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Viewpoint Article

Introducing the Worldwide Bureaucracy Indicators: A New Global Dataset on Public Sector Employment and Compensation

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Abstract: *The public sector employs roughly a third of the world's paid workforce. Their wages not only represent the income of a substantial portion of the population but also influence pay setting across the rest of the economy. However, global data on employment and compensation within the public sector, and how these compare to the private sector, has been limited to date. This paper describes a novel dataset produced by the World Bank's "Bureaucracy Lab" attempting to fill this gap. The "Worldwide Bureaucracy Indicators" (WWBI) are compiled from over 53 million unique observations and consist of 63,282 individual observations across 92 variables of the characteristics of public-sector employment, compensation, and the overall wage bill for 132 countries between 2000 and 2018. The indicators, constructed from nationally representative household surveys, present a micro-founded picture of public sector labor markets across the world.*

Evidence for Practice

- The Worldwide Bureaucracy Indicators (WWBI) provide the most comprehensive global data published to date on employment and compensation in both the public and private sectors.
- The WWBI draws on millions of observations of individuals from household surveys across the world to provide a globally uniform set of country-level indicators.
- Coherent and harmonized data on public sector employment and compensation provides policymakers with benchmarks for wage setting across countries.
- The dataset provides coherent descriptions of the demographics of the public service, pay levels, employment size, and relative wage levels. It indicates that public employees are older and more educated than their private sector counterparts, and the gender distribution more even.
- The WWBI are an opportunity for policymakers to better understand where their country fits in the landscape of public sector employment and pay, and for academics to understand stylized facts of public service compensation. The public sector does, on average, pay more than the private sector for similarly qualified individuals in a majority of countries, but skilled and senior public employees tend to earn a lower wage than their counterparts in the private sector.

Public administration matters for the delivery of government services, the provision of infrastructure, and the effectiveness of regulation (Arizti et al. 2020; Ingraham, Joyce, and Donahue 2003; Moynihan and Beazley 2016; Rasul and Rogger 2018). Public institutions also have an impact on fiscal sustainability and the competitiveness of the overall labor market (Hasnain et al. 2019). The public personnel that administers the state and staff public institutions are therefore a critical element of the state. By association, their employment and compensation are key determinants of state productivity (Finan, Olken, and Pande 2017).

These personnel make up roughly a third of the world's paid employees. This implies that public officials are not just important as an input into state capacity, but as an important segment of the economy. Further, since the public sector labor market is relatively insulated from market wage adjustment mechanisms, government pay policies can impact the rest of the economy simply through offering compensation packages that differ from the private sector (Behar and Mok 2013). For these reasons, understanding the nature of employment and compensation across public administrations is of substantive importance to the management and understanding of the state. However, empirical analysis of public administration across- and within-countries has been constrained by a lack of coherent comparative data on bureaucracy, or the public sector as a whole.

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An absence of comparative data hinders the ability of policymakers to determine the appropriate levels of employment and compensation for public sector workers - sufficient for attracting and motivating quality staff without distorting the overall labor market and causing misallocations of labor. Public administrations regularly face the task of wage setting for the public sector without profit-based benchmarks to guide their decision-making. Thus, senior officials often turn to comparisons with private sector actors or public officials in other countries.

Similarly, the development of a globally uniform data on various dimensions of the public sector (including employment, compensation, motivations and performance) would aid in the study of global public administration. Most studies on public administration still focus on a single country and most studies in developing countries remain conceptual, descriptive, or empirically qualitative (Bertelli et al. 2020; Gulrajani and Moloney 2012; Pepinsky 2019).

While these approaches have been valuable for developing concepts, measurement, and hypotheses (George and Bennett 2005), the lack of empirically rigorous studies on global public administration impedes the development of middle-range theories—"interconnected sets of propositions midway between unified theory and working hypotheses," considered the "bedrock for global public administration knowledge" (Perry 2016, 533). To conduct the much-needed large-N quantitative analysis on global public administration, scholars and practitioners require high-quality data on various dimensions of public administration around the globe.

To advance the study of global public administration, we built the Worldwide Bureaucracy Indicators (WWBI) and discovered multiple insights into public employment. For example, the public sector is a more gender-equal employer than the private sector, echoing a recent finding in *Public Administration Review* that state governments in the U.S. lead the private sector in closing the gender wage gap (Lewis, Boyd, and Pathak 2018). While the earlier version of the dataset has been introduced elsewhere (Gindling et al. 2020), this article serves to introduce the latest version of the dataset to public administration scholars and suggests a public administration research agenda that can be advanced with the dataset.

The rest of the article is organized as follows: section two reviews the existing ecosystem of datasets on public employment highlighting the need for building a globally harmonized dataset. Section three describes the WWBI and how it improves on existing resources. Sections four and five present several potential applications of the dataset and expand on the insights that emerge from the WWBI.

The Current State of Cross-National Data on Public Administration

A number of global datasets on public administration exist and can be split into two broad categories. The first, based on surveys of experts, typically provide expert perceptions of the ability of the government to provide public service and manage its workforce. Two prominent examples of these are the Worldwide Governance Indicators (WGI) and the Quality of Government (QoG). WGI ranks 214 countries and territories across six composite indices constructed from over 30 unique primary sources (Kaufmann, Kraay, and Mastruzzi 2010). The QoG measures the structure and behavior of public administration through 1294 expert assessments across 159 countries (Dahlström et al. 2015).

The second, based on household or administration surveys, provide complementary data on government activities and practices including employment and compensation. The International Labor Organization (ILO) provides over 430 indicators on employment and compensation across industries, occupations, and individual demographics for 189 countries and territories. However, only a handful of these measures relate to the size of employment in the public sector. The Organizations for Economic Cooperation and Development (OECD) provides not only aggregated but also disaggregated employment and compensation statistics for its member countries (OECD 2017). In addition, OECD also offers data on the existence and application of administrative practices in diverse areas from budget, procurement to human resources, and e-governance.

Despite the proliferation of datasets related to public sector, gaps remain. First, a coherent and harmonized global dataset on public compensation is absent. This inhibits the ability of researchers and practitioners to understand the linkages between management practice and public sector productivity, of which compensation is a key determinant (Finan, Olken, and Pande 2017).

In addition, a disaggregated public employment dataset with global coverage is lacking. While the OECD only provides this information for member countries, the ILO while boasting almost universal geographic coverage and an extensive catalog of indicators, does not provide indicators directly comparing the private and public sector or disaggregated statistics within the sectors. This lack of a global database on public employment and compensation disaggregated by genders, occupations, and sectors impedes efforts aimed at answering important questions within public administration such as motivating public employees and promoting equity through research and reforms.

Introduction to the Dataset

The Worldwide Bureaucracy Indicators (WWBI), a unique new global dataset on public personnel, aims to fill this gap. The dataset encompasses data from 132 countries between 2000 and 2018 and includes 92 indicators across three categories: the characteristics of public-sector employment, wages and compensations of these employees, and the overall wage bill. Together, these provide an important, albeit narrow, picture of the skills and incentives of bureaucrats.

Indicators on public employment track key demographic characteristics including the size of the public sector workforce (in absolute and relative numbers), their age, and distributions across genders and academic qualifications. Variables on compensation capture both the competitiveness of public sector wages (compared to the private sector) as well as wage differentials across occupation, gender, education, and income quantiles within the public and private sectors. The indicators on the size of the wage bill offer a glimpse into the structure and affordability of the public sector within the larger economy. Hence, the WWBI is primarily directed toward, and is most useful for, quantitative and comparative studies

including both cross-national and temporal differences in the size and composition of the public sector.

The WWBI, therefore, makes two important improvements over previously available datasets. First, it provides a hitherto, unassembled array of indicators on public sector employees including their demographics, compensation, and overall impact on the economy. Second, the WWBI covers countries across the world from all stages of prosperity and boats an 18-year horizon with an average 6 years of coverage for countries. Altogether, the WWBI can assist researchers and practitioners in gaining better insights into the state of public employment and compensation across countries and over time. Similarly, the WWBI provides researchers with the opportunities to undertake pioneering analysis on a diverse set of policy questions related to public administration. Additionally, the dataset also has the ability to serve as measures of government's labor market footprint in a broader range of empirical research in economics and comparative politics.

Description of Dataset Construction

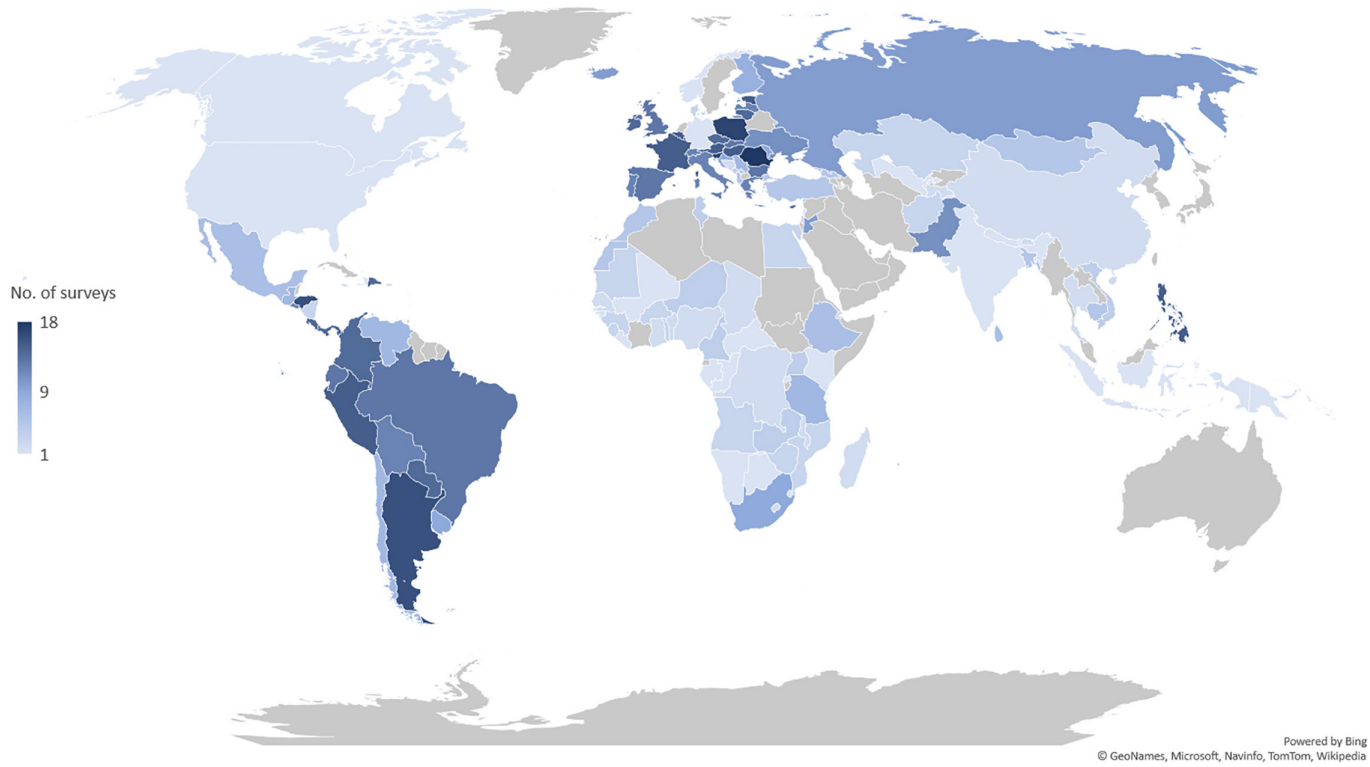
The WWBI is based on microdata drawn from survey data catalogs which house some of the most professionally conducted surveys in the world, frequently supported or managed by World Bank or multilateral organization data teams with substantial experience in such exercises. The primary source among these is the World Bank's International Income Distribution Database (I2D2). I2D2 harmonizes nationally representative household welfare and labor force surveys using a common taxonomy applied to all countries and surveys. To augment this, additional survey data were drawn from Eurostat's European Union Statistics on Income and Living Conditions (EU-SILC), LIS Cross-National Data Center's Luxembourg Income Study Database, and the World Bank's Latin America and the Caribbean Equity Lab (LABLAC). These surveys were added and harmonized to match the I2D2 data structure for the construction of 90 indicators on the public sector employment and wages. Further, two additional indicators on the relative size of the public sector wage bill in the overall economy are added to the WWBI from the International Monetary Fund's (IMF) Government Compensation and Employment Dataset, 2016.

All indicators are not available for all years, since surveys are not available for all years in all countries. Figure 1 describes the frequency of country-year pairs in the dataset, with a small cluster having data in all 18 years, and a number of countries not appearing at all. Those that are absent typically have restrictive data access rules that inhibit the World Bank's access to their survey microdata. The median number of country-year observations in our data is 4 and the mean is 6.

Further technical details are provided in an explanatory note and codebook accompanying the dataset within the World Bank Data Catalog (https://datacatalog.worldbank.org/dataset/worldwide-bureaucracy-indicators).

Advantages of Estimating Macro-Indicators from Household Microdata

Utilizing household surveys as opposed to administrative data as a source of information on public employment offers have certain advantages. Household surveys provide a rich, consistent, and regularly updated set of variables for a variety of worker



Source: World Bank. 2020. Worldwide Bureaucracy Indicators version 1.1

Figure 1 WWBI coverage (years of coverage per country).

characteristics in the public and private sectors that enable robust, controlled comparisons between the two groups.

Surveys allow data to be drawn from the public and private sectors in a common manner. Since data systems focused on the two sectors are often not coherent, this is a substantial strength. Similarly, experts are frequently knowledgeable of either the public or private sector, but not both. Therefore, surveys are a coherent way to understand the public sector within the wider economy.

Utilizing microdata to develop such macro aggregates allows for the construction of evidence-based metrics. The WWBI's 63,282 observations across 92 indicators, for instance, were developed from over 53 million unique worker-level observations from 846 surveys. Each of these surveys was collected using frontier enumeration methodologies and statistical approaches. Thus, across both space and time, household surveys are a more globally consistent source of information compared to administrative data which are more attuned to the specificities of local bureaucracies.

Within the I2D2 framework, additional methods were employed to harmonize data and reconcile persisting differences across surveys. A common coding schema was applied for the construction of a globally and temporally consistent set of indicators. Additionally, where comparability issues emerged from heterogeneous definitions, such as of public employees across countries, a conscious effort could be undertaken toward harmonization. To do this, the WWBI utilized the more broadly defined "public sector" which includes all institutional units controlled directly, or indirectly, by the central and subnational governments as well as public corporations that are engaged in a market-based activity as opposed to the more narrowly defined "general government." This was done in order to ensure cross-comparability between surveys for different countries across various years and to allow for the juxtaposition of the private and public sectors; the WWBI's main objective.

Potential Applications of the Dataset

Policymakers and researchers can use the WWBI to examine a host of features of the global characteristics of employment and compensation across the world. Here we provide three examples to illustrate potential applications of the dataset.

Example 1: The Efficiency Wage Hypothesis & Public Employee Motivation

A central question in public administration is the determinants of public employee motivation (Behn 1995; Christensen, Paarlberg, and Perry 2017). The WWBI is, for instance, ideally suited for empirically investigating the "efficiency wage hypothesis"—the extent to which wage premiums can boost worker efficiency and productivity or reduce employee turnover (Shapiro and Stiglitz 1984). Although the hypothesis has been extensively tested within firm settings (Cappelli and Chauvin 1991; Huang et al. 1998; Wolfer and Zlinsky 2015), the complementary hypothesis, that wages can boost public employees' performance, has rarely been tested (Dal, Ernesto, and Rossi 2013; de Ree et al. 2018; Taylor and Taylor 2011).

The dataset provides detailed indicators for wage premiums across occupations as well as the relative share of public/private employees receiving formal benefits. These measures can serve as independent variables in studies examining the relationship between salary, benefits, and public employees' performance and integrity (Themudo 2014). The WWBI's various indicators also serve as compliments to measures of prosocial motivations from other sources such as the World Values Survey to explore the relative importance of intrinsic and extrinsic sources of motivation on not only public employee productivity but also their initial decision to join and remain in public sector (Perry and Vandenabeele 2015). Moreover, given the preeminence of the public sector as an employer, the WWBI—given its nuanced coverage of public sector employment along occupations and levels of education—can be useful in shedding light on the ability of the public sector to affect labor allocations between the public and the private sectors.

Example 2: Understanding Equity in the Public Sector

Policymakers and researchers can also use the WWBI to advance the research agenda on equity in the public sector. Public administration, as a discipline, is firmly anchored in democratic values such as equity and justice (Frederickson 1980; Radin 2006). This requires disaggregated performance by subgroups (Wichowsky and Moynihan 2008). To this end, scholars and governments have paid attention to the analysis of subgroup performance such as how female employees fare in public organizations (Feeney, Carson, and Dickinson 2019; OECD 2017; Riccucci 2002).

The WWBI provides detailed indicators on the share of female employees at various levels of occupations ranging from senior management to clerical staff and along income quintiles within the public sector. These measures can provide a much-needed description of how female employees fare in public organizations around the world. Moreover, scholars can utilize the WWBI to advance the frontiers of representative bureaucracies by testing the possibility of a non-linear relationship between passive representation—increasing share of minority bureaucrats—and active representation—reforming the bureaucracy to serve the interests of marginalized and minority groups—within policymaking and administration around the globe (Meier 2019).

Example 3: Expanding on the External Validity of Research Findings

A frontier of public management research is the shift from the question of what works to "what works for whom, under what circumstances and for how long" (Pollitt and Bouckaert 2017, 217). The WWBI can provide researchers with more ways of contextualizing their findings. For instance, wage and benefits are major factors affecting public employees' motivation (U.S Merit System Protection Board 2008), so researchers conducting a meta-analysis may benefit from examining how characteristics of public employment such as wage premium between the public and private sector moderate the association of managerial reforms and practices such as performance management and red tape with organizational and individual performance (George et al. 2021; Gerrish 2016).

Moreover, researchers using survey or experimental data in one country may use the WWBI to understand the prevalence of the boundary conditions for their research findings. For instance, crowding-out motivation is more likely to occur in countries where public employees not primarily interested in extrinsic motivation

such as money and benefits constitute the majority of public employees (Frey, Homberg, and Osterloh 2013). Public employees' primary motivation may be different in countries where public employment has a wage premium or the public sector is the largest employer (Hasnain et al. 2019). In those countries, extrinsic motivation such as money and performance management is shown to enhance rather than crowd out public employees' intrinsic motivation (Hasnain and Manning 2014; Liu and Tang 2011). Last but not least, qualitative scholars can use the WWBI to clarify "'class' or 'subclass' of events-of which a single or a group of cases to be studied are instances" (George and Bennett 2005, 69).

Insights from the Dataset

To further illustrate how the WWBI can be used, below are several key findings that may inform the collective understanding on important topics, ranging from basic facts about the size and composition of the public sector to their motivations and diversity management.

Finding 1: The Public Sector Is a Large Employer, Particularly of Skilled Workers

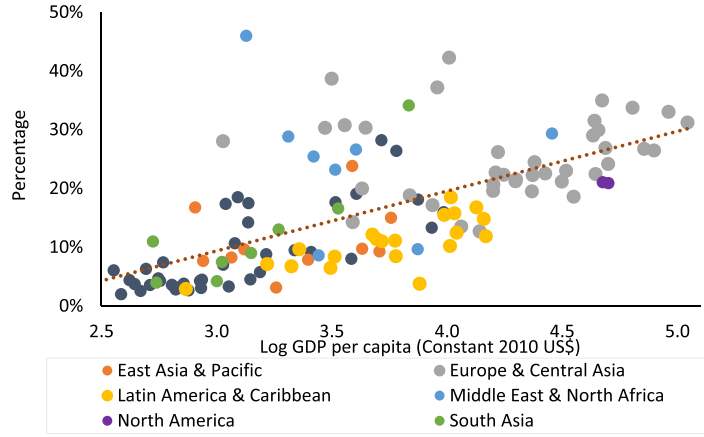
Data from the WWBI reveal dynamics within the labor market that have not been consistently documented to date. For instance, the public sector is a very large employer globally, employing—on average—over 15.8 percent of the total employed labor force. This statistic displays large variation by region with the public sector employing an average of 8.8 percent of Sub-Saharan Africa's labor force compared to the average for Europe and Central Asian nations where one out of four people are employed in the public sector. This difference reveals additional facts. Much of the differences across regions are explained by country income levels. The relative size of the public sector within total employment is positively correlated with country GDP per capita, as shown by Figure 2.

Besides total employment, the WWBI provides two additional indicators on the relative size of the public sector; as a share of paid and formal employment. The differences lie in the denominator. For paid employment, only those individuals who work for wage labor (i.e., excluding self-employed workers) are included and for formal employment, only individuals with access to any of four measures of formality (contracts, social security services, health insurance or union membership) are counted. The public sector accounts for over 30 percent of all paid employed individuals and 37.5 percent of all formally employed individuals.

Separating these global averages along regional or country income classifications reveals additional stylized facts. While the fraction of paid employment is relatively stable across income groups and regional classifications, the fraction of formal employment is negatively correlated with country income. This illustrates the relative importance of the public sector as a source for formal employment in low-income countries with large informal private sectors. Therefore, unsurprisingly, the public sector is also the single largest employer of individuals with tertiary education in most countries employing—on average—a third of the demographic (Figure 3).

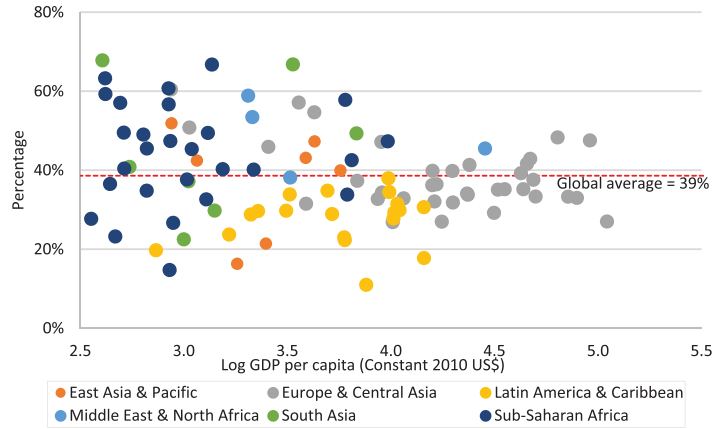
Finding 2: The Public Sector Is a More Gender-Equal Employer than the Private Sector

The WWBI also possesses a unique ability to shed light on demographic differences within the public sector between countries



Source: World Bank. 2020. Worldwide Bureaucracy Indicators version 1.1.
Note: Based on data for 127 countries

Figure 2 The relationship between public sector employment and GDP per capita.



Source: The World Bank. 2020. Worldwide Bureaucracy Indicators version 1.1.

Note: Based on data for 101 countries

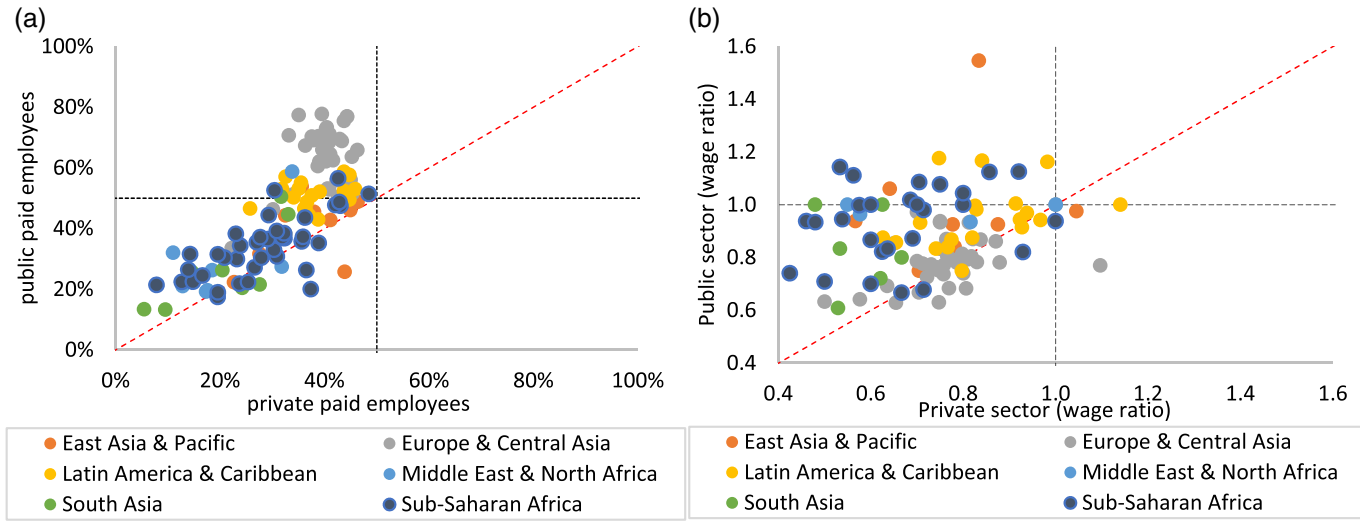
Figure 3 Proportion of tertiary education individuals in the public sector.

and between the public and private sectors. For instance, the average (and median) public sector employee is roughly five years older than their counterparts in the private sector, with countries within Europe and Central Asia possessing some of the oldest bureaucracies compared to Sub-Saharan Africa where the average civil servant is almost five years younger than their European contemporaries.

Another source of divergence between the public and private sectors is the relative involvement of women in the sector. The public sector hires more women and pays them more equally than the private sector. Countries within the European Economic Area generally hire more women than men while nations within South Asia trail the global average (Figure 4: panel a). While the pay gap still exists, it is comparatively muted in the public sector than the private sector (Figure 4: panel b).

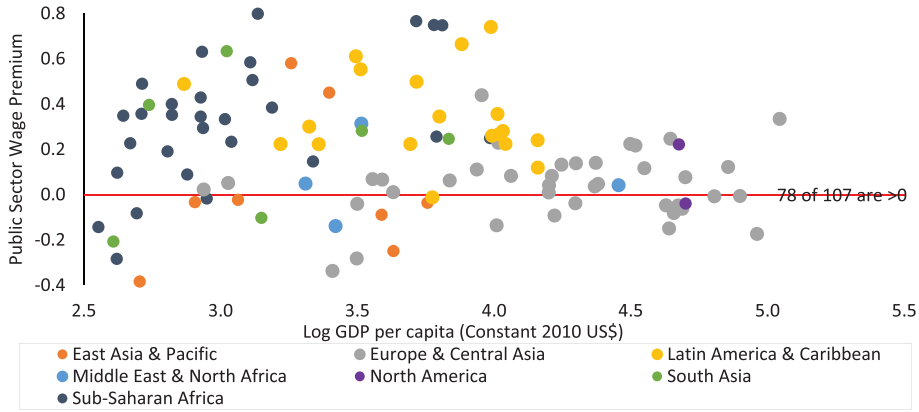
Finding 3: The Public Sector Pays on Average More than the Private Sector

Perhaps the most important way in which the WWBI can shed light on the civil service is in the comparative analysis of wages



Source: World Bank. 2020. Worldwide Bureaucracy Indicators version 1.1.
Note: Based on data for 101 countries

Figure 4 Female representation in the public and private sectors. (a) As a share of all paid employment. (b) As ratio of average wages.



Source: World Bank. 2020. Worldwide Bureaucracy Indicators version 1.1.
Note: Based on data for 107 countries

Figure 5 Public sector wage premium (compared to all private employees).

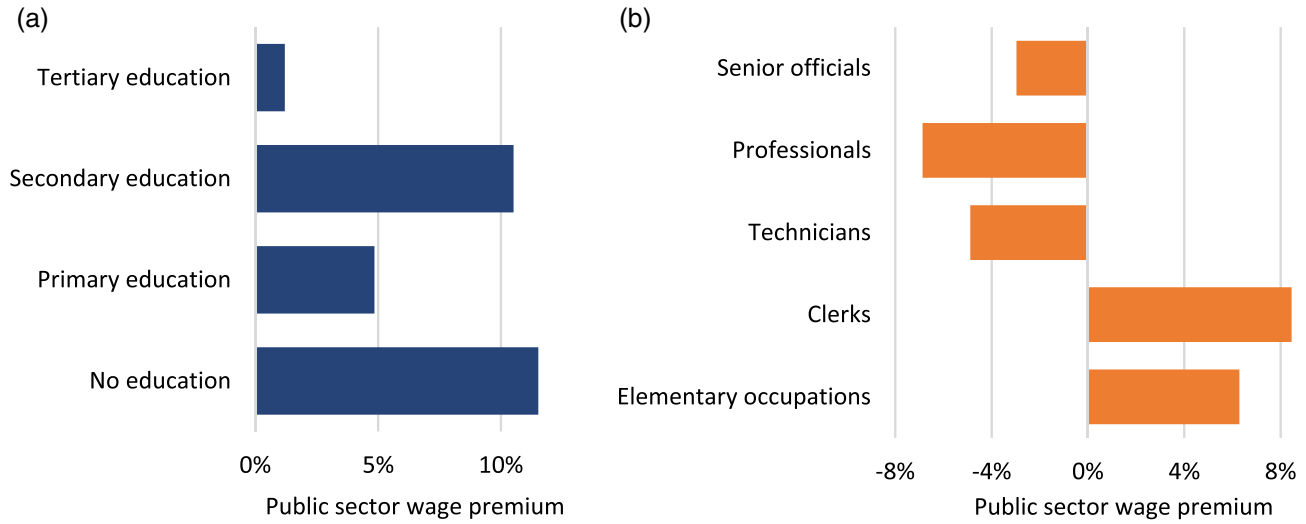
in the public and private sector. Wage analysis undertaken in the construction of the WWBI indicators reveals that public employees receive a wage premium compared to their counterparts in the private sector. In other words, there is a statistically significant difference between wages in the public and private sectors in most countries that cannot be explained by sex, age, levels of education or location (Figure 5). Specifically, wage premiums for females employed in the public sector are twice as high as compared to males; 29 and 13 percent, respectively.

However, whether this points to a large pay gap between the public and private sectors is somewhat hotly contested and open to interpretation given that the public and private sector perform differing functions (Cappellari 2002; Dickson, Postel-Vinay, and Turon 2014; Postel-Vinay and Turon 2007) and that most indices—including the WWBI - only account for base wages (Disney et al. 2009).

The WWBI does show that the size of the premium depends crucially on the choice of the private sector comparator, and the premium disappears in most countries when the public sector is compared to only formal private workers. Drawing on the few studies that investigate the movement of workers between public and private sectors (Yassin and Langot 2018), it is reasonable to assume that the formal private sector is the right comparator for more skilled public sector workers (administrators, engineers, doctors, and teachers) and the informal sector is the appropriate benchmark for unskilled workers.

Finding 4: Public Sector Wage Premiums Vary Systematically across Different Occupations and Skill Levels

Unpacking these premiums by levels of occupation and education reveals additional dynamics at play. The relative wage premium enjoyed by public sector employees is generally negatively correlated with levels of education as well as occupational classification (Figure 6). Senior officials, professionals, and technicians (relatively higher paid than clerks and elementary occupations) receive lower wages than their counterparts in the private sector (Figure 6: panel b). Generally, wages in the public sector are more compressed than those



Source: World Bank. 2020. Worldwide Bureaucracy Indicators version 1.1.
Note: Panel a is based on data from 84 countries; panel b has 79 countries

Figure 6 Public sector wage premiums (decomposed). (a) By levels of education. (b) By occupation levels.

in the private sector, explaining the divide in wage premium between high- and low-earning occupations. For example, using the standard measure of pay compression of the ratio of the 90th percentile wage to the 10th percentile wage, the public sector has lower compression than the private sector in 72 out of 95 countries in the WWBI.

Conclusion

Responding to the need for better data on global public administration (Perry 2016), the Bureaucracy Lab at the World Bank has published the Worldwide Bureaucracy Indicators (WWBI). The dataset presents a globally harmonized and evidence-based approach to the design of employment and compensation statistics for the public sector across the world. This article has provided an overview of the dataset's construction and methodological approach, and further details can be found in the technical documents accompanying the dataset.

We have demonstrated that the WWBI can be utilized to advance policymakers and researchers understanding of government as employers around the globe. Analysis of the WWBI can help answer important questions in public administration ranging from public employee motivation, through representative bureaucracy, to the appropriate size of public employment and compensation. Those topics are just a small sample of questions that can be answered with the WWBI. We encourage policymakers and researchers to explore the potential of the WWBI in advancing the frontiers of global public administration practices and research.

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