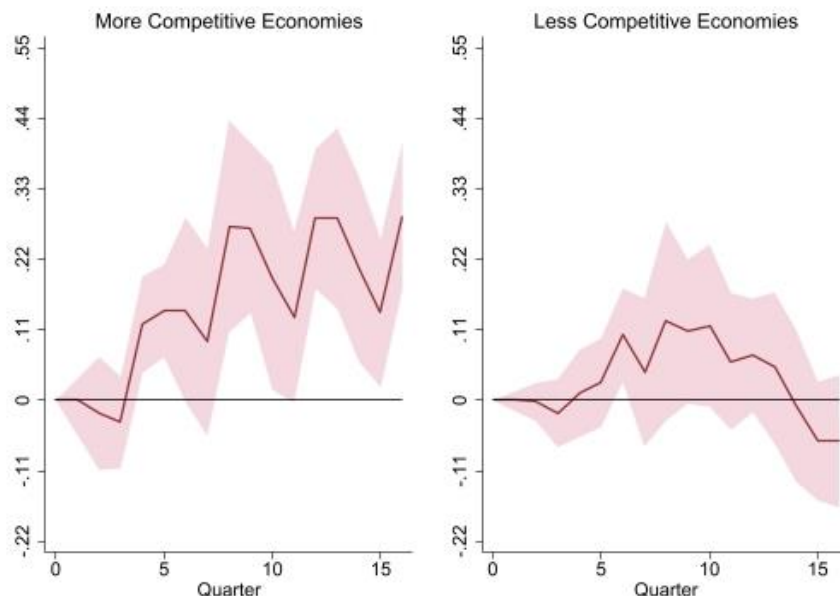
Note: see footnote for Figure 9.

## B.2 The Impact of Public Wage Shocks on Private Wages

Figure 11-12 show that an increase in public wages leads to larger and more persistent effects on private wages in countries with higher union density and bargaining coverage and countries with greater degree of centralization of wage bargaining. For instance, a one percent shock in public wages in these countries increases average private wages by up to around 0.31 and 0.52 percent, respectively (Figures 11-12, LHS). The effects in countries with lower unionization and bargaining coverage and less centralized bargaining are much smaller (at around 0.13 and 25 percent, respectively) and are less persistent.[22] Other conditions, such as the degree of overall price stability and the strength of the economy, may also increase the magnitude and persistence of the effects of public wage shocks on private wages. Whether a higher inflation environment increases the impact of public wage increases on private wages is assessed by interacting the public wage variable with a binary indicator equal to 1 if the initial level of inflation in a country is higher than a certain threshold, and zero otherwise.[23] In the current context, if wage negotiations in the public sector set the benchmark for private sector negotiations, an increase in public wages would be expected to have larger spillovers on private wages in a high-inflation environment compared to under a low-inflation environment.

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[22] A similar pattern is found when we allow the effects to vary by the degree of union density in the public sector, with the impact of average public wage increases being higher in countries where union density in the public sector is higher.

[23] We use the 90th percentile of inflation across countries in the sample as a threshold, which amounts to roughly 4.5 percent inflation.

Figure 13 displays the results, which suggest that a one percent increase in public wages leads to around 0.59 increase in private wages (peak response)—roughly 3 times larger than the increases observed in a low-inflation environment. We also find that the effect of public wage increases on private wages is larger and more persistent during periods of lower economic slack (Figure 14).[24] This may be explained by the fact that workers' bargaining power is greater when labor demand is strong, and supply is tight.
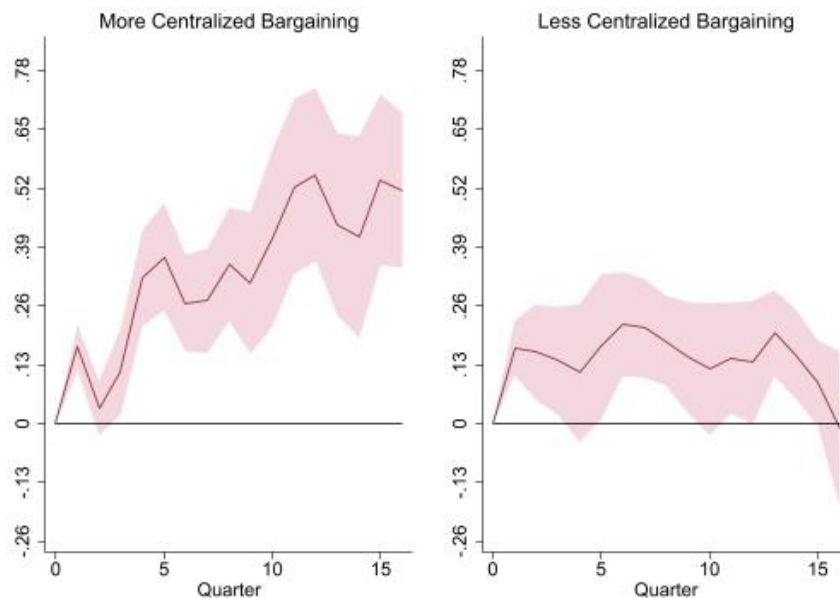
Figure 11. The Response of Private Wages to Public Wage Shocks
(in percent by degree of bargaining coverage)
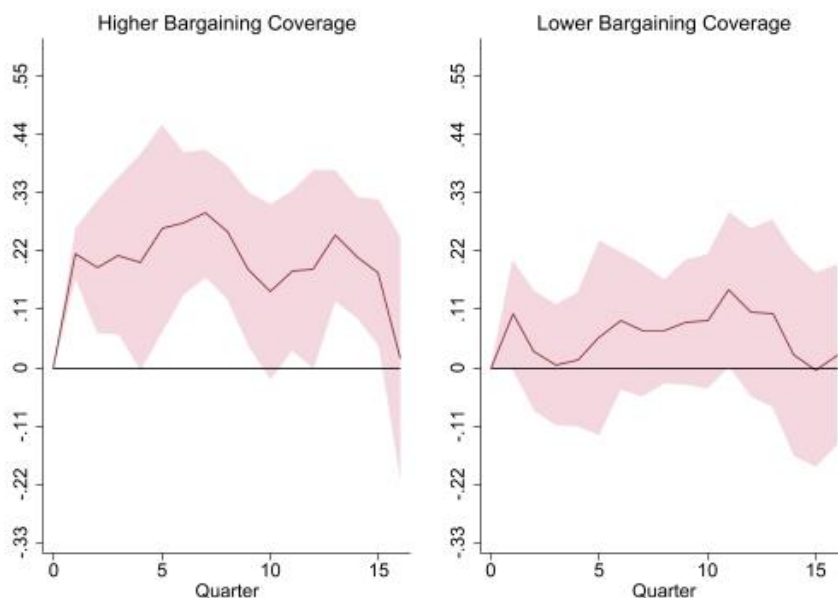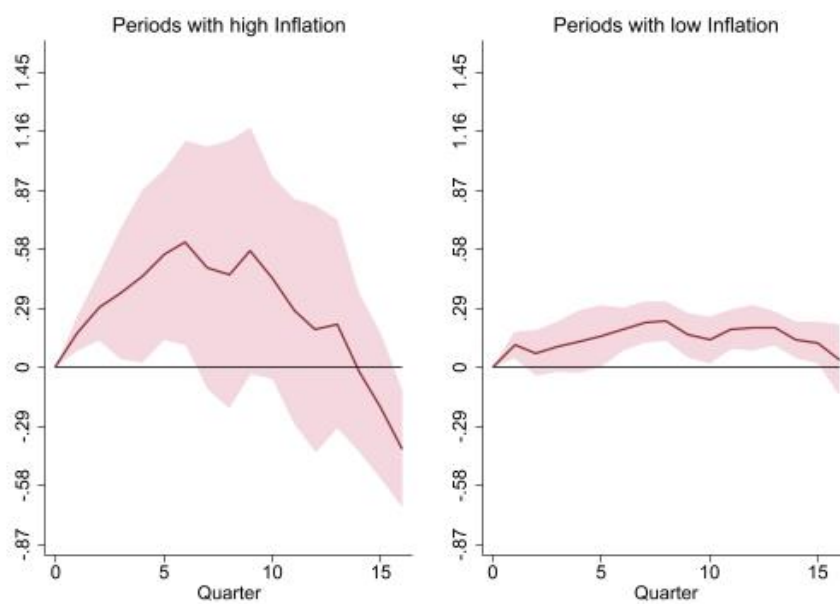

Note: see footnote for Figure 9.

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[24] We use civilian employment as a measure for economic slack. Compared with the unemployment rate, this measure has advantages, most notably it accounts for individuals without jobs who elect to stop actively searching for employment (called "discouraged" workers) and consequently are not counted as unemployed. As an analogue to the unemployment gap, we measure the current employment shortfall using the transition function suggested in Auerbach and Gorodnichenko (2013).

Figure 12. The Response of Private Wages to Public Wage Shocks
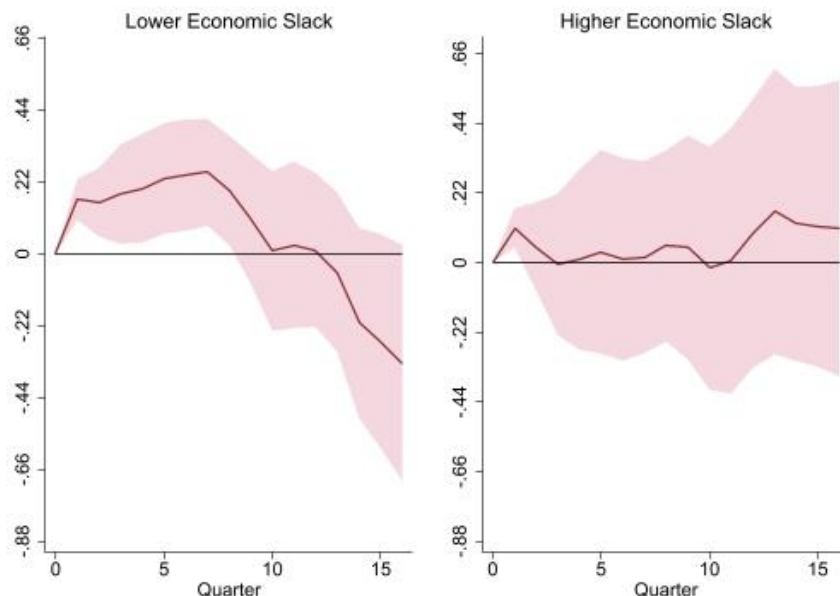(in percent by degree of centralization of wage bargaining)

Note: see footnote for Figure 9.

Figure 13. The Response of Private Wages to Public Wage Shocks
(in percent by inflation level)

Note: see footnote for Figure 9.

Figure 14. The Response of Private Wages to Public Wages Shocks
(in percent by state of the economy)

Note: see footnote for Figure 9.
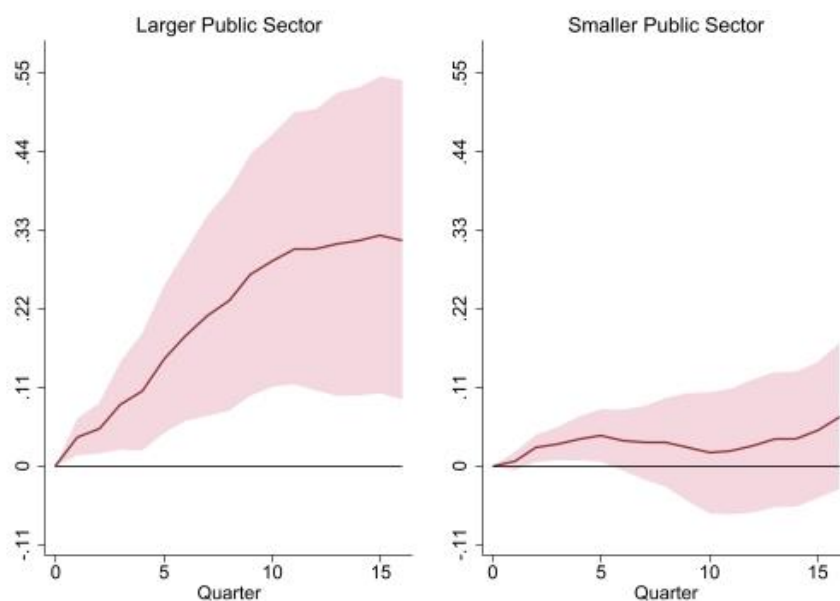
B3. The Impact of Public Wage Shocks on Inflation

The pattern for the responses of inflation, in terms of both magnitude and persistence, follows to a large extent the response of private wages to public sector wages. As explained earlier, through their association with private wages and the possibility of contributing to a wage spiral, public wages could lead to higher and more persistent inflationary pressures. Figure 15-19 display the impulse responses of the consumer price level to a public wage shock in different country environments. Our findings suggest the following:

- An increase in public wages leads to larger and more persistent effects on the consumer price level in countries where the size of the public sector is relatively large. In particular, the effect in countries with a larger public sector is around 0.3 percent (Figure 15)—nearly 5 times bigger than the effect for countries with a relatively small public sector (around 0.06 percent). Furthermore, while shocks to public wages have a persistent effect on consumer prices in the former group, their effects on consumer prices in the latter group are transitory—being short-lived and becoming statistically insignificant starting from few quarters after the shock. This is expected as in countries with a relatively larger public sector, public wage negotiations tend to set the benchmark for private sector wage negotiations.
- The impact on the consumer price level is also larger and more persistent in countries with higher bargaining (or union) coverage (Figure 16) and in countries with greater degree of centralization of wage bargaining (Figure 17). For instance, a one percent shock in public wages in these countries increases the consumer price level by up to around 0.10 and 0.22 percent, respectively (Figures 16-17, LHS). The effects in countries with lower unionization and bargaining coverage and less

centralized bargaining are smaller (at up to around 0.03 and 0.06 percent, respectively), are less persistent, and mostly insignificant (Figures 16-17, RHS).[25]

- Moreover, if wage negotiations in the public sector set the benchmark for private sector negotiations, an increase in public wages would be expected to have larger spillovers on inflation in a high-inflation compared to a low-inflation environment—mostly due to the fact, as we have shown earlier, private wages tend to rise more and in a more persistent way under a higher inflationary environment. Our results (Figure 18) suggest that a one percent increase in public wages leads to around 0.44 increase in consumer prices (peak response)—roughly 3 times larger than the response associated with a low inflation environment (peak response of around 0.14 percent).

- We also find evidence that the effect of public wage increases on consumer prices is larger and more persistent during periods of lower economic slack (Figure 19). In such periods, consumer prices rise by about 0.2 percent in response to the public wage shock and remain positive and significant over long horizons. As discussed earlier, this could be explained by the fact that during periods of low economic slack workers' bargaining power is typically greater since labor demand is strong and labor markets are tight. In contrast, we find no evidence of ana effect of public wage shocks on consumer prices during periods of higher economic slack.
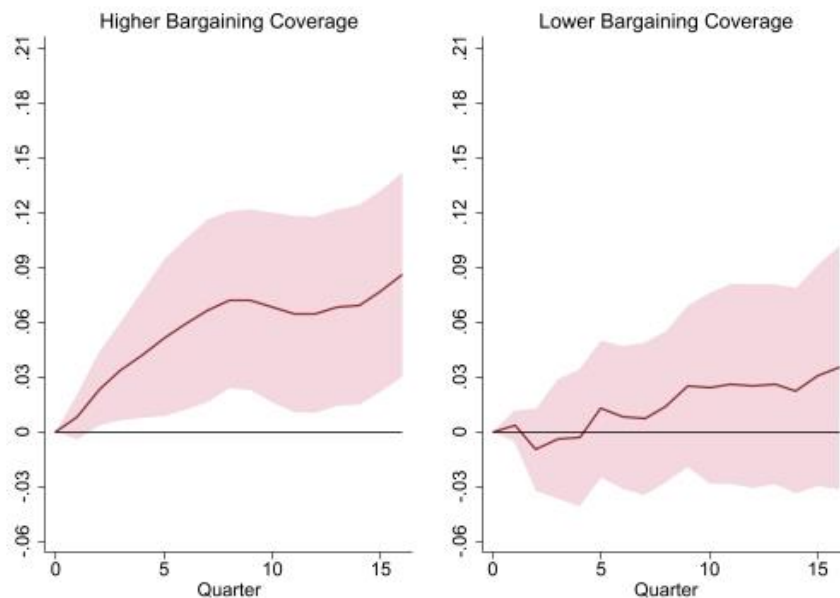
Figure 15. The Response of the Consumer Price Level to Public Wage Shocks
(in percent by size of the public sector)

Note: see footnote for Figure 9.

Figure 16. The Response of the Consumer Price Level to Public Wage Shocks
(in percent by degree of bargaining coverage)

Note: see footnote for Figure 9.

Figure 17. The Response of the Consumer Price Level to Public Wage Shocks
(in percent by degree of centralization of wage bargaining)

Note: see footnote for Figure 9.

Figure 18. The Response of the Consumer Price Level to Public Wage Shocks
(in percent by inflation level)

Note: see footnote for Figure 9.

Figure 19. The Response of the Consumer Price Level to Public Wage Shocks
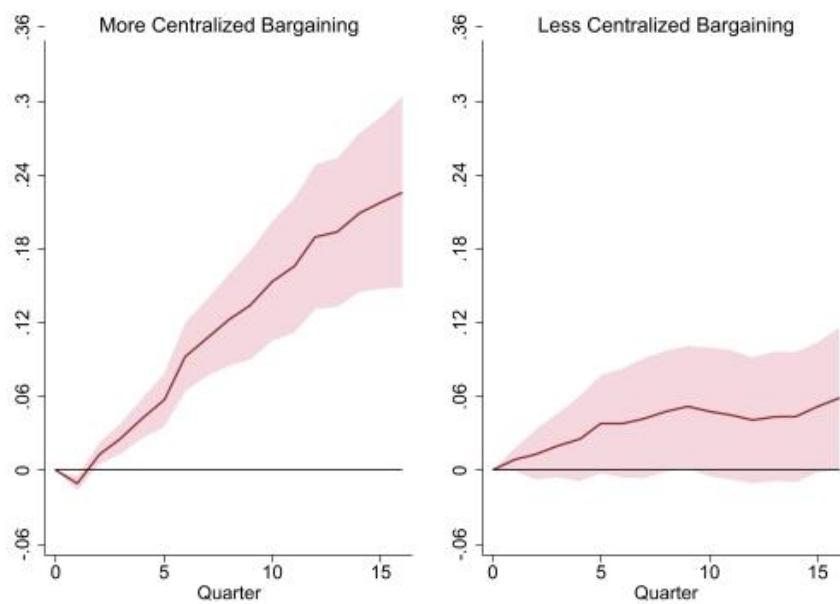(in percent by state of the economy)

Note: see footnote for Figure 9.

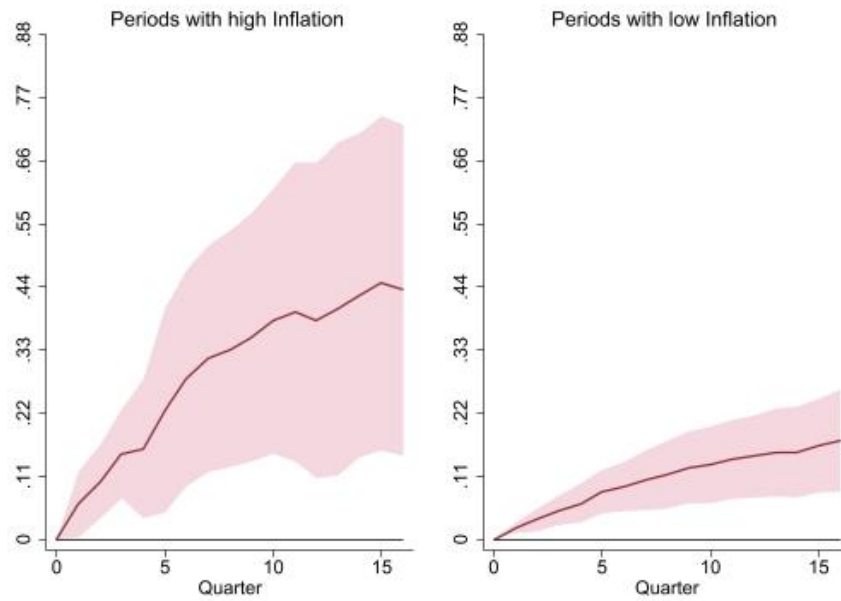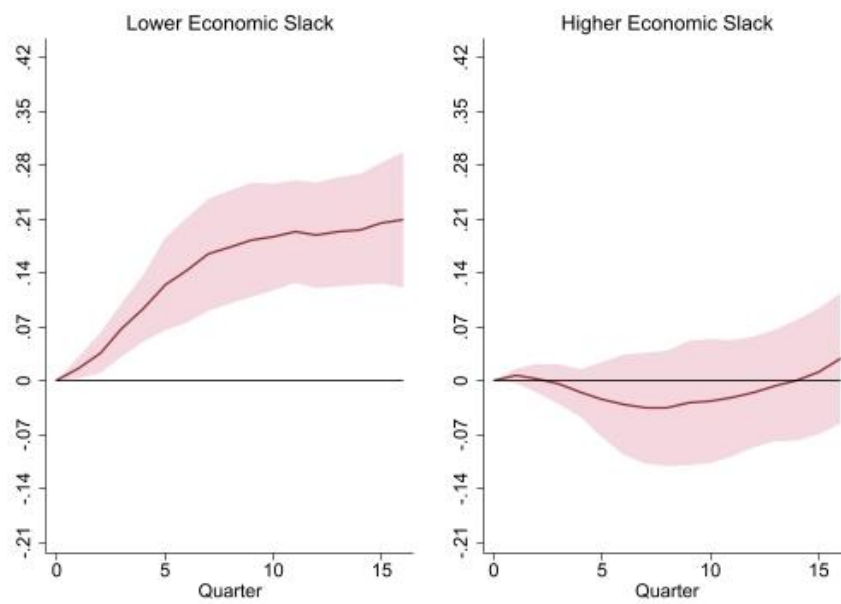# VI. Conclusion

In this paper, we examine how public and private wages compare across countries and over time using two novel and comprehensive cross-country datasets compiled for this purpose. Using the first dataset of micro-econometric estimates, we find that, on average, public wages are around 10 percent higher than private wages for workers with similar socio-economic characteristics. The premium tends to decrease with the level of development, ranging from 5.4 percent in AEs, 11.7 percent in EMs, and 12.8 percent in LIDCs. The premium is also found to be higher for women compared to men, possibly reflecting gender wage discrimination in the private sector, and the premium appears to be driven primarily by a premium for lower-skilled workers.

Using time series data on average public and private wages across time over 1990: Q1-2022: Q2, we also find evidence of a public wage premium, especially in EMDEs. The premium in high-income countries was relatively stable up to the start of the financial crisis in 2008, after which it first increased sharply (reflecting a sharp decline in private wages) and then gradually decreased as private wages recovered post crisis. We also find evidence that the premium varies with economic and political cycles. First, the premium varies counter-cyclically across the economic cycle, driven primarily by public wages decreasing by less than private wages during bad economic times. Second, the public wage premium is found to be higher during election years, albeit only in the sample of low-income countries.

Finally, we also estimate the dynamic of public wage shocks on private wages and inflation. We find that public wages tend to drive the wage setting mechanism in the economy in countries where the public sector is relatively large. We also find that both private wages and the price level respond positively to public wage shocks, with significant heterogeneity in the effects, owing to both labor market characteristics and prevailing macroeconomic conditions at the time of the public wage increase. In particular, changes in public wages have larger and more persistent effects on both private wages and inflation in countries with higher unionization, higher bargaining coverage, and in more centralized wage bargaining regimes. They are also larger and more persistent during periods of higher slack in the economy and during periods of higher inflation.

Annex I. Data Source, Methodology

Source	Regression method			Main data sources	Country coverage
	Public dummy	Decomposition	PSM 1/		
IMF	Yes	-		National labour force and household surveys	Bosnia, Botswana, Burkina Faso, Cameroon, Costa Rica, Egypt, Ghana, Gambia, Honduras, Hungary, Jamaica, Kenya, Lithuania, Moldova, Mozambique, Philippines, Rwanda, Serbia, El Salvador, Zambia, Tunisia
ECB	Yes	-		EU-SILC	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, United Kingdom
Panizza (2001), Panizza and Qiang (2005), and Mizala et al (2011)	Yes	Yes		ECLAC household surveys	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, Uruguay, Venezuela
Aminu (2011)	Yes			General household surveys	Nigeria
Hyder and Reilly (2005), and Aslam and Kingdon (2009)	Yes			Living Standards Measurement Survey, and Labour Force Survey	Pakistan
Glinskaya and Lokshin (2007) and Azam and Prakash (2010)		Yes	Yes	National Sample Survey	India
Birch (2006), Gibson (2007), Siminski (2013)	Yes	Yes	Yes	Household, Income and Labour Dynamics Survey, and International Social Survey Program Work Orientations	Australia, New Zealand
Filmer and Lindauer (2001)	Yes			Labour Force Survey, and Household Expenditure Survey	Indonesia
Finan et al (2015)	Yes			National Household Survey	Albania, Armenia, Egypt, Georgia, India, Indonesia, Iraq, Korea, Laos, Pakistan, Sri Lanka, Tajikistan, Timor Leste, Uganda, USA, Vietnam
Casero and Seshan (2006)		Yes		National Household Survey	Djibouti
KIPPRA (2013)	Yes			Economic Survey	Kenya
Lucifora and Meurs (2006)		Yes		Labour Force Survey, Survey of Household Income and Wealth, and Enquete Emploi	France, United Kingdom, Italy
Melly (2005)	Yes			Socio-Economic Panel	Germany
Mueller (1998), and Lammam et al (2015)	Yes			Labour Market Activity Survey	Canada
Molato (2005)	Yes			Labour Force Survey, and Family Income and Expenditure Survey	Philippines
Nielsen and Rosholm (2001)	Yes			Priority Survey, and Living Conditions Monitoring Survey	Zambia
Ognjenovic (2011)	Yes			Living Standards Measurement Survey	Serbia
Rubil (2013)		Yes		Labour Force Survey	Croatia

Note: 1/PSM = Propensity Score Matching (results not used in our analysis.

References

Abdallah, C. and K. Kpodar, 2022. "Dynamic fuel price pass-through: Evidence from a new global retail fuel price database." Energy Economics, 66, August 2017, Pages 303-312.

Afonso A. and P. Gomes, 2014, "Interactions between private and public sector wages," Journal of Macroeconomics, Volume 39, Part A, pp.97-112.

Akhmedov A. and E. Zhuravskaya, 2004, "Opportunistic Political Cycles: Test in a Young Democracy Setting," The Quarterly Journal of Economics, Volume 119, Issue 4, pp.1301–1338.

Alesina A., R. Baqir, and W. Easterly: 2000, "Redistributive Public Employment," Journal of Urban Economics, 48(2), 219-241.

Angrist J. D. and J. S. Pischke: 2009, "Mostly Harmless Econometrics: An Empiricist's Companion," Economics Books, Princeton University Press, Edition 1, Volume 1.

Ashenfelter O. C. and R. G. Ehrenberg: 1975, "The Demand for Labor in the Public Sector," In Hamermesh D. S. (eds.), "Labor in the Public and Nonprofit Sectors," Princeton University Press, 55–78.

Auerbach, Alan, and Y. Gorodnichenko. 2013. "Measuring the Output Responses to Fiscal Policy" American Economic Journal: Economic Policy 4 (2): 1–27.

Bellante D. and A. N. Link: 1981, "Are Public Sector Workers More Risk Averse Than Private Sector Workers?" Industrial and Labor Relations Review, Cornell University, ILR School, 34(3), 408-412.

Bermperogloua D., E. Pappa, and E. Vella, 2017. "The government wage bill and private activity". The Journal of Economic Dynamics and Control. 79 (21-47).

Blanchard, O., Perotti, R., 2002. An empirical characterization of the dynamic effects of changes in government spending and taxes on output. Q. J. Econ.117 (4), 1329–1368.

Blinder, A. S., 1973, "Wage Discrimination: Reduced Form and Structural Estimates," Journal of Human Resources. 8 (4): pp.436–455.

Borjas, G. J.: 1980, "Wage Determination in the Federal Government: The Role of Constituents and Bureaucrats," Journal of Political Economy, 88(6), 1110–1147.

Cahuc, P. and S. Carcillo, 2012, "Can Public Sector Wage Bills Be Reduced?" NBER Working Paper No. w17881.

Camarero, M., G. D'Adamo, and C. Tamarit, Cecilio, 2014, "Wage leadership models: A country-by-country analysis of the EMU," Economic Modelling, 44, issue S1, pp. S2-S11.

Campos, M., D. Depalo, E. Papapetrou, J. Pérez, and R. Ramos, 2017, "Understanding the public sector pay gap," IZA Journal of Labor Policy, 6, issue 1, pp.1-29.

Carstens, A (2022): "The return of inflation", speech at the International Center for Monetary and Banking Studies, Geneva, 5 April 2022.

Chatterji M., K. Mumford, and P. N Smith: 2007, "The Public-Private Sector Wage Differential: Gender, Workplaces and Family Friendliness," Dundee Discussion Papers in Economics 202, Economic Studies, University of Dundee.

Cochrane, J. H., 2022, "The Fiscal Theory of the Price Level," Princeton: Princeton University Press, forthcoming.

De Castro F., M. Salto, and H. Steiner: 2013, "The gap between public and private wages: new evidence for the EU," European Economy - Economic Papers 508, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Dickson M., F. Postel-Vinay, and H. Turon, 2014, "The lifetime earnings premium in the public sector: The view from Europe", Labour Economics, 31, Pages 141-161.

Drazen A. and M. Eslava, 2010, "Electoral manipulation via voter-friendly spending: Theory and evidence, Journal of Development Economics," Volume 92, Issue 1, pp. 39-52.

Eckardt S. and Z. Mills, 2014, "What Goes up Must Come Down – Cyclicality in Public Wage Bill Spending," World Bank Policy Research Working Paper No. 6760.

Endegnanew, Y., M. Soto, and G. Verdier, 2007, "Do Elections Affect the Wage Bill?", Chapter 6 in Gaspar, Gupta and Mulas-Granados, eds., Fiscal Politics.

Finan, F., B. Olken, and R. Pande, 2015, "The Personnel Economics of the State," National Bureau of Economic Research Working Paper 21825.

Friberg, K., 2007, "Intersectoral wage linkages: the case of Sweden," Empirical Economics, vol. 32, pp.161-184.

Friedman, M., 1956, "The Quantity Theory of Money: A Restatement," In: Friedman, M., Ed., The Optimum Quantity of Money, Aldine Publishing Company, Chicago, pp.3-41.

Gaspar, V., S. Gupta, and C. Mulas-Granados, Carlos (eds.), 2017, "Fiscal politics," Washington, DC: International Monetary Fund.

Giordano, R., D. Domenico, M. C. Pereira, B. Eugène, Bruno, E. Papapetrou, J. J. Pérez, L. Reiss, and M. Roter: 2011, "The public sector pay gap in a selection of Euro area countries," Working Paper Series 1406, European Central Bank.

Gregory, M. B.: 1990, "Public-sector pay," In Gregory M. B. and A. W. J. Thomson (eds.), "A Portrait of Pay – 1970-1982: An Analysis of the New Earnings Survey," 172-205, Oxford: Clarendon Press.

Gunderson, M.: 1979, "Earnings Differentials between the Public and Private Sectors," The Canadian Journal of Economics, 12(2), 228–242.

Gunderson, M.: 1989, "Male-Female Wage Differentials and Policy Responses," Journal of Economic Literature, American Economic Association, 27(1), 46-72.

Holm-Hadulla F., S. Hauptmeier, and P. Rother, 2012, "The impact of expenditure rules on budgetary discipline over the cycle," Applied Economics, 44:25, pp.3287-3296.

Holmlund, B.: 1993, "Wage setting in private and public sectors in a model with endogenous government behavior," European Journal of Political Economy, 9, 149-162.

Hyder, A., and B. Reilly: 2005, "The Public and Private Sector Pay Gap in Pakistan: A Quantile Regression Analysis," The Pakistan Development Review, 44(3), 271–306.

International Monetary Fund, 2016, "Managing Government Compensation and Employment - Institutions, Policies, and Reform Challenges," IMF Policy Paper (Washington: International Monetary Fund).

Jordà O., M.Z Schularick, and A. M. Taylor, 2013, "When Credit Bites Back," Journal of Money, Credit and Banking, vol. 45(s2), pp. 3-28.

Jordà, O., 2005, "Estimation and Inference of Impulse Responses by Local Projections," American Economic Review, 95 (1): pp.161-182.

Jørgensen, P. and Søren L. 2022. "The inflation response to government spending shocks: A fiscal price puzzle?" European Economic Review, V. 141, January 2022.

Lamo, A., J. Pérez, and L. Schuknecht, 2013 "Are government wages interlinked with private sector wages?" Journal of Policy Modeling, Elsevier, vol. 35(5), pp.697-712.

Lamo, A., L. Schuknecht, and J. Pérez, 2008, "Public and private sector wages: co-movement and causality," Working Paper Series 963, European Central Bank.

Lane, P. R., 2003, "The cyclical behaviour of fiscal policy: evidence from the OECD," Journal of Public Economics, Volume 87, Issue 12, 2003, pp.2661-2675.

Lindquist J. and R. Vilhelmsson, 2006, "Is the Swedish central government a wage leader?" Applied Economics, 38:14, pp.1617-1625.

Linnemann, L., 2009. "Macroeconomic effects of shocks to public employment," J. Macroecon. 31 (2), 252–267.

Lucifora C. and D. Meurs: 2006, "The Public Sector Pay Gap In France, Great Britain And Italy," Review of Income and Wealth, International Association for Research in Income and Wealth, 52(1), 43-59.

Mincer, J. A.: 1974, "Schooling, Experience, and Earnings", No. 74-1 in NBER Books. National Bureau of Economic Research, Inc.

Mizala A., P. Romaguera, and S. Gallegos: 2011, "Public–private wage gap in Latin America (1992–2007): A matching approach", Labour Economics, 18(1), 115-131.

Moore, W.J. and J. Raisian: 1991, "Government wage differentials revisited," Journal of Labor Research, 12, 13-33.

Mueller R. E.: 1998, "Public–private sector wage differentials in Canada: evidence from quantile regressions," Economics Letters, 60(2), 229-235.

Oaxaca, R., 1973, "Male-Female Wage Differentials in Urban Labor Markets," International Economic Review. 14 (3): pp.693–709.

Oesingmann, Katrin (2016) : Extension of Collective Agreements in Europe, CESifo DICE Report, ISSN 1613-6373, ifo Institut - Leibniz-Institut für Wirtschaftsforschung an der Universität München, München, Vol. 14, Iss. 2, pp. 59-64.

Ognjenovic K.: 2011, "Wage Differences between the Private and the Public Sector in Serbia: Some Evidence from Survey Data," The wiiw Balkan Observatory Working Paper 091.

Panizza U. and C. Z. W. Qiang: 2005, "Public–private wage differential and gender gap in Latin America: Spoiled bureaucrats and exploited women?" The Journal of Socio-Economics, 34(6), 810-833.

Panizza U.: 2001, "Public Sector Wages and Bureaucratic Quality: Evidence from Latin America," Economia Journal of the Latin American and Caribbean Economic Association, 0, 97-152.

Pappa, E., 2009. The effects of fiscal shocks on employment and the real wage. Int. Econ. Rev. 50 (1), 217–244.

Perez, J. and A. Sanchez: 2010, "Is There a Signaling Role for Public Wages?" European Central Bank Working Paper 1148.

Ramey, V. and S. Zubairy, 2018, "Government spending multipliers in good times and in bad: Evidence from us historical data," Journal of Political Economy 126(2), pp.850–901.

Rattsø J. and H. E. Stokke, 2019, "Identification of the private-public wage gap," Labour Economics, Volume 59, pp.153-163, ISSN 0927-5371.

Robinson, J., Torvik, R., Verdier, T. (2006). "The Political Foundations of the Resource Curse," Journal of Development Economics, Vol. 79, 447-468.

Rogoff, K., 1990, "Equilibrium Political Budget Cycles," *The American Economic Review*, vol. 80, no. 1, pp.21–36. *JSTOR*.

Schuknecht, L., 2000, "Fiscal Policy Cycles and Public Expenditure in Developing Countries," Public Choice 102, 1pp.13–128.

Shi M. and J. Svensson, 2006, "Political budget cycles: Do they differ across countries and why?" Journal of Public Economics, Volume 90, Issues 8–9, pp.1367-1389.

Strom, B., 1997, "Envy, fairness and political influence in local government wage determination: evidence from Norway," Economica, 62, pp.389-409.

Weichselbaumer D. and R. Winter-Ebmer: 2005, "A Meta-Analysis of the International Gender Wage Gap," Journal of Economic Surveys, 19(3).

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