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Creating Public Payroll Indicators: A Methodological Guide

Christian Schuster

Sandra Naranjo Bautista

Robert Lipinski

Inter-American Development Bank

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Christian Schuster*

Sandra Naranjo Bautista**

Robert Lipinski***

* University College London

** Inter-American Development Bank

*** Oxford University

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Abstract

Effective public pay and employment practices are vital to fiscal sustainability and a capable workforce. This technical note provides practical, replicable methodological guidance for analyzing a crucial evidence source: public payroll data. Every government operates a payroll, issuing payments to all public employees, typically on a monthly basis. Thanks to the digitization of payroll systems, these transactions are now digitally recorded in most governments. Analytics of these records can provide rich insights to enhance public pay and employment. These include strengthening the sustainability of pay expenditure, narrowing gender pay gaps, addressing turnover and retention, and projecting staffing needs as retirements approach. Yet many governments either do not analyze their payrolls or generate only a limited set of insights. This note provides guidance to help governments expand their payroll analytics. It rests on a simple observation: payroll records across countries share a common structure, with each row is a payment to a public servant. Building on this, the note sets out a common approach to analysis and visualization that uses accessible code, a replicable dashboard for policymakers, and—thanks to standardized methods—enables benchmarking across organizations and countries. The guidance covers eight domains: employment growth, average pay trajectories, pay expenditure growth, salary equity, gender pay gaps, turnover, career development and promotions , and retirement projections. By standardizing payroll analytics, the methodology also lays the groundwork for cross-country public payroll indicators, providing a new lens on how public administrations operate.

Keywords: public payrolls; public pay; public employment; turnover; gender pay gaps

JEL codes: H83, C81

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Key Ministry of Finance Payroll Analytics Use Cases

This type of analytics provides a clear picture of the sources of wage bill pressures and how to manage them more strategically. It helps anticipate fiscal impacts, target savings, ensure equity, and strengthen compliance—turning personnel spending into a tool for fiscal sustainability, public sector efficiency, and fairness.

1. **Wage bill control and forecasting:** track wage bill trends and decompose wage growth into headcount versus average pay
2. **Establishment control:** use headcount growth by position and joiner-leaver flows to assess requests for new posts
3. **Spending reviews:** pinpoint cost drivers (e.g., overtime, allowances) across organizations to inform targeted savings
4. **Sectoral personnel budget allocation:** compare employment and pay trajectories by sector (e.g., health, education, security, core administration) to inform sectoral personnel budget allocations
5. **Pay policy costing:** estimate average pay trajectories and component shares to provide an initial approximation of the fiscal impact of pay adjustments
6. **Pension and retirement liability planning:** project upcoming retirements as an input for pension obligations and replacement cost estimates
7. **Turnover cost exposure:** identify high-turnover areas that drive recruitment and training costs
8. **Pay equity in key positions or careers:** benchmark salaries across organizations for public servants in the same position or career tracks to identify inequities and inform corrective actions
9. **Gender equity:** diagnose gender gaps—overall, and by rank, contract type, or position—in recruitment, pay, promotion, and turnover to inform corrective actions
10. **Compliance and payroll audit:** flag multiple payments to individuals and detect rank classifications inconsistent with position descriptions

Key Civil Service Agency Payroll Analytics Use Cases

This type of analytics equips the civil service with the data needed to manage people, not just payroll. By tracking headcount flows, retirements, turnover, promotions, and pay equity, agencies can plan succession more effectively, strengthen retention, modernize career structures, and benchmark performance across organizations—ensuring that the workforce is aligned with future needs and equitable in its opportunities.

1. **Establishment control:** use headcount growth by position and joiner-leaver flows when assessing requests for new posts
2. **Strategic workforce and succession planning:** map workforce growth and contraction by projecting future retirements by role and organization, thereby planning recruitment pipelines
3. **Retention policies:** identify organizations or positions with high turnover and design targeted retention policies
4. **Career and promotion management:** track promotion rates across ranks, positions, and organizations to identify merit-progression gaps
5. **Pay structure modernization:** use equity and compression indicators to calibrate pay bands, salary steps, and allowances
6. **Gender equality:** diagnose gender gaps—overall, and by rank, contract type, or position—in pay and promotion to guide target setting and monitor progress
7. **Critical skills pay:** compare pay and turnover for key positions in competitive external labor markets (e.g., IT specialist, medical doctors) to identify needs for critical-skills pay supplements
8. **Organizational benchmarking and support:** use central dashboards to enable HR units across government organizations to benchmark payroll indicators against those of other organizations and draw lessons from high performers

1. Introduction

Amid rising global debt projections, many countries are under increasing fiscal pressure and face mounting demands to curb public spending (IMF, 2025). At the same time, declining public trust in government across numerous contexts underscores the urgency of strengthening governance and improving service delivery to restore confidence (Valgarðsson et al., 2025).

Public pay and employment are critical levers for advancing both fiscal sustainability and effective governance. Public payrolls account for a quarter of general government expenditures and almost 10 percent of global GDP (World Bank, 2024). In Latin America and the Caribbean, the wage bill represents a third of public expenditure and half of tax revenues (Naranjo Bautista et al., 2025). Globally, public employment accounts for approximately 30 percent of wage employment (Baig et al., 2021). Strengthening public pay and employment practices can therefore have significant multiplier effects—not only by supporting fiscal sustainability, but also by enhancing the productivity of a substantial share of the workforce and improving overall government effectiveness.

How can governments make effective public pay and employment decisions? One key answer is by counting on data to guide such decisions. A key data source is public payrolls. Every government operates a payroll, issuing payments to all public employees, typically on a monthly basis. As noted above, public payroll data from countries across the world amounts to 10 percent of global GDP, 30 percent of wage employment, and over a third of public expenditure in Latin America.

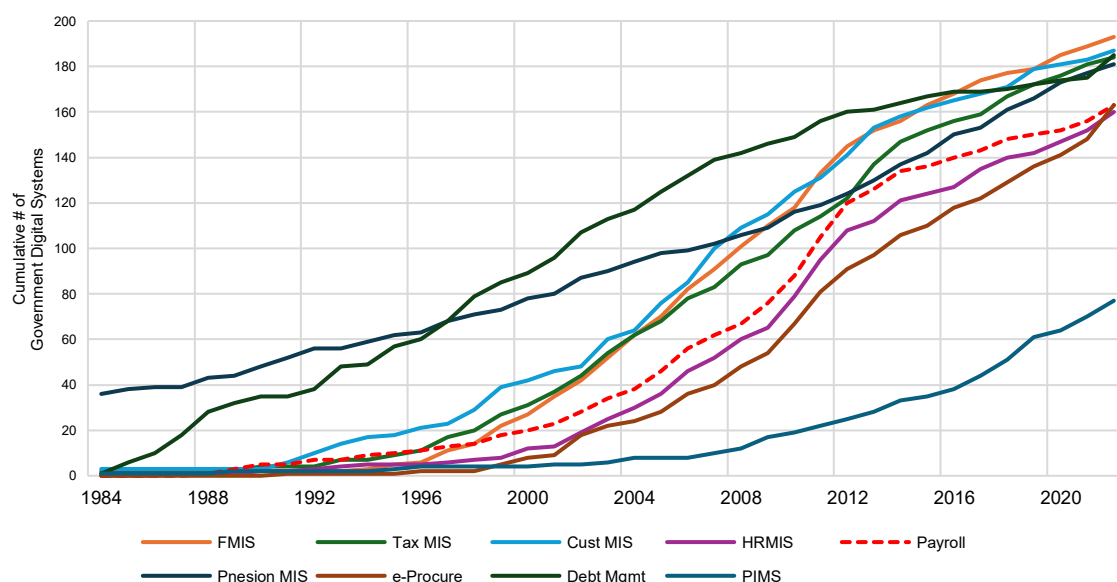
Payroll records analytics therefore hold significant promise for improving fiscal sustainability and government effectiveness. Payroll analytics can, for example, help identify where additional public employment is needed and where it can be restrained; reveal disparities in government pay for equivalent roles—highlighting positions where salaries are already high and less justifiable for further increases—and forecasting which countries are at risk of fiscal pressure due to future retirement and pension obligations for public employees (de Albuquerque Tavares, Ortega, and Woodhouse, 2023). Given these benefits, the analysis of payrolls and personnel data has become a standard practice in private sector organizations (Davenport, 2019).

Yet, many governments fail to make comparable use of analytics of their payroll data. In Latin America and the Caribbean, for instance, only 29

percent of countries use their personnel data for diagnostic analyses (World Bank, 2024a). As a result, public organizations in a range of countries struggle with obtaining an accurate understanding of their own workforce composition (OECD, 2007). In the absence of such data, governments facing fiscal pressure may resort to blunt measures, such as across-the-board cuts, which can undermine both government effectiveness and service quality (cf. Pew Charitable Trusts, 2020).

Why, then, have governments not made greater progress in payroll analytics? A key reason lies in the historical difficulty of conducting such analysis when payroll records were paper-based and fragmented. Over the past two decades, however, this situation has changed significantly. Payroll systems in many countries have been digitized, alongside broader efforts to digitize other core administrative systems. Figure 1 shows the growth in such systems in public sectors across the world. In particular, up until the mid-2000s, only a minority of countries had digital management information systems (MIS) for payroll. By 2020, the majority had adopted them.

Figure 1. The Digitization of Government Administrative Operations, Including Public Payrolls (1984–2022)



Source: Rogger and Schuster (2024), adapted from World Bank (2022).

Most governments now have digital payroll records available for ‘government analytics’ (Rogger and Schuster, 2023) ¹. A subset of these governments has started analyzing payroll microdata to inform fiscal planning, workforce planning, pay setting, and broader strategic human resource management (de Albuquerque Tavares, Ortega, and Woodhouse, 2023).

For instance, payroll analytics in Brazil—which included an integrated analysis of average pay and promotion trajectories of public servants along with retirement and pension obligation projections—underscored that the country risked heading toward a fiscal crisis if it did not implement pay and pension reforms (World Bank, 2019). The analysis also modeled the effects of different reform scenarios, providing robust evidence to inform public pay reforms. In Colombia, to inform gender pay policies, the National Planning Department used payroll analytics to assess gender pay gaps in temporary contracts. The analysis showed that women earned 5–6 percent less than men, even when comparing workers with similar characteristics (such as education, contract type, geographic region, and experience) (World Bank, 2024a). In Uruguay, payroll analytics was used to understand the career paths of public servants and their potential effect on employee motivation and retention. The analysis revealed that less than 5 percent of employees were promoted to a higher pay grade in most ministries. Further, in some ministries, exit rates significantly exceeded entry rates, suggesting challenges to retain public servants (World Bank, 2021). In Central America, cross-country payroll analytics conducted by the Inter-American Development Bank detected, among other findings, that the ratio of administrative staff spending relative to expenditure on medical personnel and teachers had increased substantially in some countries, thus pointing to areas with potential for efficiency gains (Dumas and Lafuente, 2016).

These examples show that payroll analytics can be a powerful tool for improving public administration. However, the potential remains largely untapped. The challenge lies not in the availability of payroll records, but in transforming them into actionable data. Many governments encounter barriers ranging from limited analytical skills and fragmented systems to institutional complexity, and political or ethical sensitivities. For instance, data protection and security can pose significant challenges—particularly in governments with less developed secure data analytics platforms, or in countries where payroll information is not disclosed under transparency

¹ Where such systems are absent, the centralization and digitization of payroll systems are important prerequisite for effective payroll analytics (see de Albuquerque Tavares, Ortega, and Woodhouse, 2023).

laws, given that payroll records contain personally identifiable information and may cover millions of payments to public servants. Moreover, digital records are often designed to support operational needs rather than analytical purposes, and adapting them for analysis requires targeted investments. Unlike the private sector, the public sector also faces difficulties managing reforms across institutional boundaries and addressing the political implications of increased transparency. These challenges help explain why many governments have been slower to capitalize on the data revolution (Rogger and Schuster, 2024). This technical note provides methodological guidance to help governments move from merely holding digital payroll records to actively using them for strategic decision-making. It offers a practical, low-barrier framework, complemented by [sample R code](#) and a dashboard that public sector teams can adopt and replicate.

To this end, the note first highlights that payroll records share a common data format across countries and identifies key variables for analysis. Second, the note provides a framework for assessing the coverage of payroll data in a given government. Third, the note introduces key indicators which can be derived from payroll records across eight domains: pay expenditure growth, employment growth, average pay trajectories, salary equity, gender pay gaps, turnover rates, promotions and career development, and retirement projections. The note provides guidance on how to calculate indicators in each of these domains for government as a whole, for particular organizations, and for specific groups of employees (e.g., by position, gender, or contract), complemented by sample R code for each indicator. Fourth, the note outlines common pitfalls in deriving payroll indicators from payroll records and offers approaches to addressing these pitfalls. The note concludes by emphasizing the importance of leveraging the common payroll data format to standardize payroll analytics across countries, thereby enabling the development of cross-country public payroll indicators. Such indicators could enable governments to benchmark their performance on key indicators and provide a lens to deepen our understanding of how public administrations around the world operate.

2. From Payroll Records to Payroll Data

The methodological approach in this technical note builds on the insight that payroll records, understood as government administrative records

documenting the monthly² compensation of every public servant (de Albuquerque Tavares, Ortega, and Woodhouse, 2023), share a common data format across countries, with each row representing a payment made to a public servant in a given month.

At its most basic level, payrolls register the name of the public servant receiving the payment, the organization in which they are employed, the payment amount, and the month and year of the payment (Table 1). As detailed further below, a range of key indicators—such as public employment growth, pay trends, turnover rates, and gender pay gaps—can be constructed even when no further information is included in the payroll.

Table 1. Core Variables in Payroll Records

Month	Year	First name	Last name	Organization	Payment in pesos
January	2024	John	Doe	Ministry of Health	4500
January	2024	Mary	Johnson	Ministry of Education	5200
January	2024	Ahmed	Santos	Ministry of Finance	4100
February	2024	John	Doe	Ministry of Health	4500
February	2024	Mary	Johnson	Ministry of Education	5200
February	2024	Ahmed	Santos	Ministry of Finance	4100

Source: Authors' own elaboration.

Many countries register additional variables in their payroll records, often linking them to information stored in Human Resource Management

² We refer to monthly payments, given the prevalence of monthly salaries in both private and public organizations. Some governments may use different payment cycles for certain groups of workers—such as biweekly, semi-monthly, or even daily cycles. In such cases, the analytical approach should be adjusted accordingly (e.g., by aggregating and converting more frequent payments to a monthly basis).

Information Systems (HRMIS). These tend to include, for instance, an employee ID, gender, age (date of birth), contract type, years of experience (date of entry into the organization or public sector), working hours, job title, rank, and a breakdown of pay into its underlying components (e.g., base salary, performance pay, allowances) (cf. de Albuquerque Tavares, Ortega, and Woodhouse, 2023) (Table 2) ³. Where all or some of these additional variables are included in payroll records, a broader set of additional key indicators, such as retirement projections, promotion and career trajectories, and pay equity among public servants in similar roles, can be constructed to inform public pay and employment policies.

The remainder of this methodological guidance assumes that payroll records follow this format. In some countries, however, different salary components for the same employee in a month—such as base salary, allowances, or performance pay—are recorded as separate rows rather than as separate columns within a single row. In such cases, analysts should first transform the data into a wide format, i.e., add columns for each salary component so that each employee is represented by a single row per month.

³ These are, of course, not the only potential HRMIS variables that may be linked to payroll records in a given country. Other possible variables include education level, performance ratings, and the specific unit within the government organization where an individual works. This methodological guide focuses on the variables listed in Table 2 because of limitations in the coverage or quality of additional HRMIS variables in many countries in Latin America and the Caribbean. Education level is often recorded only at the time of a public servant's entry or when pay supplements are tied to educational degree attainment, and it can therefore be outdated for many public servants.

Table 2. Payroll Records with an Expanded Set of HRMIS Example Variables

Month	Year	First name	Last name	Organization	Employee ID	Gender	Date of birth	Contract type	Date of entry	Working hours	Job title	Rank	Base salary	Performance pay	Pension contribution	Allowance	Gross pay	Net pay
January	2024	John	Doe	Ministry of Health	12345	M	1980-05-20	Full-time	2010-01-15	40	Manager	A1	4000	500	300	200	5000	4500
January	2024	Mary	Johnson	Ministry of Education	67890	F	1975-09-12	Part-time	2015-03-10	20	Teacher	B2	1700	0	200	100	2000	1700
February	2024	John	Doe	Ministry of Health	12345	M	1980-05-20	Full-time	2010-01-15	40	Manager	A1	4000	500	300	200	5000	4500
February	2024	Mary	Johnson	Ministry of Education	67890	F	1975-09-12	Part-time	2015-03-10	20	Teacher	B2	1700	0	200	100	2000	1700

Source: Authors' own elaboration

3. Assessing Payroll Data Coverage

While all governments operate payrolls—and most, as noted, have digitized them—the coverage of *centralized* digital payroll records varies across countries. Mapping payroll data coverage before any analysis is important to ensure that conclusions reflects its limitations and to identify areas where coverage could be expanded.

Figure 2 identifies six dimensions along which payroll data coverage can vary. These include variation in the coverage of organizations, contract types, positions, time periods, variables, and (missing) values.

First, organizational coverage may vary. In the absence of a centralized digital payroll, analysts might only be able to analyze payroll records of select organizations. This lack of a centralized digital payroll might reflect limitations in the digital payroll system or, alternatively, might be intentional—for instance, due to legal or regulatory frameworks which decentralize pay. Where a centralized digital payroll exists, coverage may extend to central government ministries; to the entire central government, including agencies; or, in the best cases for analytical purposes, to all government organizations, including non-executive institutions and regional or local governments.

Second, coverage by contract type may vary. Payrolls may include only permanent employees or, additionally, temporary employees and consultants; in the more comprehensive cases, they may also include pensioners. Third, payrolls may differ in position coverage, with some employee groups within organizations maintaining separate payrolls. By way of example, security sector employees, such as military, intelligence, and police staff, may be registered in a separate payroll to limit access to security personnel information. Similarly, employees paid from an organization's own-source revenues (e.g., through fees for services provided to citizens) may appear in separate, secondary payrolls of organizations. In the best case, the central payroll encompasses all positions in the organizations analyzed.

Fourth, temporal coverage may differ. Some payroll records are only available on an annual basis, while others provide monthly data. Moreover, the historical depth of payroll data—that is, the number of years it covers—can vary. Ideally, to understand trends over time, at least five years of historical monthly data should be available.

Fifth, variable coverage may differ. Some payrolls only register total pay received. Others include demographic variables as well as details on pay composition—for instance, performance pay or supplements such as education or remote posting. In some cases, HRMIS data is fully integrated with payroll records, thus adding variables such as the unit an employee works in, their position title, rank, performance rating, or the name of their manager.

Finally, the coverage of (missing) values may vary. Some digital payroll records contain a significant number of missing or inaccurate entries in a range of variables. Payroll systems that rely on manual data entry are particularly susceptible to errors (for instance, inadvertently adding extra zeros to pay entries). Missing values are often concentrated in specific organizations, positions, or contract types—for instance, when HRMIS data is not recorded for employees on temporary contracts. Ideally, payroll records contain few or no missing or inaccurate entries.

Figure 2. Payroll Data Coverage: A Framework for Assessment



Note: The arrows and “levels” in each of the six dimensions are stylized and should not be interpreted as linear progressions toward greater coverage. For instance, some payroll systems may contain aggregate pay and pay composition variables, but not demographic variables.

Source: Authors’ own elaboration.

The preferred response to coverage gaps is to address them directly—for instance, by seeking access to additional payrolls (e.g., employees on consultancy contracts) to ensure that the analysis is based on the most comprehensive record of public pay and employment in a given country. Such access may not always be possible or cost-effective (e.g., if each hospital maintains its own secondary payroll, the cost of cleaning and

integrating records may be excessive). As such, in any country, there will invariably be some payroll data coverage gaps.

This puts a premium on ensuring that conclusions drawn from the analysis are mindful of data coverage limitations. For instance, if employment growth is analyzed using payroll records that exclude individual consultancy contracts, inferences about average annual government employment growth may be misleading, particularly if much of recent employment growth occurred through such contracts. Similarly, if payroll records exclude certain types of institutions, estimates of total public pay expenditure growth might be biased. By contrast, if the analysis focuses on differences in employment or pay practices *across* organizations, then organizational estimates and comparisons can be constructed accurately even if payroll records do not extend to all organizations. In short, when applying this methodological guide, analysts should be mindful of the inferences allowed by their payroll coverage and of the conclusions that can and cannot be drawn in light of coverage limitations⁴.

While this methodological guide focuses on constructing key indicators from payroll records, analysts should not limit themselves to this single data source. For instance, using this guide, analysts can construct key payroll indicators for each school in a country—such as the number of teachers, their average pay, and annual turnover. By linking this data to school performance records, analysts can then assess which aspects of public pay and employment are key determinants of better outcomes. For example, to what extent does teacher turnover affect student performance in standardized test scores (cf. de Albuquerque Tavares, Ortega, and Woodhouse, 2023)? In short, the indicators emphasized in this methodological guide are valuable in their own right, but can also be combined with additional data to identify the key determinants and components of public sector productivity and efficiency (cf. Rogger and Schuster, 2023).

⁴ Where coverage limitations preclude an analysis of core government priorities—such as the fiscal sustainability of the projected future wage bill—the centralization of payroll record collection is an important first step toward enabling more meaningful payroll analytics in the future.

4. Constructing Key Public Employment and Pay Indicators through Payroll Analytics

Drawing on the payroll variables outlined in Table 2, this section presents a standardized methodology for developing key public employment and pay indicators across eight domains: employment growth, average pay trajectories, pay expenditure growth, salary equity, gender pay gaps, turnover, career development and promotions, and retirement projections. As noted, this methodological guide is complemented by annotated sample R code to estimate each indicator, along with a dashboard that visualizes these indicators within and across countries. In most countries, available payroll statistics focus primarily on government-wide indicators—for example, total wage bill growth or average public sector pay. While such aggregate metrics are useful, they often mask important differences in the public sector. A key added value of this approach is its ability to generate disaggregated indicators—not only for government as a whole (defined here as the full set of organizations and contract types included in the payroll) but by organization and employee characteristics (e.g., gender, age, contract type, rank, and years of experience). These disaggregations are important because pay and employment practices often vary sharply across different organizations within government (Schuster, Naranjo Bautista, and Lipinski, forthcoming). Disaggregated, organization-level indicators not only provide a more nuanced understanding of public employment dynamics but also an expanded user base of payroll analytics. While Ministries of Finance and Civil Service Agencies typically rely on government-wide indicators to shape pay and personnel policies, organization-level indicators can support decision-making across all government entities.

4.1 Employment Growth

Why employment growth indicators matter

Effective workforce planning and management in the public sector relies on a clear understanding of where (in which organizations and which kind of roles) employment is expanding or contracting. For example, is the share of the population employed in the public sector increasing or decreasing over time? Which organizations account for the bulk of public employment growth? Are surges in public employment concentrated in specific months, for instance, around election periods? Are public sector organizations able to attract staff with specialized skills, such as IT professionals? Are some organizations becoming too top-heavy, with a disproportionately large number of managers per employee? Is employment growth particularly pronounced among workers on more precarious contracts? Indicators that disentangle the growth and composition of the public sector workforce are essential for answering these and other core workforce planning and management questions.

To measure overall employment growth, payroll analytics can generate three key sets of indicators:

1. Total number of employees, by month and year
2. Total number of additional employees (joiners minus leavers), by month and year
3. Percentage growth in the number of employees (joiners minus leavers as a share of the total number of employees at the beginning of the year)

As noted above, analyzing overall employment growth requires payroll data coverage that aligns with the unit of inference—such as central government, general government, or a key sector, like education. The longer the temporal coverage, the broader the time horizon for assessing trends.

The total number of employees can then be estimated by counting the number of rows in the dataset with unique employee IDs for each month⁵, or—if employee IDs are not available—by counting the number of rows in a month with unique combinations of names, age, and organization. One important qualification applies (both here and for subsequent indicators) in that analysts need to consider whether to estimate the overall number of employees or the number of full-time equivalent employees (FTE). Using

⁵ This ensures that a public servant receiving multiple payments in a month —recorded in separate rows — is not counted more than once.

FTE is preferable to avoid misinterpreting increases in part-time roles (e.g., one full-time position split into two part-time roles) as an expansion of public employment. This approach requires, however, both a variable indicating the number of weekly working hours and valid data entries for that variable.

Once employment and employment growth indicators are calculated, they can be disaggregated along the key dimensions for both the government as a whole and individual organizations. Key margins include, for example:

- By rank, to assess whether organizations are becoming top-heavy (a high ratio of managers to staff) or disproportionately weighted toward administrative support roles relative to professional-technical staff
- By contract type, to determine whether employment growth is concentrated in more precarious contracts
- By salary quintile, to assess whether employment growth is concentrated in lower or more precarious pay bands
- By key position (e.g., IT professional, manager, teacher, doctor, nurse, police officer) to evaluate the government's ability to attract and retain staff in critical positions, and growth or contraction in such positions
- By gender, to track changes in gender equity in public employment
- By number of salary payments per month, to assess growth in employment among public servants receiving multiple salary payments per month

Sample R code for estimating these indicators (and those in subsequent sections) is accessible [here](#). This technical note is also complemented by a dashboard visualizing these indicators—which can be adapted for other countries seeking to generate similar metrics. Figure 3 below presents an example visualization of one of our analysis countries. The figure compares public employment growth by contract type. It underscores growth across all contract types, with the greatest growth in permanent (*planta*) contracts. Employment in *planta* contracts increased by 32 percent between 2019 and 2023. Moreover, the data reveals a notable spike in consultancy (*honorario*) contracts during the pandemic, followed by a decrease in employment under these contracts thereafter.

Figure 3. Employment Growth by Contract Type in Sample Country



Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.2 Average Pay

Why average pay indicators matter

Effective pay-setting policies, which safeguard fiscal sustainability while enabling government to attract, motivate, and retain skilled staff, require a precise understanding of the structure and evolution of pay within government. For instance, is average public sector pay increasing in real terms over time? If a public employee remains within government, how does their pay evolve over the course of their career? Where average pay is increasing, which salary components—be they base pay or specific pay supplements—drive this increase? Is real pay increasing for public employees across ranks and contract types over time, or is it happening only in specific ranks or contract types? Is the trajectory of real pay consistent across organizations and levels of government, or do some organizations experience pay spikes while others face declines? And are pay increases over time concentrated in certain positions requiring scarce skillsets (e.g., IT professionals) or in roles with potentially strong union influence for better pay (e.g., teachers), or are they relatively homogeneous across government positions? Indicators that disentangle these and other pay-related questions are essential for evidence-based and effective pay-setting.

To understand average pay, its components, and its evolution over time, payroll analytics can generate five key sets of indicators:

1. Average gross pay, by month and year
2. Average net pay, by month and year
3. Average pay increase for continuing employees (excluding leavers and new hires), by month and year⁶
4. Average real (inflation-adjusted) pay increase for continuing employees (excluding leavers and new hires), by month and year
5. Share of average pay by salary component, by month and year

Inferences about pay are limited to the units, such as central government, general government, or a key sector like education, for which payroll data is available. Average employee pay can typically be calculated as the sum of payments made to each unique employee ID in a given month, divided by the number of unique employee IDs in that month. The sum accounts for public employees holding multiple contracts with one or more public sector organizations—for instance, doctors working two part-time shifts in

⁶ Where payroll data include the date a public servant joined public administration, average public sector pay can also be modeled by years of experience.

different hospitals⁷. For the final indicator—inflation-adjusted pay—analysts must supplement payroll data with external inflation statistics.

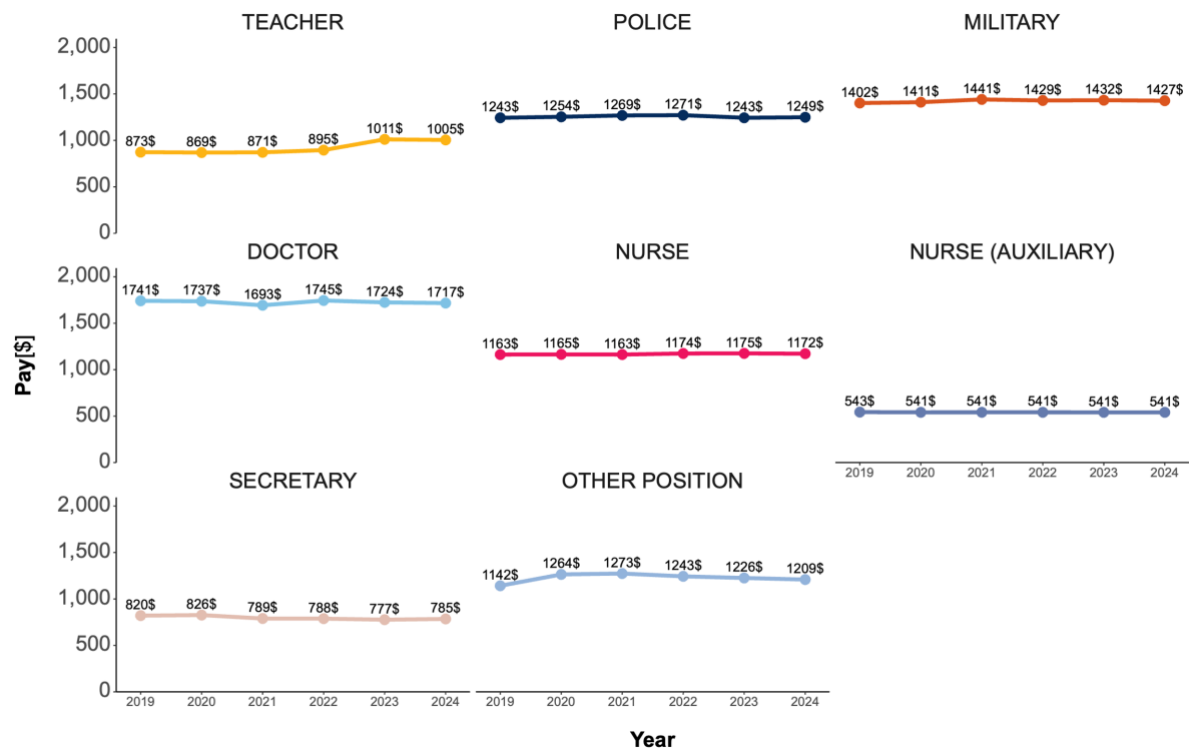
Once pay indicators are calculated, they can be disaggregated along the key dimensions for both the government as a whole and for individual organizations. Key dimensions include, for example:

- By key position (e.g., IT professional, manager, teacher, doctor, nurse, police officer) to assess potential changes in pay competitiveness and the government's ability to attract and retain staff in critical positions
- By salary quintile, to assess how real pay evolves for employees in lower or more precarious pay bands
- By rank, to determine whether pay evolution particularly favors certain hierarchical levels (such as managers, technical-professional staff, or administrative support staff)
- By contract type, to identify differential pay increases (such as consultants vs. permanent employees)
- By gender, to track changes in gender equity in public pay

Figure 4 below presents an example visualization, which highlights the evolution of average pay for key positions in one of our analysis countries from 2019 to 2024. It underscores flat nominal pay across a range of key positions over time.

⁷ As a caveat, summing payments made to a public servant to estimate average pay is not appropriate for all inferences. For instance, caution is needed when calculating average organizational pay to avoid including payments that employees concurrently receive from other organizations, or additional payments that reflect tasks beyond full-time work, such as weekend lecturing at universities.

Figure 4. Average Pay over Time in Key Positions in Sample Country



Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.3 Pay Expenditure

Why pay expenditure indicators matter

Public payrolls account for a quarter of general government expenditures (World Bank, 2024). Understanding the evolution and composition of pay expenditures is essential to ensuring fiscally sustainable public pay policies, including identifying the drivers of pay expenditure growth. For instance, are pay expenditures increasing as a share of total government spending? Are these increases driven by growth in public employment or by rising average pay? Which salary components contribute the most to pay expenditure increases? In which organizations are pay expenditures increasing most significantly? Are these increases concentrated in key positions (such as teachers or doctors) or in specific contract types? Answering these questions is essential to aligning fiscal planning, workforce planning, and public pay setting.

To understand pay expenditure, its components, and its evolution over time, payroll analytics can generate seven key sets of indicators:

1. Total pay expenditures (nominal and real), by month and year
2. Pay expenditures (as a percentage of government expenditure)⁸, by month and year
3. Pay expenditures (as a percentage of GDP), by month and year
4. Percentage change in pay expenditure, by month and year
5. Share of pay expenditure change attributable to changes in the number of employees versus changes in average pay per employee, by month and year
6. Share of pay expenditure by salary component, by month and year
7. Increase in pay expenditure by salary component, by month and year

Pay expenditures can be calculated as the total sum of payments made to employees in a given month. For inferences about the evolution of pay expenditures, particular care must be taken to account for coverage gaps in the payroll data. To effectively inform fiscal planning—such as central government, general government, or a key organization like the Ministry of

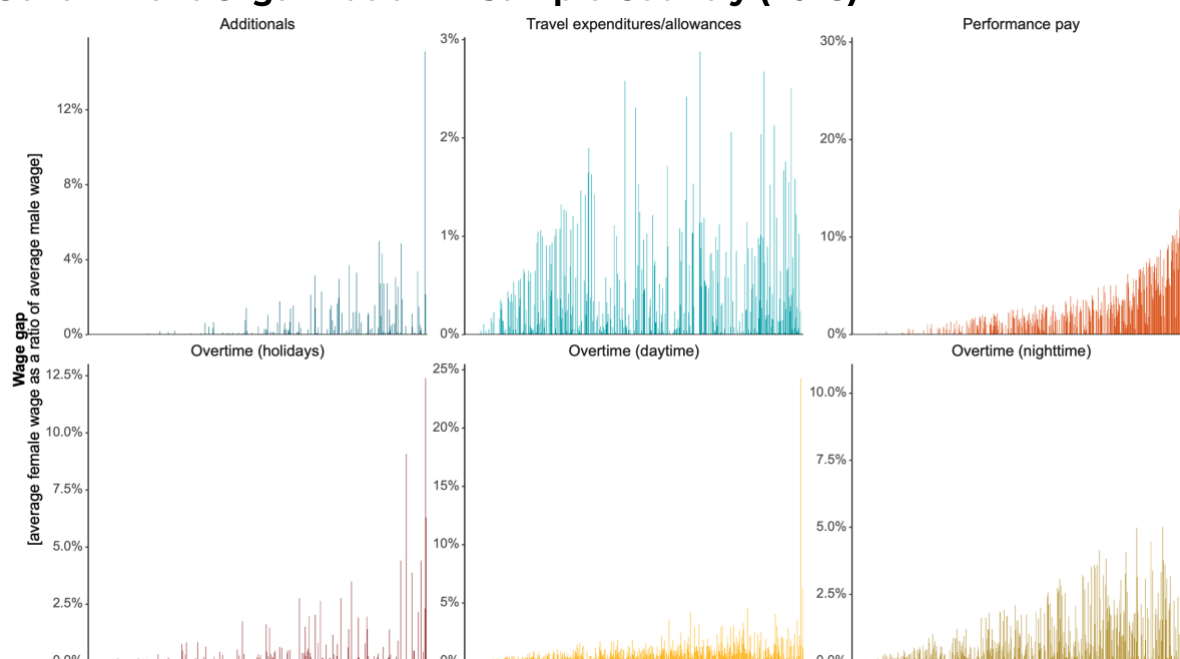
⁸ Indicators 2 and 3 require access to data sources beyond payroll records —specifically, GDP estimates and government expenditure figures from financial accounts or budget execution reports. The feasibility of constructing these indicators therefore depends on the availability of such data. Moreover, GDP and government expenditure are often reported on a quarterly or annual basis. When the corresponding payroll indicators are estimated monthly, additional modeling assumptions are required to impute missing monthly GDP and expenditure figures.

Education—comprehensive data coverage is required, particularly across contract types and positions, for the unit under analysis. Once pay expenditure indicators are developed, they can be disaggregated along key margins, for both the government as a whole and individual organizations. Key margins include, for example:

- By sector, to assess whether pay expenditure growth is concentrated in education, health services, or core public administration
- By region, to examine regional disparities in the share of government expenditure allocated to pay
- By key position, to analyze how pay expenditures in positions requiring scarce skills (e.g., IT professionals) evolve
- By rank, to determine whether pay expenditure growth is concentrated in specific levels of the hierarchy (e.g., managers)
- By contract type, to assess whether pay expenditure growth is driven by increased spending on specific contract types (e.g., consultants)

Figure 5 below presents an example visualization of one of our analysis countries. The figure plots the share of total pay allocated to different salary components by organization, highlighting the heterogeneity of pay complement practices across government entities. For instance, in some organizations, performance pay accounts for more than 20 percent of total pay, while in many others no performance pay is provided. Similarly, some organizations, particularly in the health sector, allocate over 10 percent of total pay to overtime (daytime, nighttime, or holidays), whereas many others offer no overtime pay.

Figure 5. Share of Pay Allocated to Different Salary Components, by Government Organization in Sample Country (2023)



Notes: Each bar represents the value of a pay component as a percentage of total gross pay for each public sector organization in 2023. Missing bars indicate that the institution did not include this pay component in its payroll. Organizations are presented in ascending order based on the cumulative share of all listed salary components in total pay.

Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.4 Pay Equity and Compression

Why pay equity indicators matter

The effect of public pay policies on staff, such as their motivation to perform well and stay in the organization, depends not only on pay levels and pay competitiveness, but also on horizontal pay equity and vertical pay compression. For instance, greater horizontal pay inequities—where employees performing the same tasks and responsibilities receive significantly different pay—may lead to dissatisfaction and demotivation, especially when these differences do not reflect performance variations (Green et al., 2019). At the same time, vertical pay decompression—that is, larger pay differences between top and bottom ranks or between the top and bottom 10 percent of earners—enhances incentives for promotion and may thus lead to greater motivation, help retain highly skilled staff, and boost productivity, particularly when promotions are merit-based (Wallskog et al., 2024). Conversely, excessive decompression can demoralize staff and undermine their sense of fairness, particularly when pay progression is not merit-based (Deserranno et al., 2025).

To understand pay compression, payroll analytics can generate several key sets of indicators, including:

- Salary multiplier between the top 10 percent of earners and the bottom 10 percent of earners, by year
- Salary multiplier between the top 20 percent and the bottom 20 percent of earners, by year
- Salary multiplier between the highest and lowest ranks, per year

Once pay compression indicators are calculated, they can be disaggregated along key margins for both the government as a whole and individual organizations. Key margins include, for example:

- By contract type, to assess whether pay compression differs across contract types (e.g., consultants vs. career civil servants)
- By sector, to examine whether pay compression is concentrated in key sectors such as education, health services, or the core public administration
- By region, to identify regional disparities in pay compression

Key indicators for horizontal pay equity include:

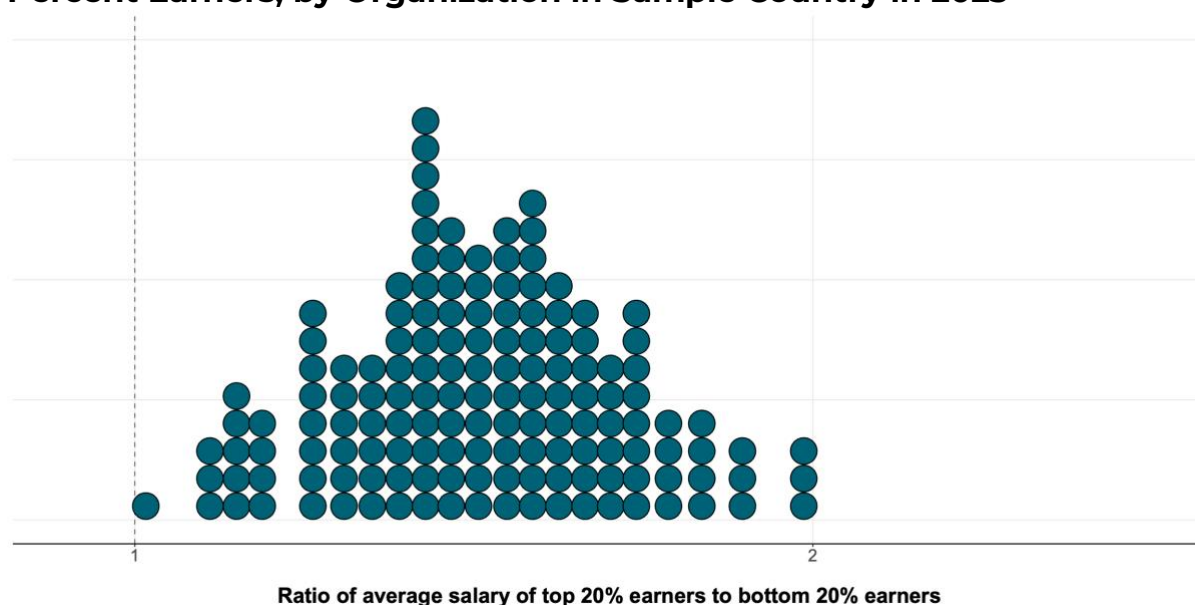
- Salary multiplier between the top 20 percent of earners and the bottom 20 percent of earners within each rank in the most recent year
- Salary multiplier between the top 20 percent and the bottom 20 percent of earners, by key position (e.g., IT professional, manager, teacher, doctor, nurse, administrative assistant, police officer) in the most recent year
- Salary multiplier between the top 20 percent and the bottom 20 percent of earners, by key position, in a similar rank and with similar years of experience (e.g., IT professional, manager, teacher, doctor, nurse, police officer) in the most recent year⁹
- Average salary for key positions with 10 years of experience (e.g., IT professional, manager, teacher, doctor, nurse, police officer), by organization
- Number of distinct position titles within each organization in the most recent year, by organization, to assess whether pay inequities stem from inadequate or absent position classification systems

⁹ Where payroll data include sufficient variable coverage, regression analysis controlling for additional variables—such as education level, performance ratings, and location—can provide insights into the extent to which horizontal pay inequities are explained by observable characteristics.

Once pay equity indicators are constructed, they can—where not already incorporated in the calculation—be disaggregated by the government as a whole, individual organizations, sectors, and regions in the country.

Figure 6 below presents an example visualization of one of our analysis countries. It underscores that some organizations have more compressed pay, with the top 20 percent of earners receiving only slightly more than the bottom 20 percent. In others, pay is more decompressed, with the top 20 percent earning about twice as much as the bottom 20 percent.

Figure 6. Salary Multiplier between Top 20 Percent and Bottom 20 Percent Earners, by Organization in Sample Country in 2023



Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.5 Gender Equality

Why gender equality indicators matter

Governments around the world—and particularly in Latin America and the Caribbean—exhibit gender inequalities in public sector workplaces (Naranjo Bautista et al., 2022). Such disparities can negatively affect not only women’s rights, but also organizations’ productivity and performance (ILO, 2019). Gender inequalities can manifest across multiple related dimensions. Most obviously, women¹⁰ may earn less than men, both overall and when holding similar positions with comparable years of experience, and they may have smaller average pay increases over time. Additionally, women may also be underrepresented in senior ranks and experience

¹⁰ While we focus on male and female categories, the suggested indicators can be expanded to include other, non-binary genders where such data are available.

slower promotion trajectories. Women might be more likely to hold precarious or temporary contracts, as opposed to career civil service jobs, and face higher turnover rates in the public sector. Payroll analytics can detect these inequalities, pinpoint where they occur within government, and thus enable more evidence-based policies on gender pay, promotion, and employment.

To understand gender equality and its evolution over time, payroll analytics can generate several key sets of indicators. First, a series of indicators can shed light on gender pay gaps, including:

- Average pay by gender, by year
- Average pay increase by gender, by year
- Average pay within rank (e.g., manager, technical-professional, administrative support), by gender
- Average pay within contract type (e.g., permanent civil servant, consultant), by gender
- Average pay in key positions (e.g., teacher, doctor, nurse, police officer, IT professional), by gender
- Wage premium (or penalty) for men, defined as gender pay gap after controlling for age, years of service, rank, contract type, key position, organization, and other available demographic or positional characteristics
- Change in the wage premium for men, by year

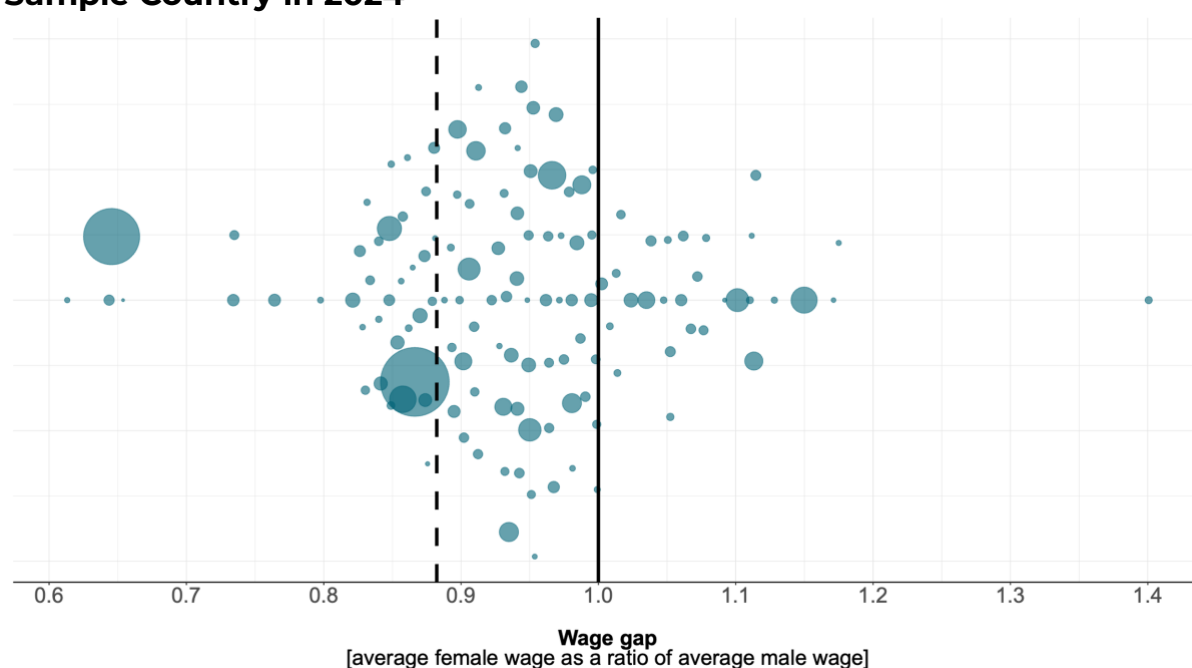
Second, payroll analytics can provide insights into gendered employment, career development, and job termination trajectories using indicators such as:

- Share of employees by gender, by year
- Share of new hires by gender, by year
- Share of employees by rank, by gender, by year
- Share of managers (highest rank) by gender, by year
- Share of employees promoted to a higher rank, by gender, by year
- Average years of service, by gender and year
- Average age, by gender and year
- Share of employees on temporary contracts, by gender, by year
- Share of employees leaving the public sector, by gender, by year
- Share of employees leaving the organization, by gender, by year
- Share of employees reaching retirement age, by gender, by year

Looking beyond pay is essential when analyzing gender inequalities, as it allows for more accurate policy conclusions (Mukhtarova et al., 2021; OECD, 2019). For example, gender wage gaps often stem mainly from men’s more favorable career progression compared to women, rather than from differences in entry-level pay (McKinsey, 2025). Once gender equality indicators are constructed, they can be estimated for the government as a whole, individual organizations, sectors, and regions in the country. This enables analysts to benchmark whether gender pay or promotion gaps are particularly salient in certain organizations or identify best-practice organizations with minimal or no gender inequalities.

Figure 7 below presents an example visualization of one of our analysis countries, plotting organizations by gender pay and size. It underscores the diversity in gender pay gaps across government organizations. While men have an average wage premium of 12 percent, this exceeds 30 percent in some organizations, whereas in others, women receive a wage premium of over 10 percent.

Figure 7. Gender Pay Gaps by Central Government Organization in Sample Country in 2024



Notes: Each point represents a single central government organization in 2024. Only organizations with at least 10 FTE are shown. Point size reflects the number of employees in an organization. The dashed vertical line indicates the interorganizational mean gender pay gap, while the solid vertical line shows pay parity.

Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.6 Turnover

Why turnover indicators matter

Understanding employee turnover is important, as it carries both fiscal cost and organizational consequences. High turnover rates can lead to a loss of organizational knowledge, disrupt organizational continuity and undermine the quality of service delivery (Akhtari et al., 2022). High turnover rates can also weaken team cohesion and effectiveness, while lowering morale among the remaining staff (Knight et al., 2013). Similarly, high turnover has substantial fiscal costs in terms of recruitment and training of new staff. For example, turnover in the UK civil service has been estimated at £74 million (Institute for Government, 2019). At the same time, very low turnover rates can also risk undermining organizational effectiveness. For instance, when few new staff with fresh ideas, technological skills, or innovative approaches are recruited, organizational innovation may be undermined (Schubert and Andersson, 2014). Payroll analytics can identify where within government high or low turnover is occurring: in which organizations and ranks, for which types of positions and contract types, and for which demographic groups of public servants. This level of disaggregation enables governments to design more evidence-based retention approaches and strengthens workforce planning by shedding light on groups of staff more likely to require replacement in the future.

To understand turnover and retention of employees, payroll analytics can generate a range of indicators, including the following:

- Public sector turnover: share of employees leaving the public sector, by year
- Organizational turnover: share of employees leaving their organization, by year
- Public sector resignations or redundancies: share of employees leaving the public sector before retirement (i.e., leavers excluding retirees), by year
- Organizational resignations or redundancies: share of employees leaving the organization before retirement (i.e., leavers excluding retirees), by year
- Public sector retirements: share of employees retiring, by year
- Mobility (I): share of employees leaving their organization to join another public sector organization, by year
- Mobility (II): share of employees in an organization who joined from another public sector organization, by year

- Precarity: share of employees holding temporary contracts, by year
- Public sector longevity: average years of experience in the public sector, by year
- Organizational longevity: average years of experience in the organization, by year
- Newcomers: share of employees with fewer than 5 years of experience in the organization, by year

Importantly, many key workforce indicators—such as employee exits—are not directly recorded in payroll systems and must instead be inferred. For example, turnover is often inferred by detecting that individuals disappear from the payroll. This approach requires careful consideration of the country context to distinguish between permanent exits and temporary absences, such as periods of unpaid leave or other reasons for zero wages.

As further detailed in Section 6.3, distinguishing between different types of departures—such as organizational exits, public sector exits, and interorganizational mobility—requires either a standardized employee ID across the public sector to track departures or, in its absence, matching techniques to determine whether individuals reappear in another organization's payroll in subsequent months.

Distinguishing retirements from other types of exits (resignations or redundancies) further depends on whether a defined retirement age (normal or mandatory) exists, and whether it is applied uniformly or varies by factors such as the contract type or the organizational affiliation.

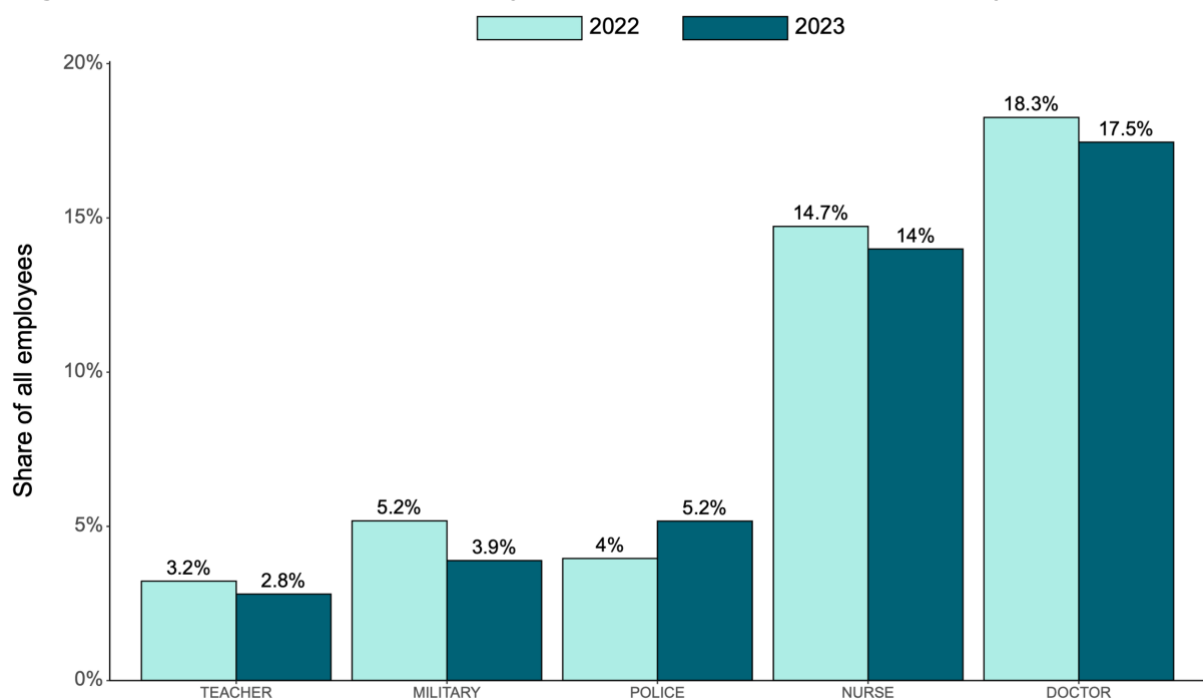
Once turnover indicators are constructed, they can be disaggregated along key margins for both the government as a whole and individual organizations. Key margins include, for example:

- By gender, to analyze gender-specific turnover patterns
- By contract type, to determine whether turnover is particularly pronounced among employees on precarious contracts
- By years of service and age, to assess whether turnover is a particular challenge for new and young recruits
- By sector, to assess whether high turnover is concentrated in particular areas, such as health services or education
- By region, to determine whether turnover is a particular challenge in certain parts of the country (e.g., the capital, where private sector competition for skilled staff might be higher)

- By key position, to assess whether turnover is a particular challenge for positions requiring scarce skills (e.g., IT professionals)
- By rank, to determine whether turnover is especially high at certain hierarchical levels (e.g., managers)

Figure 8 below provides a sample visualization for one of the countries included in our analysis, comparing turnover rates among key positions. It highlights that turnover in the health sector is significantly higher than in the education and police sector, with particularly acute retention challenges for doctors and nurses.

Figure 8. Turnover Rates in Key Positions in Sample Country



Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.7 Promotion and Career Development

Why promotion and career development indicators matter

Effective organizations offer career development opportunities to their staff. Employees who perceive limited opportunities for advancement tend to be less motivated and less committed to their organization (Schuster et al., 2024). Public sector organizations with stronger, merit-based promotion incentives tend to exhibit greater productivity (Deserranno et al., 2025). Payroll analytics can help shed light on promotion and career development trajectories—or their absence—both

in the government as a whole and within specific organizations or professional groups.

To understand career development and promotion trajectories, payroll analytics can estimate several indicators:

- Rank distribution: percentage of employees by rank, by year
- Rank promotions: percentage of employees promoted to a higher rank, by year
- Internal promotions: percentage of employees promoted to a higher rank within their organization, by year
- External promotions: percentage of employees promoted to a higher rank in another public sector organization, by year
- Promotions within rank: percentage of employees promoted to a higher band or position within the same rank, by year
- Senior promotions: percentage of employees promoted to the director role (the most senior rank), by year

When calculating these indicators, analysts need to consider what constitutes a promotion in a country context—whether it includes only promotions between ranks (e.g., from an administrative support rank to a professional rank) or also promotions within ranks (e.g., from a professional position to another with team-lead responsibilities). Analysis should also pay close attention to organizational restructuring, which may lead to reclassification of jobs and pay grades without necessarily denoting individual advancement.

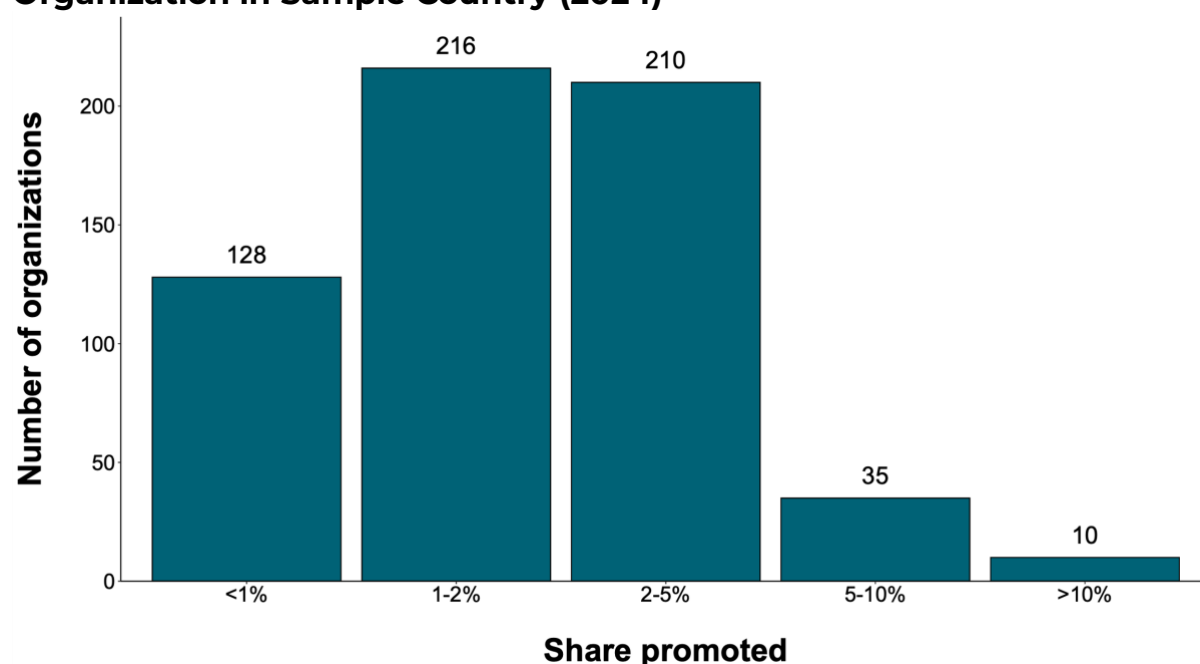
Once promotion and career development indicators are constructed, they can be disaggregated along key margins for both the government as a whole and individual organizations. Key margins include, for example:

- By prior rank, to assess whether promotion trajectories differ based on employees' initial rank
- By prior salary quintile, to examine whether promotion trajectories differ between higher- and lower-income earners
- By region, to determine whether promotion opportunities are concentrated in particular parts of the country (e.g., the capital)
- By sector, to assess whether promotion opportunities are concentrated in or are lacking within key sectors (e.g., health, education, police)

- By contract type, to examine whether promotion opportunities are concentrated among specific contract types (e.g., permanent civil servants)
- By gender, to evaluate whether career and promotion opportunities differ by gender

Figure 9 presents a sample visualization from one of the countries in our analysis. It compares the share of employees promoted to a higher rank (*estamento*) by organization in 2023, for example, from a professional to a director rank, or from a technical to a professional rank. In most organizations (359), fewer than two percent of employees were promoted across ranks. By contrast, in 17 organizations more than ten percent of employees were promoted to a higher rank in 2024. Such analyses can help identify differentiated career progression opportunities across government.

Figure 9. Share of Employees Promoted to a Higher Rank Last Year by Organization in Sample Country (2024)



Source: Schuster, Naranjo, and Lipinski (forthcoming).

4.8 Retirement Projections

Why retirement projection indicators matter

Understanding future retirements from the civil service is central for both effective fiscal and workforce planning. From a fiscal perspective, it is a key step to help governments anticipate future pension obligations and

prevent fiscal crises caused by unexpected surges in such obligations (de Albuquerque Tavares et al., 2023). From a workforce planning perspective, accurate retirement projections are crucial for organizations to anticipate future staffing needs and align recruitment and training efforts with predicted staff shortages (Ghadwan et al., 2023). Payroll analytics can identify where surges in retirement are likely to occur within government, for example, which organizations and types of positions will be most affected.

Payroll analytics can estimate several indicators to inform retirement projections:

- Number of employees reaching retirement age annually over the next ten years
- Share of employees who have reached retirement age in the past five years
- Share of employees projected to reach retirement age in the next five years
- Cumulative share of employees reaching retirement age by year over the next ten years
- Average age of employees, by year
- Share of employees by age bands (18–29; 30–39; 40–49; 50–59; 60+), by year

Retirement indicators require detailed information beyond the payroll, including minimum, normal, and mandatory retirement ages, as well as an understanding of whether these thresholds vary across employee groups (e.g., by sector or contract type). Similarly, analysts should verify whether the actual retirement practice aligns with statutory retirement norms, for instance, in cases of widespread early retirement or contract extensions beyond the retirement age. In such instances, predictions based solely on employees reaching the normal or mandatory retirement age become far less reliable.

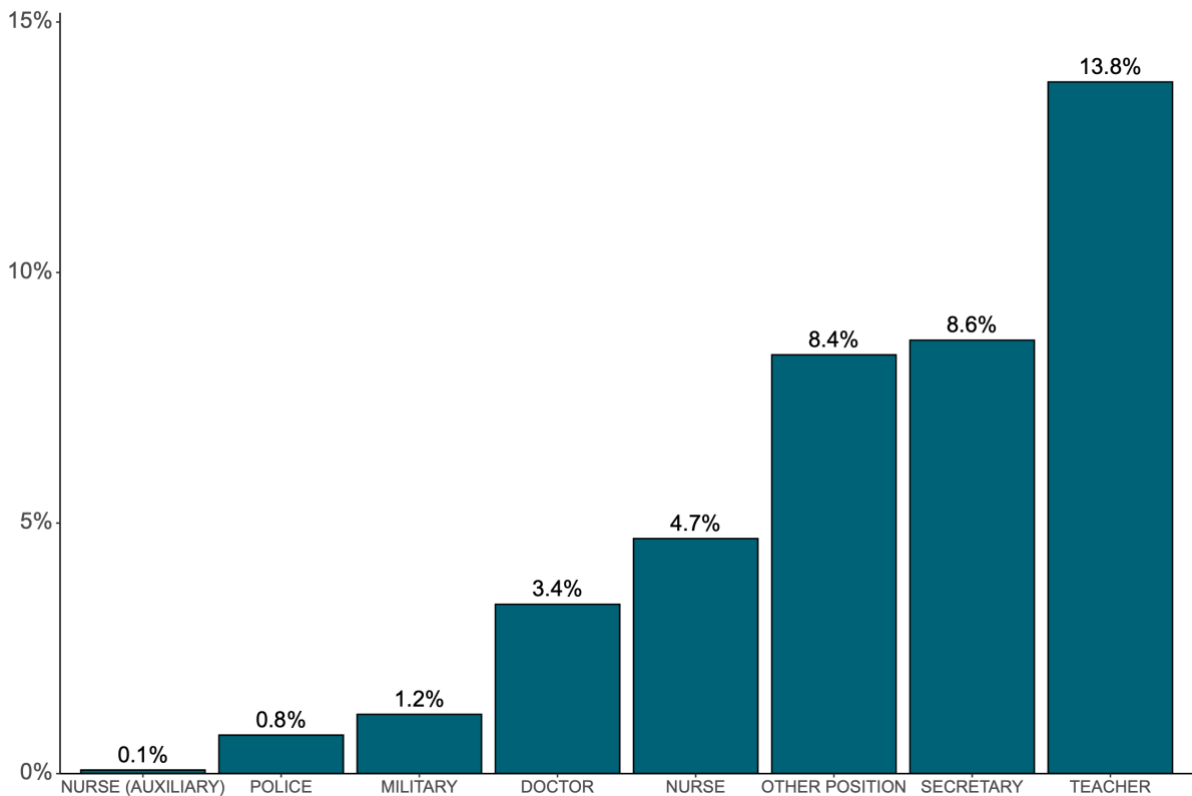
Once retirement indicators are constructed, they can be disaggregated along key margins for both the government as a whole and individual organizations. Key margins include, for example:

- By key position (e.g., IT professional, manager, teacher, doctor, nurse, police officer, secretary/assistant), to assess whether retirement will cause shortages in specific roles
- By sector, to determine whether future retirements will cause staff shortages in particular sectors (e.g., health, education)

- By rank (e.g., manager, administrative support, technical), to assess how retirements will shape promotion opportunities and guide future recruitment efforts
- By gender, to evaluate how future retirement will shape the gender composition of public employment
- By region, to determine whether future retirement will cause staff shortages in some areas of the country

Figure 10 presents a sample visualization for one of the countries included in our analysis, illustrating the proportion of employees expected to retire by position over the next five years. It underscores the need for significant forward workforce planning in education, where approximately 10 percent of teachers are projected to reach retirement age (60) in the next five years. By contrast, only about 4 to 5 percent of doctors and nurses are projected to reach retirement age by 2029.

Figure 10. Share of Employees Projected to Reach Retirement Age in Next Five Years by Position in Sample Country



Notes: Values show percent of employees classified as working in each position in 2024 who would reach the age of 60 before the end of 2029.

Source: Schuster, Naranjo, and Lipinski (forthcoming).

Retirement projections are also a critical input for predictive modeling of future public pay and pension obligations faced by governments. Such modelling requires a range of additional projections, including future hiring in different sectors and positions, public sector turnover prior to retirement, and promotion and salary progression of current public servants over time. Their key added value lies in enabling the modeling of pay or pension reforms—for example, measures to enhance the fiscal sustainability of future obligations. As this type of modelling is country-specific, it is not included in our set of indicators (see de Albuquerque Tavares, Ortega, and Woodhouse (2023), for further discussion).

5.Common Pitfalls in Analyzing Payroll Data, and How to Address Them

In developing payroll indicators, analysts encounter at least four recurring pitfalls or challenges (beyond the coverage issues noted above) to ensure that indicators accurately capture the characteristics of the public sector workforce: position classification, organizational change, multiple payments to the same employee, and tracking employees across time. These are not the only challenges payroll analytics may face in a given country, but we focus on these four as they are particularly common in a range of countries.

5.1 Position Classification

A central objective of payroll analytics is to generate insights on key positions in government, such as teachers, doctors, nurses, IT professionals, administrative assistants, or police officers. Are they paid the same across different organizations? How has their real pay evolved over time? Which positions suffer from high turnover? Answering these questions requires analysts to identify all employees in specific government positions— such as all teachers, IT professionals or police officers— within the payroll data.

Where position classifications are standardized (e.g., when all police officers in a given grade share the same position title) identifying employees in similar positions requires only filtering the payroll data by the relevant position title. In many countries, however, job titles are not standardized. In other words, employees performing the same role across different organizations may appear under different job titles in payroll records. In such cases, payroll analysis ideally requires a careful mapping of these differences, often through consultation with government organizations to accurately identify the equivalent job titles.

Where this is not feasible, for instance, when job titles for the same roles vary even within a single organization, or is not cost-effective, analysts can use key text-string searches in position titles. IT professionals, for example, might be identifiable through text strings such as ‘programmer’, ‘code’, and ‘informat’. Analysts should carefully review the resulting set of employees to ensure there are no false positives. Subsequently, analysts should triangulate the identified number of employees in those positions with alternative data sources where possible. For instance, the number of teachers or doctors can be cross-checked against union membership data, where such membership is comprehensive. Where payroll numbers fall short of reliable external sources, analysts should assess whether further text strings in position or job title could improve the identification of employees in the role of interest. Where payroll numbers exceed employee numbers from reliable external sources, analysts need to assess whether some employees included in the count should be excluded, for instance, by filtering out specific contract types, hierarchical ranks, or position text strings (e.g., “assistant” when identifying IT professionals).

5.2 Organizational Change

Many payroll indicators—such as organizational turnover rates or the evolution of average pay in an organization over time—presuppose organizational continuity, meaning that the same organization exists consistently over the analysis period. Yet, in practice, public sector organizational structures can change: organizations are merged, split, abolished, or newly created. Such changes pose challenges for payroll analytics, particularly when estimating organization-level indicators.

Consider, for instance, that the constituent parts of a single organization are merged into different entities—say, the Ministry of Trade and Industry is abolished and the Trade division is incorporated into the Ministry of Foreign Affairs, while the Industry division is absorbed by the Ministry of Economy. Failing to account for this organizational change can bias a number of payroll indicators. For instance, organizational turnover (the share of employees leaving their organization) would be overstated for government if all staff from the abolished Ministry of Trade and Industry were classified as leavers, even though they had not resigned but were instead integrated into other parts of government.

Moreover, organization-level indicators need to be interpreted cautiously in contexts of structural change. In the above example, average pay in the Ministry of Economy might appear to shift significantly—not because of actual pay changes for existing employees, but due to the incorporation of

staff from the Ministry of Industry, who may have been on different pay scales.

Payroll analytics therefore need to account for organizational change in their code, adjusting indicators (e.g., turnover rates) to avoid confounding genuine changes in pay and employment with the effects of organizational mergers or splits.

5.3 Missing IDs of Individual Public Servants

Not all governments maintain unified employee identifiers for civil service in their payroll records. In a number of countries, the decentralization of civil service management under New Public Management reforms implied that individual civil service departments function as separate employers and issue their own staff IDs (cf. Hood, 1991). For example, the United Kingdom does not support a central ID for civil servants. Similarly, Chile's published payroll records lack a unique identifier for individual employees (Consejo para la Transparencia, 2025).

Yet, many payroll indicators—such as those tracking average pay and promotions over time or measuring turnover rates—assume that analysts can identify individual employees across time, including when they transfer between different public sector organizations.

In the absence of IDs, payroll analysts still need an alternative method to uniquely identify individual employees. When available, first and last names provide the most reliable substitute for IDs to uniquely identify employees. Names alone are often insufficient, as large public sectors may have multiple employees sharing the same first and last names. Moreover, in some countries last names can change due to a change in marital status. Payroll analytics should therefore, ideally combine names with demographic information (birth dates are ideal where available) to uniquely identify individuals. In contexts where last names change due to the marital status, payroll analysts must additionally recover employees who seem to disappear from the payroll (i.e., whose unique combination of name and demographic information no longer appears in subsequent months) but in fact remain employed under a changed last name. This can be achieved by assessing who among those who appear to have dropped out from the payroll matches first names and demographic information (e.g., birth dates) with employees on the payroll from the previous month, to distinguish true leavers from employees who remain in the organization but have changed their last name.

5.4 Multiple Payments to a Single Public Servant

In many countries, employees are allowed to receive multiple payments from the same or different government organizations. For instance, a doctor may hold two part-time positions, working 20-hour shifts in separate hospitals. Employees may also take on part-time work alongside their full-time public sector position, such as ministry employee teaching evenings or weekends at public universities.

Payroll analysts need to account for this when estimating both government-wide and organization-specific indicators. As noted in Section 3 of this paper, ideally, analysts should estimate the pay and employment of full-time equivalent employees. This ensures that the creation of additional part-time roles (e.g., one full-time role split into two part-time positions) is not mistakenly interpreted as an expansion of public employment or a reduction in the average pay of employees. However, this approach requires a variable that indicates the number of weekly working hours and valid entries for that variable. In such cases, multiple payments to public servants can be summed, while including a column reflecting the (increased) FTE to enable FTE-adjusted estimations of pay and employment.

Where valid data on working hours or FTE are unavailable, a second-best approach is for analysts to sum all payments received by a given employee in a month when estimating payroll indicators. The resulting indicators thus estimate growth (or decline) in the total number of unique employees in a government (without accounting for their FTE) and the average total pay of employees—including multiple roles where applicable—again without adjusting for FTE. Payroll analysts should then caveat their findings accordingly, noting that part of the observed growth or decline in employment may reflect changes in employees' FTE working patterns rather than actual changes in pay or employment. The multiple-payment indicator described in Section 4.1—tracking the number of employees who receive multiple payments—can help analysts identify whether and where in government multiple payments may warrant special attention in payroll analysis. Further disaggregating this information by employee characteristics can be valuable in payroll audits, allowing analysts to distinguish between legally authorized payments and multiple payments to public servants that potentially violate public pay regulations.

6. Conclusion

Payroll analytics have the potential to generate a wide range of insights to improve public pay policies, enhance personnel management, and support fiscal sustainability. Every government operates a payroll on the basis of

which such insights can be generated. Yet, many governments do not systematically analyze their payroll records or they generate only a limited subset of the potential insights such analytics can offer.

To support broader use of payroll analytics in government, this technical note presents a standardized methodological approach for the analysis and visualization of payroll data. The approach enables governments to analyze their payroll records using an [accessible R code](#), visualize the results for policymakers via a dashboard, and benchmark key indicators across organizations and countries in eight core domains. As such, the approach seeks both to reduce the staff time governments spend analyzing their payroll records and to enhance the strategic value of such analytics, particularly by facilitating cross-country comparisons.

Engaging in payroll analytics also helps governments better understand the limitations of their own payroll records, specifically, which organizations and contract types are currently excluded from the central payroll and would benefit from better monitoring and analytics by being incorporated into a central payroll, where local laws and regulatory frameworks permit? Which variables in a payroll or HRMIS are unreliable, for instance, fields that are not updated regularly, thus potentially biasing conclusions drawn from the data? Payroll analytics can thus inform improvements to payroll systems and contribute to higher-quality payroll records over time.

By standardizing payroll analytics across countries, the methodology also serves as a foundation to build cross-country public payroll indicators. Such standardization improves our understanding of how public administrations function globally. Given the similarities in public payroll record formats across countries, cross-country standardization of payroll analytics offers significant benefits at relatively low costs .

A key strength of this approach is its ability to move beyond aggregate, government-wide metrics to generate granular, organization-level insights. By enabling disaggregation of payroll data by agency, contract type, and employee characteristics (such as gender, age, rank, or tenure), the methodology reveals disparities and patterns that would otherwise remain hidden. This level of detail enhances the relevance of payroll analytics not only for central government actors—such as Ministries of Finance or Civil Service Agencies—but also for managers and decision-makers within individual public organizations. In doing so, payroll analytics becomes a shared tool across levels of government, fostering more tailored, data-driven decision-making that responds to the specific realities of different parts of the public sector.

We therefore hope that this methodological guide, along with the sample R code and dashboard (available for download from the project website for use in any country), will promote a more standardized approach to payroll analytics in governments. Such standardization would enable governments and researchers to collaborate in an effort to build comparable cross-country public pay and employment indicators, in Latin America and globally. Ultimately, that would mean better, more evidence-based discussions in governments worldwide on how we can improve the management of public pay, which accounts for 10 percent of global GDP and public employment, encompassing 38 percent of the world's formally employed workforce (World Bank, 2024).

We encourage others to replicate this approach and benefit from the project resources. As emphasized throughout, these indicators are intended as a starting point—one that can be expanded by linking payroll data to other administrative or survey sources. For example, analysts could examine how teacher pay influences student learning outcomes, or how turnover among procurement officers affects the prices that government organizations pay for goods and services (cf. Rogger and Schuster, 2023).

We thus hope that these project resources provide a platform to advance public payroll analytics more broadly, supporting more evidence-based public sector workforce management and fiscal policy. Readers are encouraged to contact the authors for guidance on leveraging these resources to advance payroll analytics in their own country.

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