PFR Fundamentals

BUDGET RIGIDITY

WORLD BANK GROUP

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NOVEMBER 2024

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About the Notes and Acknowledgments

PFR Fundamentals is a series of analytical and how-to notes prepared by the Fiscal Policy Unit to assist task teams in preparing and implementing Public Finance Reviews (PFRs).

This note was prepared by a core team comprising Santiago Herrera, Massimo Mastruzzi, and Hironobu Isaka. Overall guidance was provided by Emilia Skrok and Fernando Blanco. Eduardo Olaberria provided helpful comments and inputs during the preparation process. The peer reviewers were Cristina Savescu, Barbara Cunha, Chadi Bou Habib, Rafael Chelles Barroso, and Desislava Enikova Nikolova.

Section 1

Introduction

Many countries are facing formidable fiscal challenges following a surge in debt-to-GDP ratios in recent years. Estimates of fiscal gaps suggest that sustained fiscal tightening will be needed in most countries to bring debt down to pre-pandemic levels. Moreover, as global financial markets become more unpredictable and interest rates rise, many countries will face significant challenges in maintaining sustainable levels of public debt, especially when this is coupled with increased public spending due to geopolitical tensions, aging populations, and climate change.

Budget rigidities are often cited as a reason for slow progress in expenditure containment. Policymakers report that they are not always able to quickly make fiscal changes because of constraints like laws, contracts, and other limitations. These restrictions, known as budget rigidities, make it challenging for the government to alter the size and structure of the public budget, especially in the short term. Several budget components are inflexible, including wages, pensions, and debt service. But there are other inflexibilities rooted in the constitution, laws, or decrees, such as provisions that earmark revenues, set minimum spending requirements, or require automatic indexation (spending is linked to the evolution of macroeconomic variables such as inflation, growth, or unemployment).

This note aims to help assess the extent and prevalence of budget rigidities using two approaches commonly used in World Bank studies. The first is a cross-country, model-based parametric procedure which estimates models for the fundamental determinants of different types of public spending. It estimates spending levels based on certain country characteristics. The second is a country-specific, non-parametric method based on BOOST data that classifies spending into different levels of rigidity, taking a case-by-case approach.

Section 2

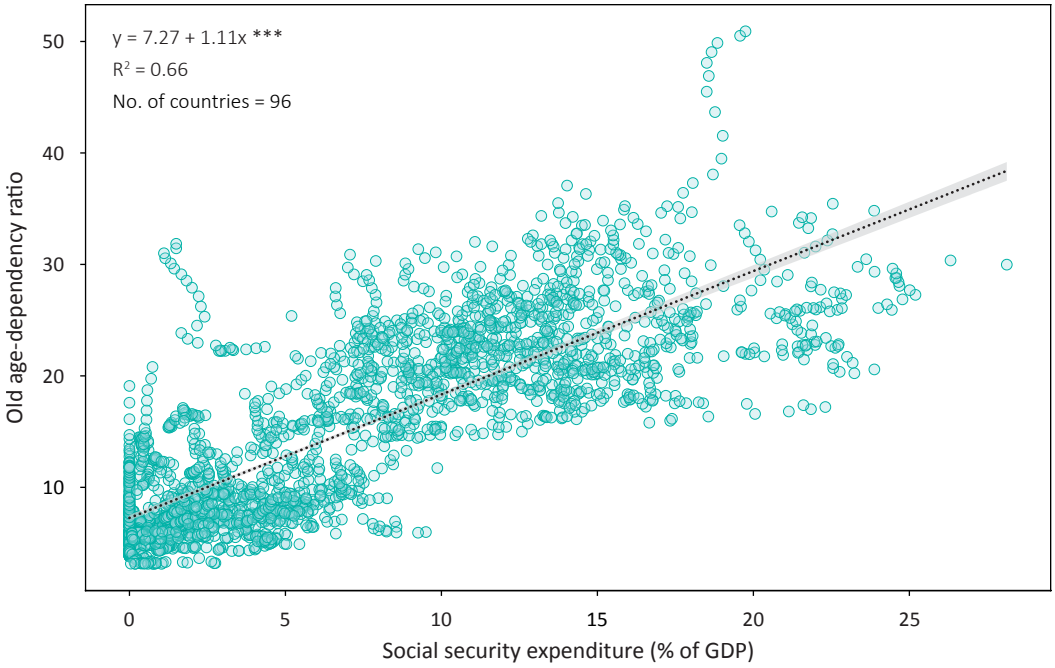
Sources of Rigidity: Overview

Rigidity refers to the inability of a government to prioritize resources, even in the medium term. The limitation has a time dimension imposed by institutional restrictions that limit the ability to modify the level or structure of the government budget within a certain period of time (Echeverry et al. 2006; Cetrángolo, Jiménez, and Ruiz del Castillo 2010). Restrictions can result from contractual obligations such as public sector wage agreements, interest payments on public debt, or the financing of large projects that extends over several years. They can also be the result of legal or other formal actions limiting discretionary government authority to make changes to the budget, for example, the protection of certain types of expenditures by constitutional or other legal provisions. Expenditures like entitlements and social security benefits that are mandated by laws outside the budget process are a further source of rigidities. Finally, rigidities can stem from institutional weaknesses of the budget process, when actors in this process are unable to reach agreement or when the scope of government action is limited by outside institutional actors, like courts. Herrera and Velasco (2019) and Herrera and Olaberria (2019) discuss sources of budget rigidity in more detail, this note focuses on a few of the main sources.

One source of budget rigidity is long-term demographic change, which determines trends of public finances in ways that are difficult to change. One of the greatest challenges for public finances comes from dramatic demographic changes. As the population of a country increases, so does demand for public services; and as a population ages, the pressure on public finances also increases (figure 1).

FIGURE 1

Old age-dependency ratio and social security spending across the world, 1970–2021



Source: Authors' calculations based on WEO (2022) and World Bank staff estimates.

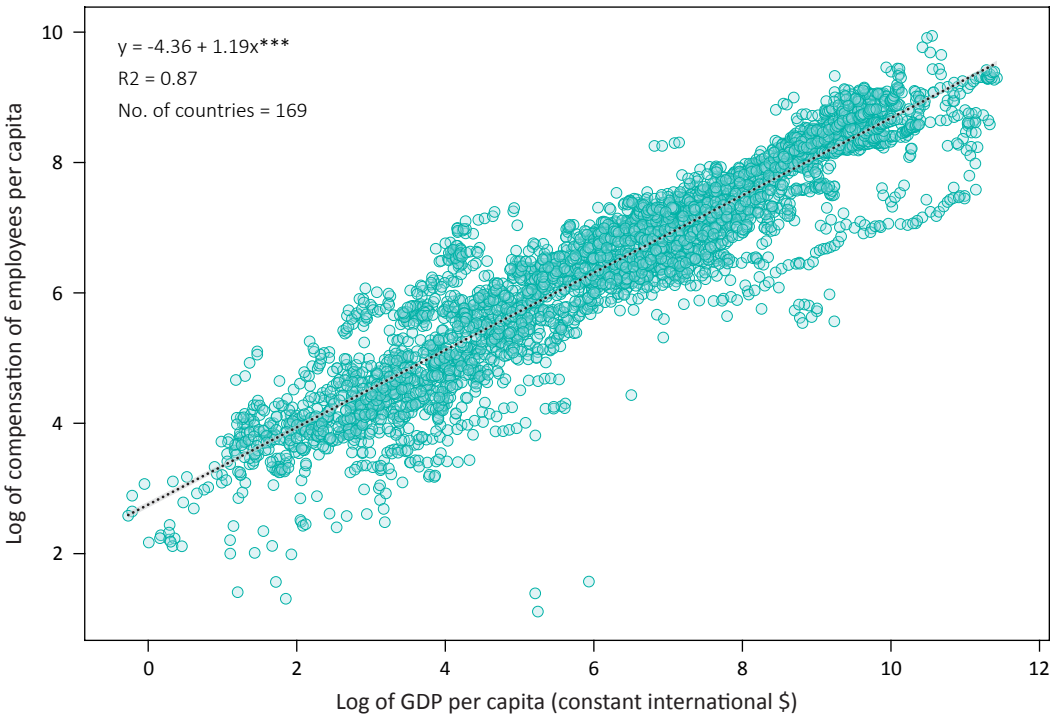
Another source of rigidity is from public wages. The wage level increases with the level of wealth of a country, as noted by development economists, such as Balassa (1964), Samuelson (1964), and Bhagwati (1984). The Balassa-Samuelson hypothesis explains wage differentials across countries with different levels of productivity, this translates into higher wages in wealthier countries, because they have higher productivity levels. The Bhagwati model explains wage differentials across countries based on factor endowment differences: those with higher capital-to-labor ratios have higher wages. **Hence, wages tend to increase with the level of development of a country.** If public sector wages are linked to private sector remuneration, these should also increase with the country's income level (figure 2).[1] Therefore, the portion of the budget dedicated to wages tends to increase as a country's income level rises.

An additional source of rigidity emanates from the evolving role of the state in protecting citizens against economic hardship, as articulated by Rodrik (2000), who developed a model in which the state insures citizens against undiversifiable external

1. Using real per capita GDP as a proxy for the country's income and the real per capita public wage bill as a proxy for the average wage in the public sector, we observe a positive association between the two variables over time.

FIGURE 2

Public Sector Wages and GDP per capita 1980–2021



Source: Authors' calculations based on WEO (2022) and World Bank staff estimates.

shocks using public sector employment. The more exposed the country is to external shocks, the higher public employment will be. Rodrik's model can be extended to examine the size of government spending (Von Hagen and Chen 2019). The results suggest that the relative size of government desired by citizens can be explained by the degree of openness and the volatility of shocks affecting the economy. For instance, if the country faces very volatile terms-of-trade in the demand for exports, the country will mitigate the risk through larger spending. A large government sector serves as a buffer against such shocks.

Political economy factors and weakness in the budget approval process also lead to budget rigidity. There is competition between different interest groups for public resources; after the conflict is resolved through public spending, beneficiaries seek to maintain their share of public resources, making the budget more rigid. This competition, together with weakness in the budget approval process, (e.g., lack of transparency or budget fragmentation) support different groups' positions to impose rigidity in the budget (Von Hagen et al. 2019)

Section 3

Two Approaches to Streamline Rigidity Analysis in PFRs

Two approaches are commonly used to measure rigidity. The first is a parametric approach which disaggregates spending in particular economic categories between structural and non-structural components using econometric methods, it associates the structural component with the rigid component of spending. The second approach is a country-specific non-parametric method that tags individual spending items and classifies them into differing levels of rigidity by applying a newly introduced taxonomy across all countries.[2] Both approaches are explained in detail below with further documentation in the appendixes.

2. Appendix 2 provides further details on the taxonomy.

3.1 Parametric approach

A parametric approach to rigidity involves decomposing public spending into structural and non-structural components. Herrera and Velasco (2019) and Herrera and Olaberria (2019) propose a measure of rigidity based on the notion that public spending can be decomposed into structural and non-structural components. The structural component is determined by long-run economic fundamentals while the non-structural component is determined by policy decisions or short-run factors associated with the business cycle. The structural determinants of the wage bill may differ from those of other components of spending, such as pension payments or transfers to subnational governments, or they may affect them with a different sign. For instance, while the wage bill will be positively related to the size of the working age population, pension payments will be negatively associated with it. Alternatively, the wage bill may not be related to private sector participation in the pension payment system, but public pension payments will. The structural component is determined by long-run economic fundamentals beyond the policymaker's control and will be interpreted as the rigid level of spending.[3] The non-structural component is the difference between the observed and the structural estimation and is determined by short-run transitory factors related to business or political cycles. The degree of rigidity of spending will be approximated by the ratio of structural spending to total spending. The non-structural component of wages or pension payments provides an indication of the discretion that policymakers have used in the past, causing deviations of total spending from the structural level.

This section presents details of the estimation of the structural components of the public wage bill and pension payments, it shows their evolution over time, and presents some cross-regional comparisons. The first step consists of estimating econometric models for the determinants of the spending aggregate (wages and pensions) and taking the predicted level for each country as the structural component.[4] Once the model is estimated , regression equations are shifted in a corrected-least squares (COLS)[5] fashion to avoid negative residuals; this adjustment implies that the reference or benchmark levels for public spending will be those of the more efficient countries or those with lower wage or pension spending per capita.

3. The estimation of long-run or structural relationships is based on panel data for up to 166 countries from 1980–2021. Data availability varies for each type of spending, so it considers both individual country and cross-country relationships between the variables.

4. Explanatory variables are those described in the previous section, but constrained by data availability. While the proxies for level of development, such as GDP per capita, population, or demographic composition are widely available, others related to political economy or budget negotiation processes are difficult to obtain. See Herrera-Olbaerria (2019).

5. COLS are typically used to estimate deterministic frontiers in cross-sectional data. See Greene (1980; 2005) and Richmond (1974).

3.1.1

The Wage Bill: Wages and Public Employment

The wage level increases with the wealth of a country (Balassa 1964; Samuelson 1964; Bhagwati 1984). Using real per capita GDP as a proxy for the country's income and the real per capita public wage bill as a proxy for the average wage in the public sector, we observe a long-run positive association between the two variables, as shown in the previous section (figure 2). In previous literature, Shelton (2007) and Herrera and Velasco (2019) estimate a structural model of the determinants of public wages, using GDP per capita, and country characteristics such as the population, population density, demographic composition (youth and elderly), and the degree of openness of the economy as explanatory variables.[6] Table 1 summarizes the estimation results.[7]

The predicted wage bill per capita is interpreted as the expected structural component of the public wage for each country, given income level and other country characteristics. It provides an estimation of the government wage level conditioned on the level of development, population, degree of openness to trade, and demographic characteristics. This level is determined by structural factors that are not under direct government control, and hence are a source of rigidity in the level of spending. The difference between the observed level and the structural component is the non-structural level or flexible component, which is associated with policy or business cycle factors. The lower the share of the structural component, the more space policymakers will have to adjust if they have the political will to do so. The share of the structural component of the wage bill fluctuates between 60 and 80 percent of the total, on average, and varies across regions (figure 3).[8]

3.1.2

Pension payments

This section presents the estimation the structural component of government pension payments and compares it with observed levels, to gauge the space for policy action in this category of spending. Pension payments, like wages, show a positive association with GDP per capita across the world, as they derive from higher wages and different

6. The model also tested for possible asymmetry in the response of wages to GDP per capita, depending on whether GDP was going up or down, or whether GDP was above or below trend. The asymmetry hypothesis was not validated by the data. The model was also estimated using a time dummy and results did not change significantly.
7. The STATA do file to replicate the analysis is available via the following link: Rigidity_codes.do.
8. This version of the How To Note assumes that wage bill rigidity emanates from the wage level, but rigidity can also originate from the level of employment. Future versions of this note may extend the work by Herrera and Munoz (2019) who decompose the changes in the wage bill between quantity (employment) and price (wages). Work contracts make labor adjustments difficult and costly. Public employment, measured as the percentage of the labor force employed by the public sector, shows different levels across regions and over time.

TABLE 1

Structural determinants of public wages

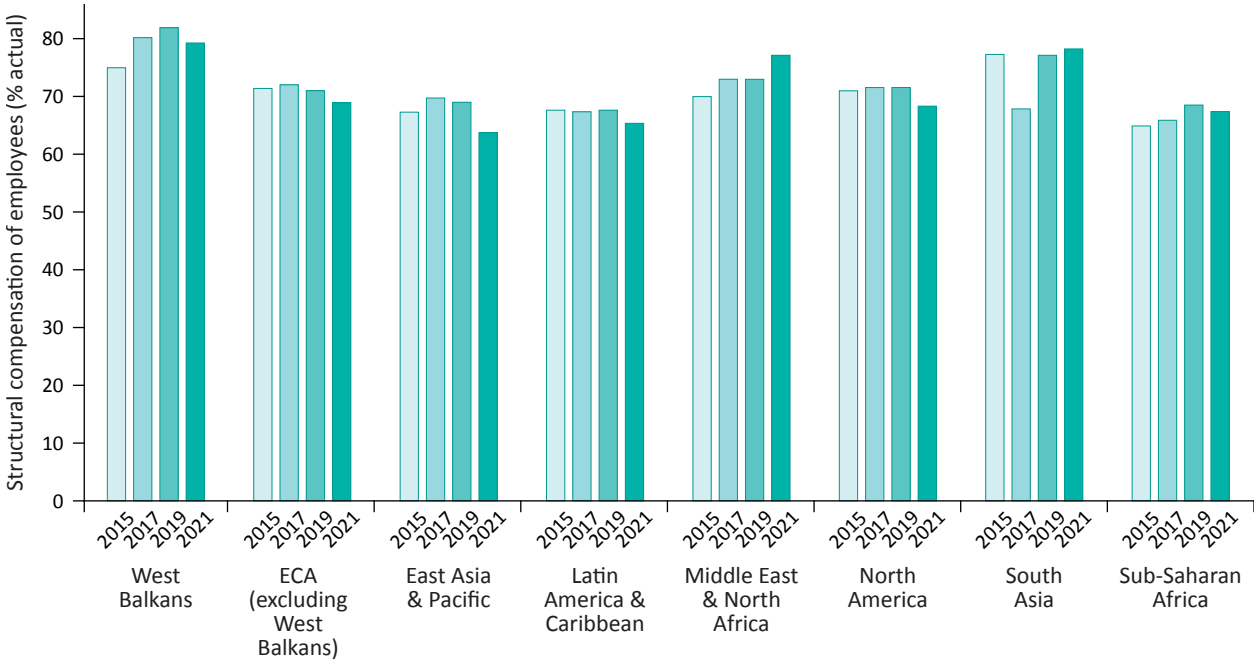
Independent variables	Fixed effects
Log of GDP per capita (constant international $)	1.143*** (0.023)
Log of population	0.163*** (0.031)
Urban population (% of total)	0.013*** (0.002)
Young age dependency ratio (% of working-age population)	0.004*** (0.001)
Old age dependency ratio (percentage of working-age population)	−0.010*** (0.002)
Openness (% of GDP)	−0.001*** (0.000)
Constant	−7.262*** (0.527)
Observations	3,979
R-squared	0.564
Adj. R-squared	0.546
F-stat	822.6
Number of countries	156
Country FE	Yes

Source: EMFTX staff calculations.
Note: The dependent variables is the log of public wage bill per capita in constant international dollars. Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

demographic compositions as societies become wealthier. The structural level was estimated using a fixed-effect model that included demographic factors, the wage level of the economy, and the type of retirement system that prevails in the country, that is, whether it is public or private, or pay-as-you-go versus individual savings.

FIGURE 3

Structural component of public wage bill as a percent of actual wage bill by region



Source: Authors' calculations based on WEO (2022) and World Bank staff estimates.

The econometric results (table 2) form the basis for estimating the structural component of pension payments. As in the case of wages, the Corrected Least Squares (COLS method) is applied to shift regressions downward to build the reference or benchmark level for the most efficient (least cost) pension payment countries. With the predicted values of pension payments, we calculate the structural component and note that the ratio of this component to the observed payments ranges from 50 percent to almost 80 percent, and varies across regions. The remaining 50 to 20 percent is the space for pension adjustment. The ratio of structural to non-structural components indicates the relative importance of economic fundamentals in driving actual pension payments. Across regions there is a rising trend in the share of the structural spending within the total during the period 2010–2019 (figure 4), except in the East Asia and Pacific region.

TABLE 2

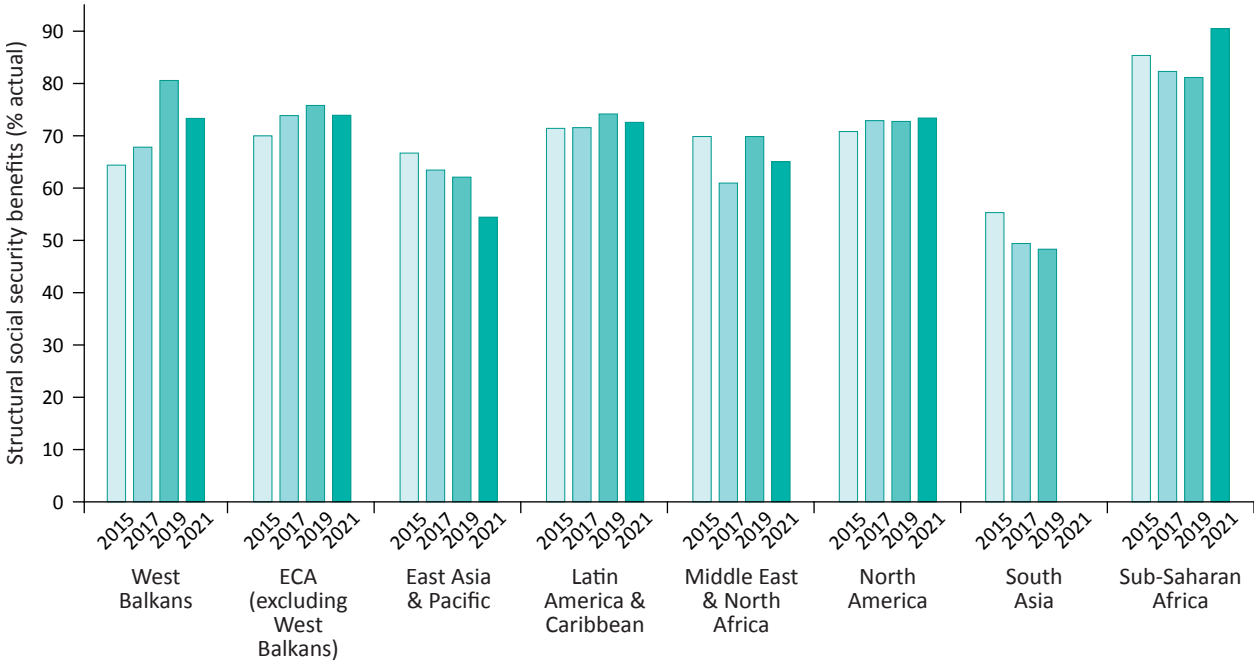
Structural determinants of the log of pension payments per capita, constant international dollars

Independent variables	Fixed effects
Log of GDP per capita (constant international $)	0.344*** (0.046)
Log of social security revenues per capita (constant international $)	0.450*** (0.024)
Log of population	0.616*** (0.084)
Old age dependency ratio (percentage of working-age population)	0.017*** (0.002)
Labor force participation rate (% of total population age 15+)	−0.008** (0.003)
Constant	−9.092*** 1.226
Observations	1,543
R-squared	0.537
Adj. R-squared	0.516
F-stat	341.9
Number of countries	61
Country fixed effects	Yes

Source: EMFTX staff calculations. Attached STATA Do file.
Note: The dependent variables is the log of social security benefits per capita in constant international dollars. Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

FIGURE 4

Structural component as a percentage of public pension payments by region, 2015–2021



Source: Authors' calculations based on WEO (2022) and World Bank staff estimates.

3.1.3

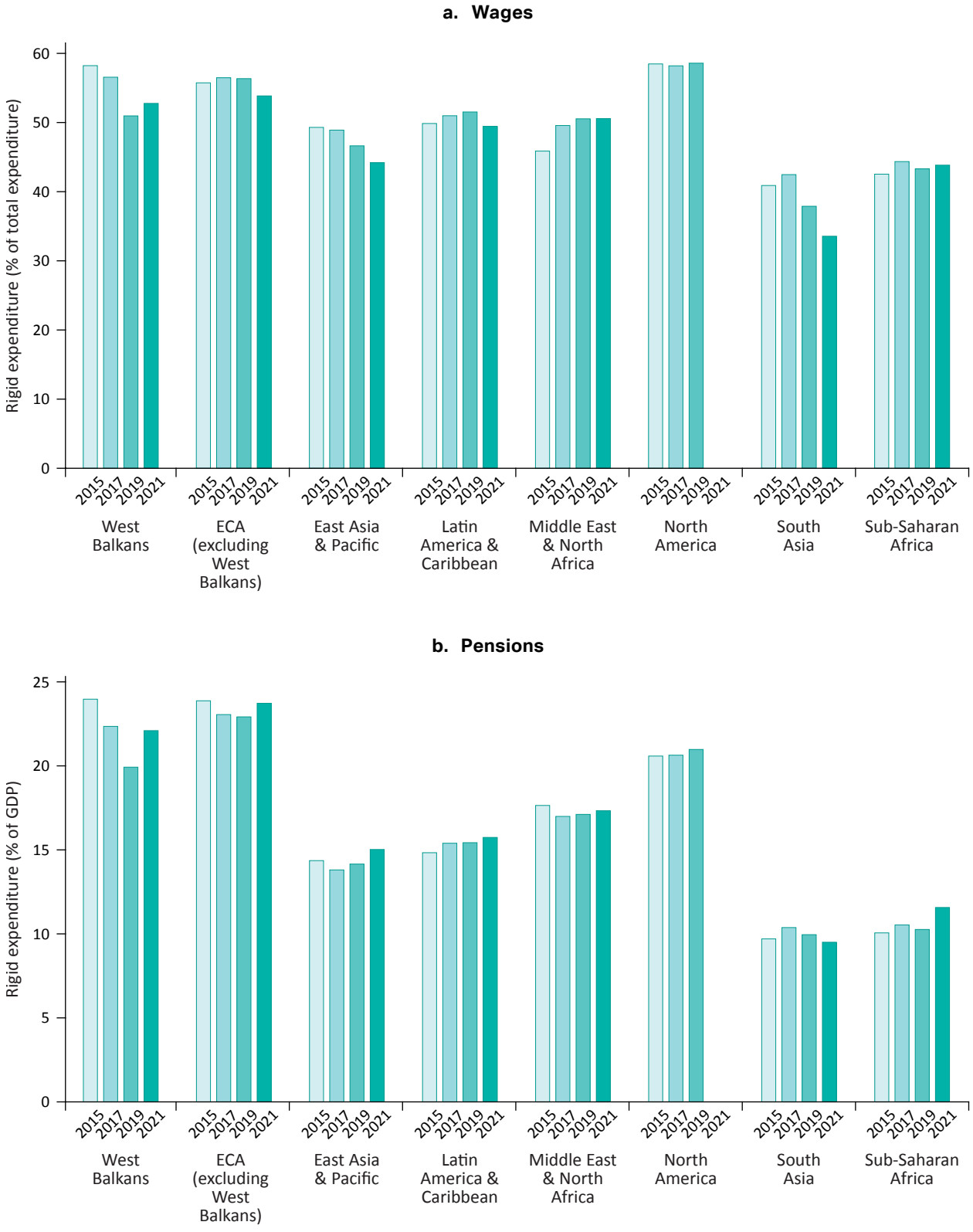
Aggregate measure of rigidity with the parametric approach

Aggregating pensions, wages, and interest payments, we obtain a more complete picture of total rigidity in the budget. When we aggregate the structural components of wages and pensions, and add total interest payments, we obtain the total measure of rigidity in the budget. This measure of rigidity is lower than previous estimates of rigidity which include the totality of wages and pensions, as only the structural component is included as the rigid part. Hence, the part of spending that is the non-structural component, or the non-rigid component, provides a measure of the potential space of expenditure reduction; the space for policy action is higher than that implied by previous rigidity estimates which include the entire aggregate of wages and pensions (figure 5).[9]

9. A parallel How to Note on the Potential Fiscal Savings explores this in detail.

FIGURE 5

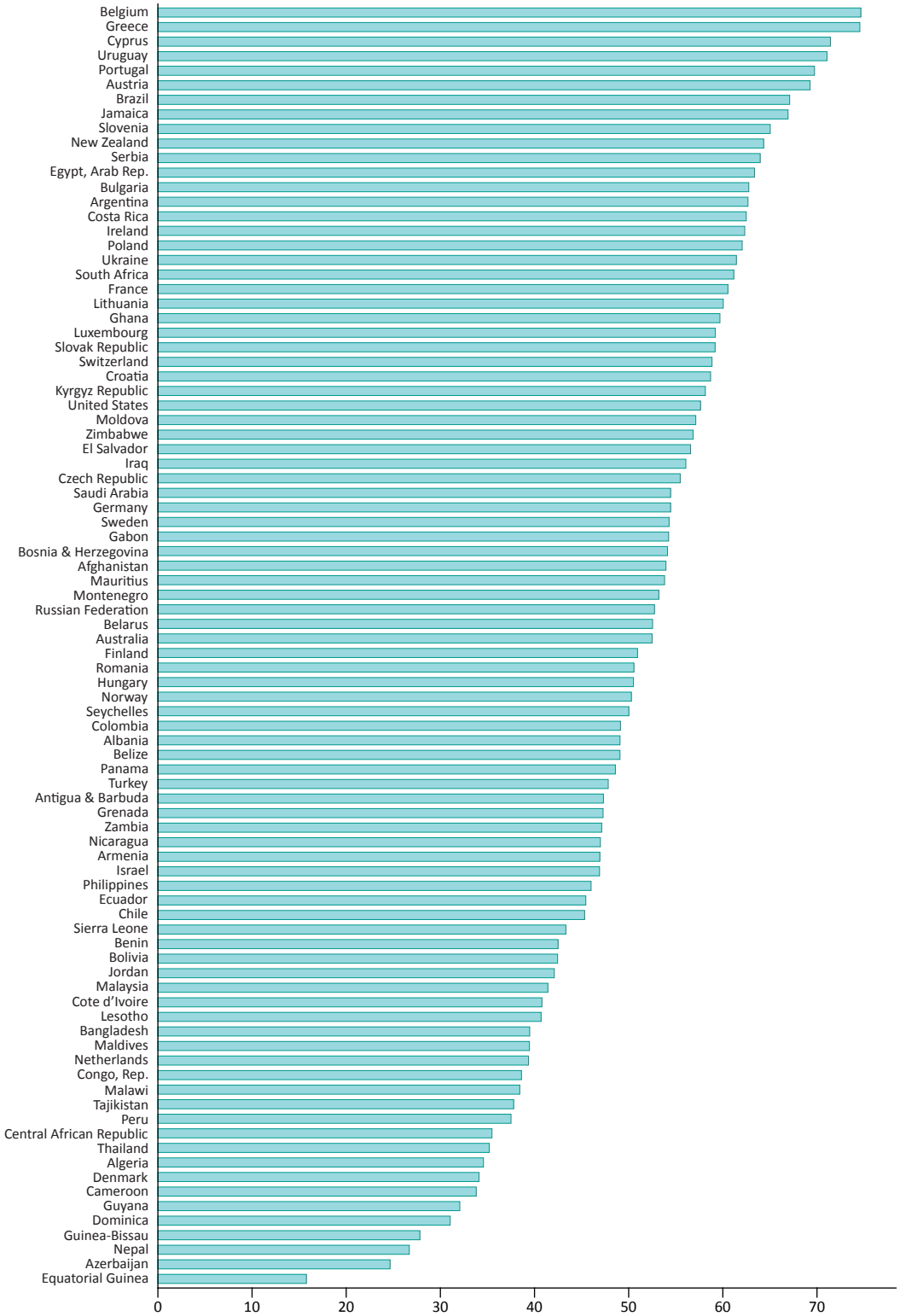
Rigid expenditure across regions, 2015–2021



Source: WB staff estimates based on Herrera and Velasco (2019).

FIGURE 6

Total rigid public spending as a percentage of actual spending (avg. 2015–2021)



Source: Authors' calculations based on WEO (2022) and World Bank staff estimates.

3.2 Non-parametric approach

The purpose of this section is to illustrate a method to gauge rigidity of the budget without econometric estimation, hence it is a non-parametric approach. A tool has been developed recently to streamline this analysis by systematically tagging expenditures across 100 developing countries on the basis of an established and consistent taxonomy. This allows for monitoring over time as well as for proper international benchmarking which is a core metrics proposed in revamped PFR guidelines.

Rigidities in the non-parametric approach are generally defined as elements within the budget that are not dependent on the discretion of policy authorities in the short run. We follow and expand typologies introduced in Centrángolo et al. (2010) and Alier (2006). In both efforts, measures of rigidity for Latin American countries were calculated via the introduction of a well-defined taxonomy grounded on firm principles. Centrángolo et al. (2010) in particular propose a classification of fiscal rigidities according to specific characteristics such as benefit principles, rights and macroeconomic dynamics (table 3). In practice, this translates into assessments of budgetary rigidity by identifying and tagging main spending areas such as: debt interest costs, social spending (either direct social protection or a wider definition that includes health and education), intergovernmental transfers, public service wages and spending financed by extra-ordinary or non-tax revenues, or earmarked revenues.

In their 'meta analysis' of rigidity assessments covering Latin American countries, Cetrángolo et al. (2010) examine the source of rigidity in each of these areas. For instance, spending items that are associated with the benefit principle are typically rigid given the fact they are linked to past financing. The clearest case is pensions which represent payouts (or "Deferred wages") from lifetime contributory schemes and are therefore fully mapped to a high rigidity tag. A similar phenomenon can be seen in some infrastructure spending linked to earmarked revenues, since these revenues cannot be spent on anything else. A second important category implies that some expenditure items should be ringfenced due to their meritorious status and which, as a result exhibit high rigidity limiting the discretion of policymakers, thus avoiding an inadequate supply. An example of these categories includes sectors with explicit (i.e., Costa Rica constitutional mandate for minimum floor of education spending) or implicit guarantees (social assistance). Other rigid items from the framework below include macroeconomic dynamics such as interest payments, rules-based inter-governmental transfers and politically inflexible expenditures such as wage bill and explicit spending priorities.

Our work expands Cetrángolo et al. (2010)'s work on multiple grounds. First it extends the analysis to all other regions, applying a consistent methodology to over 120 devel-

TABLE 3

Classification of fiscal rigidities according to main characteristic

Main characteristic	Specific types found
Benefit principle	Social Security Infrastructure funding Funding of specialized government agencies
Rights and guarantees established in various kinds of regulations	Meritorious goods More or less generic rights Guarantees of assured supply Priority or protected spending
Intergovernmental relations	Basic transfer systems Transfers with sector-specific allocations Other transfers between levels of government
Macroeconomic dynamics	Payment of debt service Clauses for wage adjustment, assets and others Countercyclical fiscal policy
Extraordinary income	Non-renewable resources (royalties, etc.) Privatization of public enterprises Debt-relief programs Loans from multilateral lending institutions
Other disputes within the public sector	Explicit priorities (Judiciary, Legislature, spending priorities, etc.) Politically inflexible expenditures (wages and other operating expenses)
Implicit in fiscal policy	Tax expenditure

oping countries for more than a decade. This allows for monitoring of expenditure rigidity over time as well as international benchmarking. Second, its flexible structure allows for further refinements, adjustments and routine annual updates. Third, it further operationalizes Centrángolo's framework, leveraging the granularity of fiscal data collected through the BOOST initiative, resulting in increased accuracy in tagging. For instance, not all spending on procurement of goods and services is tagged as low rigidity, as specific categories of specialized services and basic services such as rent and utilities are considered rigid given the typical long-term nature of these contractual obligations. Similarly, some grants are tagged as rigid if they are constitutionally mandated while

others are either medium or low rigidity, based on their exact nature. Ad hoc expenditures such as statutory expenses, regardless of their nature, are mapped as high rigidity while one-off expenditures that are introduced on a one-off basis are treated as low rigidity even though their nature is typically high rigidity (i.e., covid social assistance).

The proposed framework presents three levels of rigidity: high medium and low. The reason for the introduction of a "medium" category reflects the need to account for cases where mapping to low or high is not clear-cut. An example is the case of operational grants: constitutionally-mandated and statutory grants typically exhibit high rigidity, but most operational grants (and subsidies) could still be viewed as carrying some level of rigidity if their award is essential for the functioning of government agencies but they are not as high as the previous types. Similarly, spending on low rigidity items—such as capex and goods and services—in merit sectors such as health and education would also need to be elevated from low rigidity status in order to signal what would likely be a highly scrutinized budget area. In short, the medium category allows users to apply their country knowledge when deciding upon the rigidity level to which certain pockets of spending should be assigned. A "neutral" rating also prevents these items from being included in high or low levels of rigidity, which are often the relevant basis of analysis.

Developing and consistently applying the taxonomy for tagging rigidity levels is not without challenges as budget nomenclature and institutional settings and priorities differ substantially across countries. For instance, countries might lack sufficient granularity to identify the particular types of spending needed for accurate tagging like decomposition of use of goods and services. Identification of line items is not always straightforward when viewed through the earmarking of tax revenues or when accounting for external financing. Disentangling differing levels of rigidity for grants is also not clearcut given the variation in institutional settings under which these grants are awarded, as grants awarded on statutory or constitutional grounds might exhibit greater rigidity than in other scenarios. Subsidies and operational grants are typically more rigid than others because of the implication that they might carry in terms of agencies' fulfilling their mandates, while others could exhibit higher or lower levels of rigidity contingent on whether constitutional, statutory or judicial mandate underpin their disbursements. Accounting for one-off expenditures is also tricky as these items might be rigid by nature but only awarded for a limited amount of time. In each case, established taxonomy needs to be weighed against in-depth knowledge of country context and its budget process. Appendix B present a more detailed discussion of these issues.

Excel-based tools have been developed to implement non-parametric rigidity analysis. The tool enables international benchmarking of rigidity for over 120 countries with background data on backend calculations. The tool allows for custom changes at country level based on user preferences. Its output is also presented in the expenditure dashboard pre-

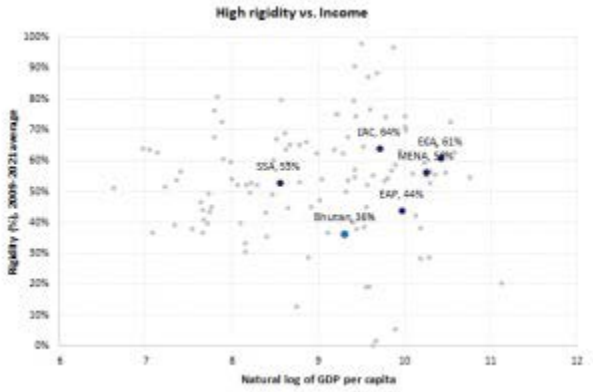
senting the evolution and benchmarking of rigidity for all available countries. Both tools are available on the PFR resource page and are presented in more detail in appendix B.

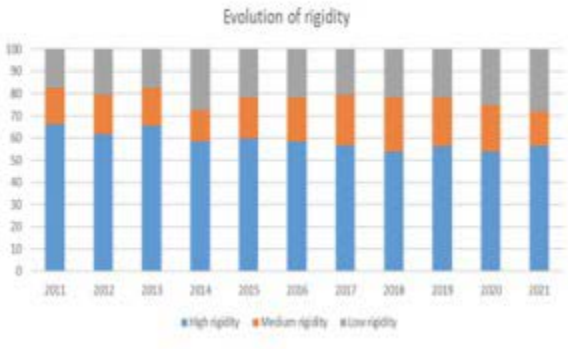
The tool has already been used in a number of PERs to determine the level of rigid spending as well as the main drivers of budget rigidity. For instance, the Bulgaria 2023 PER applies the above mentioned methodology to gauge the level and evolution of rigidity in the country, placing the country well above income and regional peers, and potentially undermining policy makers' ability to adapt to needs or shocks. Bhutan's 2023 PER also presents a discussion of budget rigidity using the proposed methodology (figure 7). The analysis provided insights into the evolution and the benchmarked performance, revealing that Bhutan's expenditure rigidity is relatively high compared to most of its peers with around 60 percent of its public spending categorized as high rigid. The PER emphasizes the need for Bhutan to keep main drivers of recent rise in rigidity

FIGURE 7

Expenditure rigidities in Bhutan and international perspective (Bhutan 2023 PER)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
High rigidity	**66.0**	**61.7**	**65.4**	**58.5**	**59.7**	**58.6**	**56.6**	**53.9**	**56.4**	**53.9**	**56.4**
Wage Expense	23.1	21.2	21.3	24.7	26.6	22.2	19.7	18.3	27.5	29.1	24.3
Interest expense	6.1	5.5	7.3	6.5	5.6	4.8	4.0	3.9	3.7	1.5	2.6
Social benefits	1.0	0.9	1.3	1.4	1.3	1.6	1.3	1.2	1.7	3.1	6.6
Basic services	1.6	1.8	1.5	1.8	1.7	1.5	1.5	1.4	1.9	1.6	1.4
Grants (contributions, stipends)	3.2	2.6	2.8	3.4	3.4	2.8	2.4	2.3	3.7	4.0	3.5
Foreign funded capex	31.1	29.6	31.1	20.8	21.1	25.7	27.7	26.8	18.0	14.6	17.9
Medium rigidity	**16.6**	**17.7**	**17.3**	**14.0**	**18.3**	**19.6**	**22.8**	**24.4**	**21.8**	**21.0**	**15.4**
Subsidies	1.0	0.8	0.9	0.6	0.5	0.8	0.7	4.0	4.8	4.1	2.6
Capex in social sectors	10.3	12.1	11.7	7.9	8.2	8.3	11.0	9.5	6.5	7.4	7.3
G&S in social sectors	4.0	3.6	3.5	4.2	4.4	3.5	3.1	3.0	4.3	3.7	2.5
Other current grants	1.3	1.3	1.2	1.3	5.2	7.1	8.1	7.9	6.2	5.8	3.0
Low rigidity	**17.4**	**20.6**	**17.3**	**27.5**	**22.0**	**21.8**	**20.5**	**21.7**	**21.7**	**25.0**	**28.2**
Capital Expenditures	8.4	9.9	6.9	15.8	12.7	14.0	12.7	14.4	12.1	16.0	13.0
Other Goods and services/expenses	9.0	10.7	10.4	11.7	9.3	7.8	7.8	7.3	9.6	9.1	15.2





in check, particularly the wage bill and social benefits, in order to maintain the needed flexibility to counter future shocks.

There is ground for further refinement of this work. On one hand, better measurements of rigidity at country level can be achieved by further drilling down on specific expenditure line items whose classification can be adapted contingent on country context. Over time this is expected to further refine accuracy of individual country rigidity measures and in turn improve benchmarking. On the other hand, a combination of both the parametric and non-parametric approaches could be pursued to combine merits of both approaches. In particular estimated coefficients identified using the parametric approach could be applied to rigidity tagging undertaken in the non-parametric approach, for instance by assigning only the estimated percentage of rigidity of wage bill to the high rigid category for any given country. As the tool continues to be expanded in terms of country coverage and years, any subsequent refinement will be automatically integrated, leading to improved accuracy and comprehensiveness over time.

Budget Rigidity and the Analysis of Spending in PFR: Areas of Attention

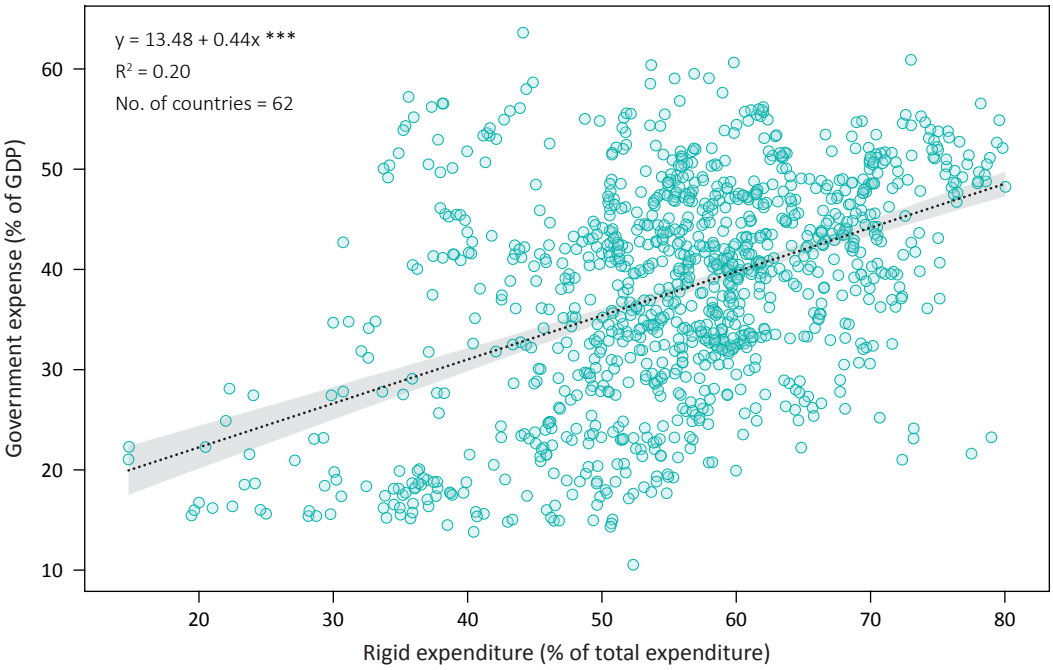
Budget rigidities reduce the scope of policy maneuver and budget reallocation; hence, they lead to higher government spending as the only way for a government to achieve its objectives. Higher spending is associated with higher taxes, higher debt, or both (figure 8). Since higher spending needs to be financed, rigidity is expected to be associated with higher tax rates, higher deficits, and higher debt (Herrera-Olaberria 2019). These correlations imply a vicious circle of rigidity to higher spending and debt, which implies higher debt service, which implies more rigidity.

Budget rigidity also induces inefficiency (Echeverry et al. 2006; Mattina and Gunnarson 2007). Figure 9 shows a negative association between rigidity and efficiency of the public sector: countries with more rigid spending have lower efficiency scores. Efficiency is measured by technical efficiency, defined as the distance between the observed infrastructure output levels and the production efficiency frontier, that is, the maximum output level attainable with a given level of input. It is necessary to note that inefficiency can also lead to budget rigidities. For instance, inefficient public teachers or doctors may become constituents for minimum spending rules on education and health.

Rigidity in the budget can lead countries into fiscal distress by pushing the public debt to unsustainable levels (Munoz and Olaberria 2019; Von Hagen and Chen 2019). Periods of fiscal distress, identified as periods when either the debt-stabilizing primary

FIGURE 8

Government spending and rigid expenditure as a percentage of total expenditure



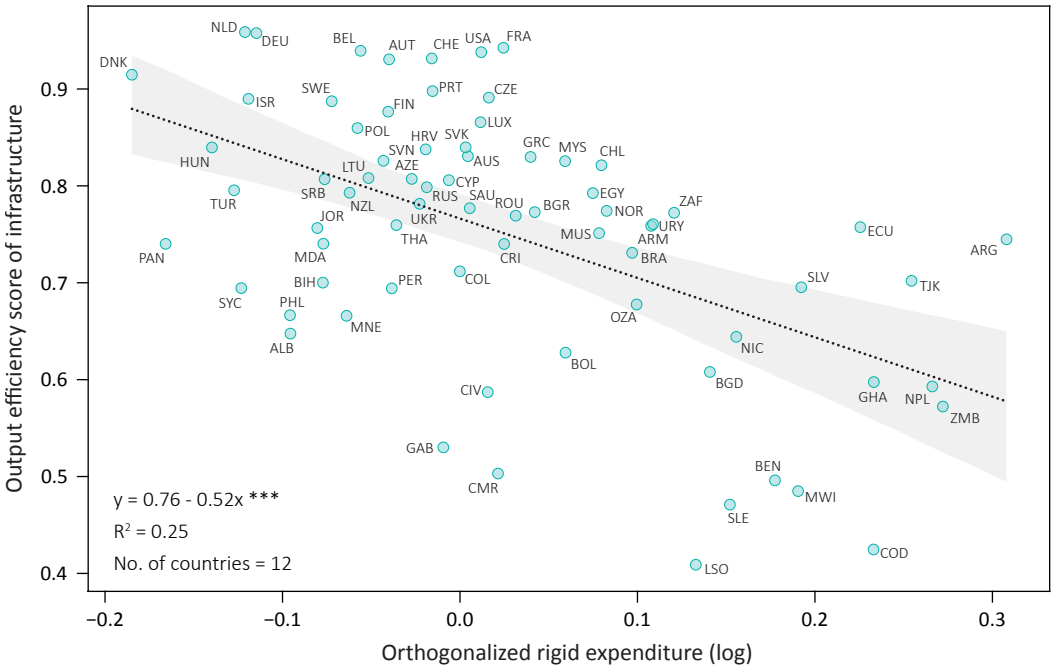
Source: EMFTX staff calculations.

balance or the level of public debt are above a certain high threshold, are positively associated with the level of budget rigidities, even after controlling for economic and political factors that previous literature has identified as potential determinants of this probability of distress.

In summary, the analysis of budget rigidity is essential, given its implications for the allocation of public resources. More rigid spending impedes the potential reallocation of resources to more productive spending, and hence mitigates the impact of spending on growth and reduces the size of fiscal multipliers. Rigidity of spending is also associated with higher spending, as governments need to prioritize their resources, and are unable to reallocate existing rigid spending. Higher debt will also be a consequence of rigid budgets. The inability to cut rigid spending will be associated with the likelihood of debt distress in the case of unexpected large shocks. Applied economists and policymakers will need these tools to facilitate analysis.

FIGURE 9

Public sector efficiency and rigid expenditure



Source: Authors' calculations based on WEO (2022) and World Bank staff estimates.

APPENDIXES

Appendix A

Estimation of the Structural Component of Spending

THIS STUDY ESTIMATES RIGID EXPENDITURE BY ADDING STRUCTURAL PUBLIC WAGES, STRUCTURAL PENSIONS PAYMENTS, AND ACTUAL INTEREST PAYMENTS. The structural component of the subnational government (SNG) transfers are not included to avoid double counting the transfers to pay for salaries, mostly the education and health sectors. The SNG structural component is used due to its significance as a source of rigidity for some countries, such as Brazil, Colombia, Peru and Mexico.

$$\begin{matrix}\textit{Rigid}\\ \textit{expenditure}\end{matrix} = \begin{matrix}\textit{Structural}\\ \textit{public wages}\end{matrix} + \begin{matrix}\textit{Structural}\\ \textit{pension payments}\end{matrix} + \begin{matrix}\textit{Interest}\\ \textit{payments}\end{matrix}$$

Structurally rigid expenditure is estimated using a fixed-effect model where the logarithm of the expenditure per capita in constant international dollars ($y_{i,j}$) depends on a set of structural independent variables ($x_{i,j}$) such as the logarithm of GDP per capita in constant international dollars, the logarithm of the population, or the dependency ratios. The fixed effects (u_i) absorb the time-invariant structural heterogeneity across countries, and the structural covariates capture the variation of expenditure explained by changes of structural factors over time. The residuals ($\varepsilon_{i,j}$), are the difference between the observed spending levels and the structural component. The estimated functions are dis-

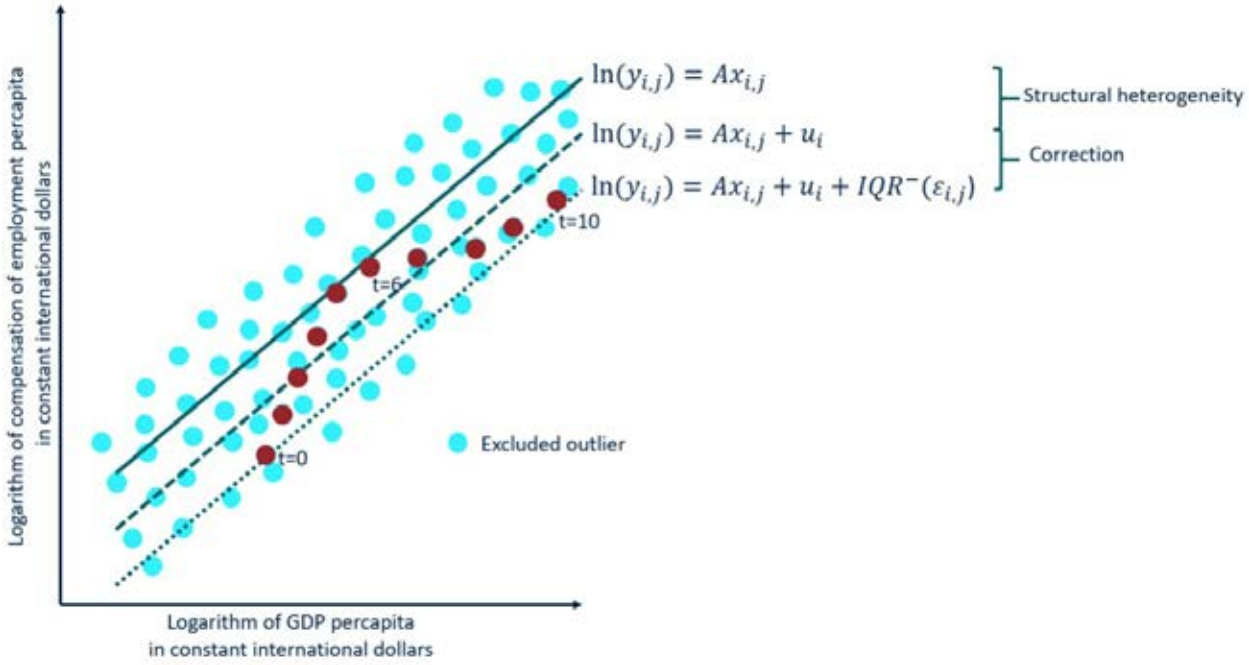
placed, such that all residuals are positive, following the corrected ordinary least square (COLS)[10] method.

$$\ln\left(y_{i,j}\right) = Ax_{i,j} + u_i + \epsilon_{i,j}$$

The scatter plot in figure A.1 illustrates this procedure. The solid line is the part of the model defined by time-variant structural factors, the logarithm of GDP per capita in this chart. The dashed line is a country-specific estimation that includes the effect of time-variant structural factors and country time-invariant characteristics. The difference between these two lines, the fixed effects, captures the structural heterogeneities across countries resulting from non-observable time-invariant characteristics.

FIGURE A.1

Estimation of structural expenditure



10. COLS are typically used to estimate deterministic frontiers in cross-section data. This procedure was explained by Greene: http://pages.stern.nyu.edu/~wgreene/FrontierModeling/SurveyPapers/Greene-FRONTIERS.pdf.

This model is corrected to have only positive errors by shifting it "downward" by the minimum error. This procedure is equivalent to estimating a frontier that defines the minimum expenditure possible given countries' structural characteristics. The errors are first cleaned for outliers, eliminating those that exceed 1.5 times the interquartile range (IQR).[11]

$$\ln\left(\hat{y}_{i,j}\right) = Ax_{i,j} + u_i + \text{IRQ}^{-}\left(\varepsilon_{i,j}\right)$$

The dotted line in figure A.1 represents the corrected model that describes the structural expenditure that used to be below actual spending represented by the orange dots. In this hypothetical case, the actual spending was close to its structural level in year zero ($t = 0$), suggesting that it would be difficult to adjust. However, in the sixth year ($t = 6$) actual expenditure is significantly higher than its structural component, and hence it would be easier to adjust.

11. This is a typical procedure to clean data for outlier observations.

Appendix B

Technical Notes on Non-Parametric Approach

A SERIES OF STEPS ARE REQUIRED TO ACCURATELY AND CONSISTENTLY CALCULATE LEVELS OF RIGIDITY. The first step is to establish a basic taxonomy, building on existing literature (Cetrángolo et al. 2010 and Alier 2006). Broad rules are applied to assign tags of high, medium and low rigidity to main economic items as per table B.1 below. Consistent with the framework explained in the main narrative, items such as wage interest and pensions are always assigned to high level rigidity. Capital expenditures are typically mapped to low rigidity with few exceptions (those in education and health are tagged as medium given the meritorious argument while foreign finances infrastructure and those with earmarked revenues are tagged as high rigidity). Grants are mapped to either high (foreign, statutory, etc.), medium (subsidies and operating grants) or low (all others) depending on their nature, although these mappings are also weighed against country knowledge and context. Finally, recurring expenses in the procurement of goods and services are typically marked as low rigidity with the exception of specific items like basic services and employment contracts reflecting the higher rigidity of these components.

The rationale for these broad mappings draws heavily from Centrángolo and related literature. For instance, high rigidity of the wage bill is associated with the X principle which states. High rigidity of pension and interest payments related to the benefits principle and macroeconomic dynamics discussed in Centrangolo. Statutory expenses and similar categories are also mapped as high rigidity consistent with the view that

TABLE B.1

Main mappings

H	M	L
Wage bill Spending in goods and services (employment contracts) Spending in goods and services (basic services) Interest on debt Social benefits (excluding pensions) Social benefits - (pensions) Other rigid expenditures (foreign, statutory, defense, some grants)	Spending: Capital Expenditures (with some exceptions) Spending: Use of goods and Services (excluding high and medium rigidity sub-items) Other expenses (residual)	Spending: Capital Expenditures (educthealth) Spending: Other goods and Services (educthealth) Spending: Subsidies to production Most operating grants

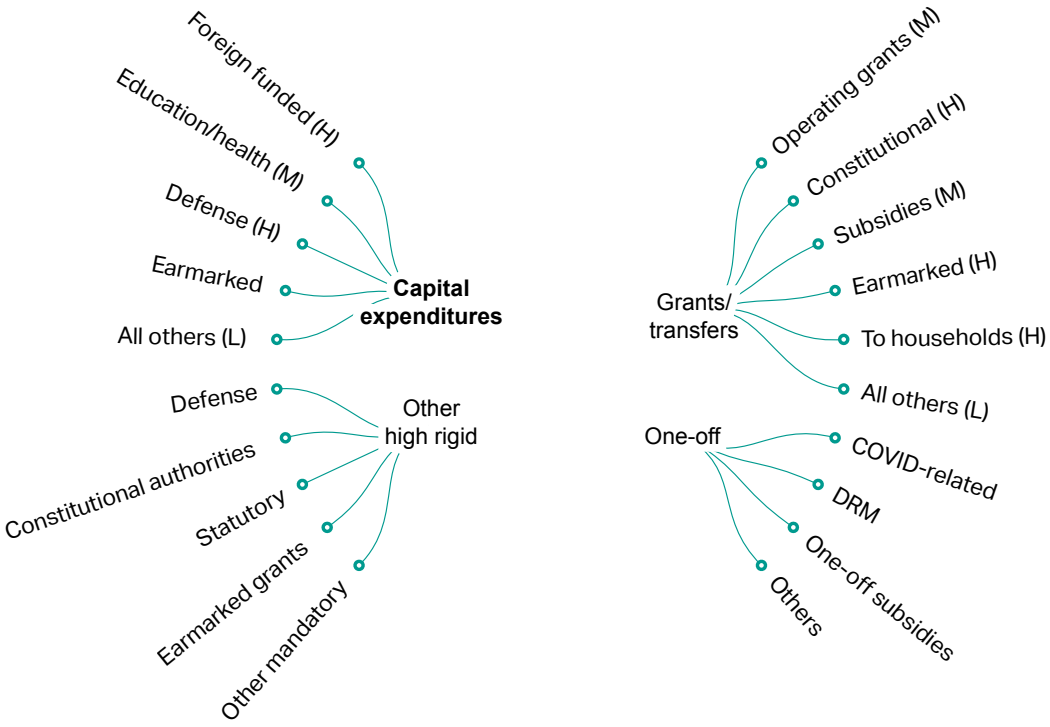
they are enforced by either constitutional or legal mandates. Recurrent use of goods and services on the other hand needs to be dissected for more precise tagging. While the category per se is of low rigidity, some categories typically deviate from the norm. Basic services such as rent and utilities as well as contractual arrangements typically need to be paid (short of causing arrears) and often involve multi-year arrangements

The second step requires identifying nuances and exceptions to the established rules within each category. As detailed in table B.2, capital expenditures require careful treatment. While the rigidity of the bulk of capital spendings is low, exceptions often arise. In the majority of cases, foreign-funded investments are ringfenced from the budget process and should therefore be treated as highly rigid, while capital spending in 'merit' sectors such as education and health are also more difficult to evade. Infrastructure spending linked to earmarked revenues like road funds should also be viewed as rigid as these funds cannot be used for any other purpose. Spending in capital defense projects in most countries is rarely subject to re-allocation so they are also treated as highly rigid. Similar reasoning and rationale are presented in the case of grants and transfers. Additional nuances can be applied in the future including applying parametric estimation of the rigidity components of the wage bill and pensions to overall calculations.

The third rule involves the application of additional 'corrections' to the first two steps. This phase involves discretional interventions that further refine measurements by applying deviations to the first two steps. This might involve accounting for one-off expenditures such as covid relief programs and post catastrophic events transfers which, while rigid in nature (i.e., social assistance) were also introduced under emergency status

TABLE B.2

Additional rules and exceptions



and therefore easier to reverse than more long-standing, traditional social assistance programs.

Tools have been produced to streamline this analysis. On the one hand, a rigidity tool allows users to identify individual line items mapped to differing rigidity levels with the opportunity of applying small modifications to pre-determined calculations, tailored to country knowledge and context. The tool then visualizes the evolution of rigidity levels (high, medium and low) along with charts on international benchmarking as in figures B.1 (Bhutan) and B.2 (Bulgaria).

As mentioned in the main narrative there is ground for further refinement of these mappings. This requires drilling down on specific expenditure line items whose classification can be adapted by leveraging in-depth knowledge of country context and budget process. The recurring nature of the work, coupled with its inclusion as core metrics of PFRs, provide a fertile opportunity for these incremental gains to be achieved over time.

FIGURE B.1

Snapshot of excel-based tool for rigidity analysis in the case of Bhutan (example)

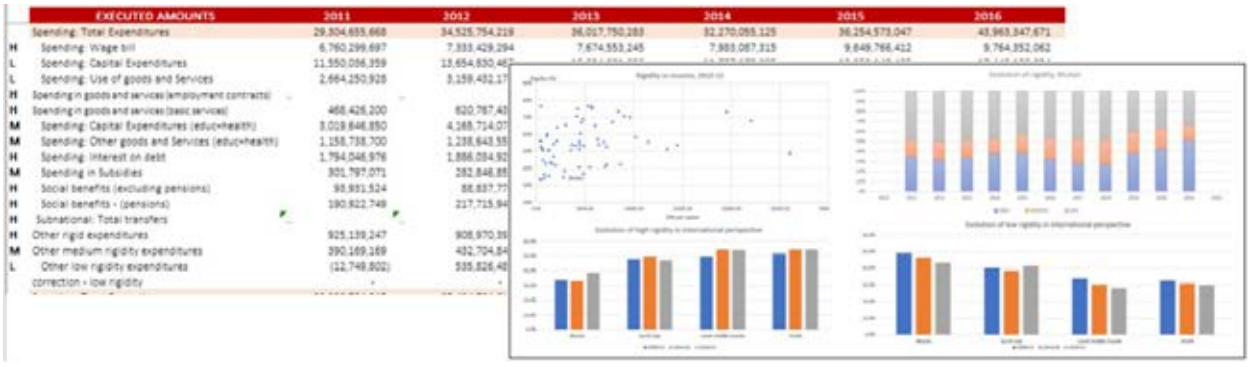
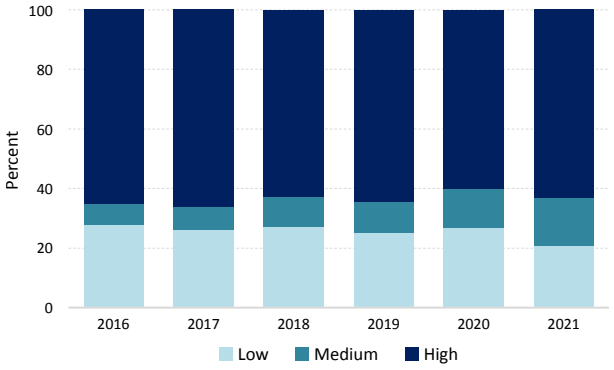


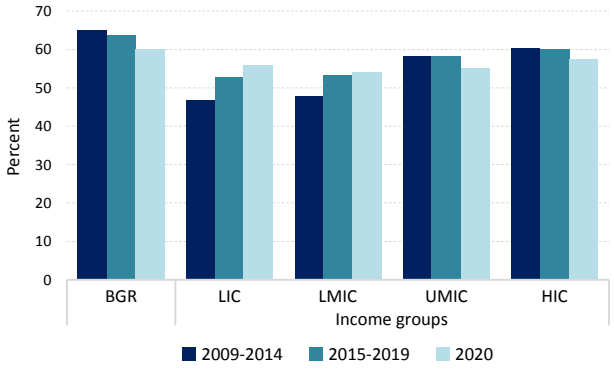
FIGURE B.2

Rigidity analysis in the case of Bulgaria (example)

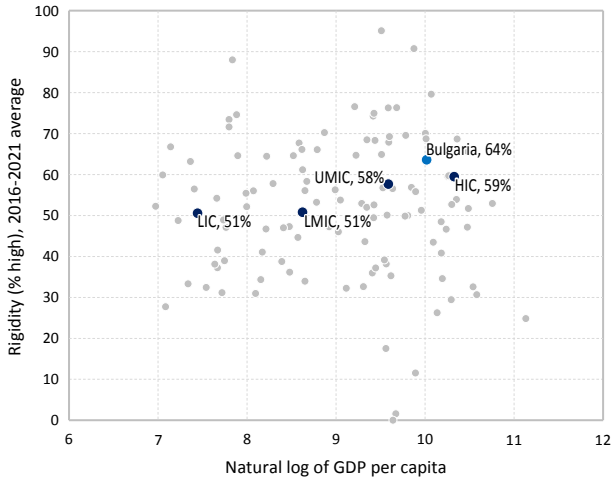
a. Evolution of rigidity in Bulgaria



b. Evolution of high rigidity among comparators



c. High rigidity vs. income



An additional tool presents these pre-determined calculations for use and inclusion in a PFR. The PFR tool comprises, amongst other things, a rigidity module that can be employed for assessing the level and evolution of expenditure rigidity. To conduct this analysis, the user must make a few decisions by selecting the following:

1. Country of interest for the efficiency analysis
2. Aspirational and structural peers of the selected country of interest

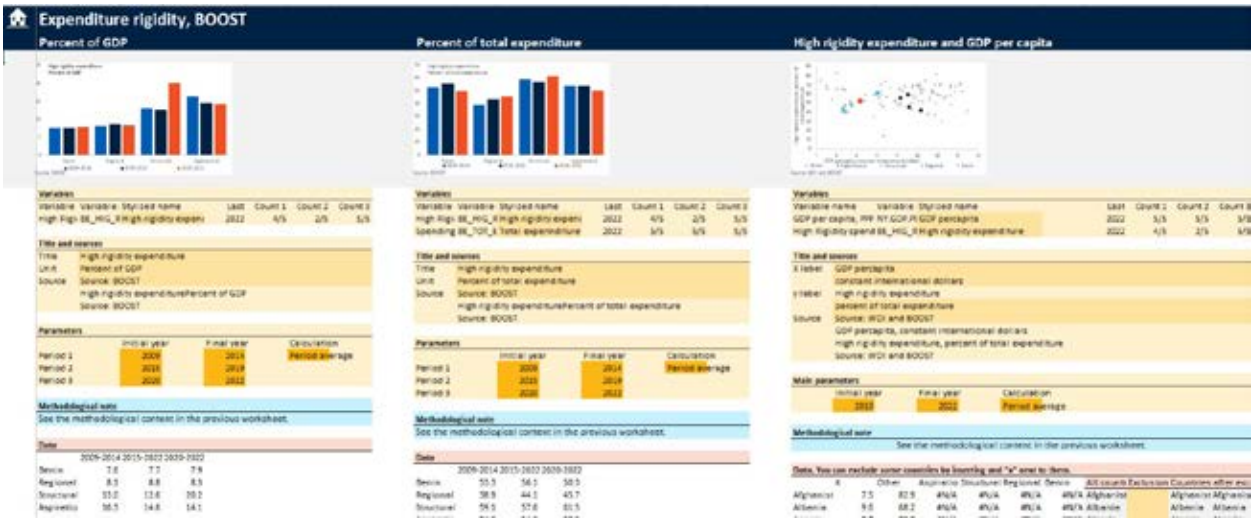
Navigating the tool. In the **"Countries"** tab, users can easily choose their country as well as aspirational and structural peers in the PFR tool (see figure B.3). Once the user makes these core decisions, the update will run and the tool will automatically generate key outputs including relevant rigidity scores for the selected country and an international perspective, which serve as key inputs for the efficiency chapter in PFRs. Figure B.4 below highlights where users can go to conduct a quick but detailed evaluation of public spending rigidity. For illustrative purposes, we use Ecuador as the representative country. The relevant sheets where rigidity analysis is displayed is in sheet 3_6 and 3_6a.

FIGURE B.3

Choosing your country and your country's peers (EFMTX tool)

FIGURE B.4

Evaluating public spending rigidity



Tables B.3 **and** B.4 **presents country tables derived from this approach.** Rigidity parameters have been computed for around 115 countries following the above methodology. This includes annual data from 2006 onwards to allow for comparability over time and across countries. Only countries for which granular information was available were included in this sample to ensure consistency of results.

TABLE B.3

Evolution of high rigidity, 2015–22 (%)

Code	2015	2016	2017	2018	2019	2020	2021	2022
AFG	92.8	88.3	84.4	84.6	83.0	82.7	...	...
ALB	72.3	74.1	72.4	72.3	72.5	70.1	66.0	64.2
AGO	73.3	75.0	77.0	75.4	80.2	81.0	69.7	64.2
ARG	69.1	73.1	75.5	78.9	85.8	85.5	74.8	78.6
ARM	68.6	68.8	68.2	74.0	72.5	71.9	70.9	64.2
AZE	...	...	...	39.4	38.1	43.3	45.9	42.5
BHS	...	...	41.6	56.1	49.4	47.8	51.7	42.9
BGD	42.3	42.7	43.9	37.5	29.9	26.7	0.0	0.0
BLR	59.2	59.5	56.5	56.8	57.7	56.6	...	...
BLZ	61.1	68.4	60.8	66.9	67.1	67.4	64.3	61.8
BEN	53.2	55.4	55.1	57.3	59.6	52.4	49.9	48.5
BTN	51.2	51.3	50.5	48.2	50.0	49.5	50.6	...
BIH	68.3	67.0	66.0	64.1	64.8	60.1	62.5	...
BRA	67.5	67.9	71.5	70.9	61.6	62.8	62.0	73.6
BGR	77.0	71.4	72.0	69.1	70.3	68.2	75.1	70.4
BFA	58.7	66.4	51.2	58.7	65.0	64.5	...	...
BDI	59.6	58.7	58.4	58.0	57.6	56.0	57.8	52.7
CMR	53.9	...	58.9	59.9	59.5	59.8	58.2	...
CPV	68.5	66.1	55.7	68.0	64.3	68.7	68.3	65.9
CHL	35.2	35.3	34.6	34.3	33.7	33.3	22.4	31.8
COD	52.0	67.2	74.0	65.7	71.1	78.1	69.8	...
COL	...	...	...	...	65.4	62.6	57.7	59.2
CRI	48.1	49.8	48.3	48.2	48.0	47.3	52.7	50.6
HRV	...	77.5	75.1	74.4	72.4	66.9	65.6	61.2
DMA	...	...	...	...	36.1	47.9	26.1	26.5
DOM	65.6	61.4	64.0	63.6	46.2	60.1	54.3	52.5
ECU	33.4	35.9	36.4	38.2	43.9	49.4	43.2	47.3
SLV	51.7	53.7	56.5	56.8	57.1	49.2	53.6	32.6
ETH	46.9	68.5	41.9	37.3	45.3	49.3	49.7	49.1
FJI	32.2	36.1	40.4	37.6	42.5	45.8	46.3	43.2
GAB	51.1	54.4	...	...	...	...	...	...
GEO	57.6	58.0	56.9	53.8	51.2	53.4	53.0	48.9
GHA	...	...	62.2	65.2	63.0	58.9	66.0	...
GTM	64.5	61.4	60.5	59.9	60.5	58.8	56.3	48.9
GIN	44.5	47.3	39.3	51.5	46.1	52.7	48.0	47.6
GNB	56.7	50.9	62.3	52.4	61.7	56.4	71.5	72.4

(Table continues next page)

TABLE B.3

Evolution of high rigidity, 2015–22 (%) *(continued)*

Code	2015	2016	2017	2018	2019	2020	2021	2022
GUY	...	...	...	39.8	40.6	41.0	36.2	28.6
HTI	57.8	55.2	...	...	...	...	...	...
HND	...	58.9	60.4	58.9	73.1	72.5	67.6	67.9
JAM	...	80.0	79.1	73.2	67.2	66.3	69.6	69.4
JOR	77.2	77.4	77.4	77.7	...	...	...	...
KAZ	42.9	42.0	34.6	52.9	53.1	54.0	...	...
KEN	53.3	58.5	55.6	58.1	59.2	60.8	59.0	56.4
KIR	37.8	33.1	28.7	34.7	27.1	42.0	...	...
XKX	55.4	58.7	56.5	56.0	56.5	58.7	61.3	55.4
KGZ	57.8	57.4	56.0	60.0	61.9	68.0	60.1	...
LAO	45.5	50.4	44.5	46.8	51.5	50.9	...	...
LBN	75.8	74.9	74.4	74.4	...	...	...	...
LSO	64.1	64.4	63.5	65.1	67.9	64.2	64.3	62.0
LBR	29.7	43.7	60.1	70.9	69.2	71.1	65.4	...
LTU	...	...	72.6	77.5	78.7	62.7	78.6	67.6
MKD	78.4	79.4	80.2	79.1	77.9	74.2	73.4	74.0
MWI	51.6	53.4	58.0	54.3	...	...	...	...
MDV	...	...	65.6	71.1	60.1	56.1	54.3	56.2
MLI	44.6	32.9	44.7	45.7	...	...	...	...
MHL	51.4	47.0	43.8	44.7	43.0	44.0	44.9	...
MRT	55.8	57.7	58.5	60.6	62.8	51.2	44.5	38.5
MUS	...	65.0	66.1	63.7	63.9	56.8	52.9	64.5
MEX	73.5	69.9	62.7	63.3	65.7	63.0	60.6	60.9
MDA	58.7	60.8	61.2	60.4	61.1	59.8	59.4	48.5
MNG	58.7	66.3	71.5	72.0	63.9	68.5	70.6	64.2
MOZ	60.7	70.0	71.4	72.1	72.7	73.0	74.2	77.5
MMR	32.6	40.8	40.6	40.7	35.4	...	...	...
NAM	52.7	...	...	...	...	63.9	60.7	63.8
NIC	61.6	59.7	61.7	56.0	58.2	59.8	...	...
NER	42.4	52.0	54.1	...	...	...	...	...
OMN	51.2	56.8	56.3	57.7	62.9	...	...	...
PAK	50.5	46.9	48.5	51.8	57.9	56.1	54.4	...
PLW	43.6	43.3	40.5	41.6	36.8	28.3	35.7	...
PNG	45.7	54.7	62.2	52.1	56.1	53.4	51.6	47.5
PRY	65.6	67.2	68.5	67.4	69.3	72.2	67.1	67.3
PER	53.3	55.2	55.6	56.1	58.7	55.0	51.5	52.4

(Table continues next page)

TABLE B.3

Evolution of high rigidity, 2015–22 (%) *(continued)*

Code	2015	2016	2017	2018	2019	2020	2021	2022
PHL	...	...	...	...	48.3	46.3	46.4	...
POL	75.5	78.0	73.6	71.4	71.3	68.8	69.2	64.7
ROM	64.0	67.1	69.5	69.6	70.4	69.0	68.4	...
RWA	...	...	48.8	45.4	41.4	40.7	40.6	...
WSM	38.8	41.2	43.0	42.8	46.4	48.4	43.8	...
STP	64.3	62.9	74.6	73.4	69.6	65.7	...	...
SAU	61.9	59.0	60.1	60.7	...	...	...	...
SEN	40.5	38.2	41.1	44.3	...	...	...	...
SRB	75.2	74.7	72.1	70.4	69.4	63.1	63.1	63.1
SYC	66.2	62.2	59.4	59.2	61.6	52.6	57.6	58.3
SLE	52.1	46.4	50.6	58.3	60.1	51.2	49.6	...
SVN	71.3	74.1	74.5	72.8	73.0	69.1	...	...
SLB	44.0	39.4	37.7	37.8	39.5	42.8	39.8	...
SOM	...	51.4	58.6	55.1	56.8	65.3	68.0	70.2
ZAF	66.9	67.0	67.8	68.8	69.0	69.3	70.7	70.2
LCA	51.4	...	...	50.0	50.9	55.9	51.6	51.5
TZA	...	...	56.2	54.3	53.4	51.9	52.6	47.7
THA	42.9	44.6	42.8	42.0	42.2	37.1	35.2	38.0
TLS	35.1	25.4	36.8	36.8	35.8	38.7	30.1	28.9
TGO	38.4	35.9	40.2	42.7	43.1	41.4	37.4	...
TON	63.4	63.3	62.7	59.1	56.7	57.0	55.7	...
TTO	48.2	56.6	60.1	58.7	58.4	56.6	58.2	58.7
TUN	53.3	57.0	52.9	51.3	61.3	59.1	61.2	55.5
TUV	41.2	41.6	43.1	38.7	41.8	42.3	...	...
UGA	45.5	40.5	52.2	49.3	47.1	42.8	44.0	49.9
UKR	75.2	76.4	77.2	74.8	65.6	67.3	68.7	76.9
URY	67.6	68.3	68.0	67.6	75.6	70.0	67.8	64.8
UZB	57.3	57.3	53.7	45.7	45.1	47.7	...	...
CAF	...	85.5	71.6	72.3	56.9	41.7	57.7	...
MNE	...	...	...	...	...	67.9	72.8	70.6
NGA	80.9	79.2	72.7	59.2	56.6	68.5	58.0	...
ZWE	...	...	...	51.6	37.4	46.9	44.0	49.7

TABLE B.4

Evolution of low rigidity, 2015–22 (%)

Code	2015	2016	2017	2018	2019	2020	2021	2022
AFG	3.7	7.9	11.9	11.6	14.3	12.9	...	...
ALB	20.6	18.4	20.6	20.3	19.6	22.1	26.6	27.6
AGO	17.5	16.8	18.1	20.4	14.6	13.8	22.6	28.8
ARG	25.2	20.4	21.6	18.5	11.6	10.5	17.9	14.3
ARM	20.8	14.6	18.0	12.6	14.2	14.7	12.0	18.9
AZE	...	...	...	51.0	51.8	42.8	39.7	44.9
BHS	...	...	40.0	29.1	33.5	34.3	31.7	44.1
BGD	45.1	47.1	47.2	52.6	60.0	64.3	100.0	100.0
BLR	20.4	19.7	25.1	28.4	34.3	37.0	...	...
BLZ	21.8	17.9	22.9	14.8	15.3	13.9	12.8	18.2
BEN	23.1	23.1	26.1	24.7	22.0	28.2	33.9	32.8
BTN	30.5	29.0	26.6	23.9	24.1	26.5	31.9	...
BIH	22.3	23.5	23.8	24.6	25.1	27.0	25.3	...
BRA	31.2	30.8	27.5	28.1	37.5	36.4	36.5	25.7
BGR	8.0	11.9	10.4	11.2	9.4	9.0	6.5	9.4
BFA	27.0	17.6	36.5	32.5	27.6	26.6	...	...
BDI	30.7	37.8	38.2	38.5	38.9	40.6	38.2	43.7
CMR	29.4	...	27.7	25.6	28.8	26.8	25.3	...
CPV	17.0	18.6	30.8	15.8	15.7	10.5	12.2	15.1
CHL	42.4	43.5	43.7	43.5	44.0	45.3	51.9	48.3
COD	44.7	28.1	22.1	31.9	24.6	16.8	24.0	...
COL	...	...	...	...	26.9	35.6	27.8	28.4
CRI	34.2	31.1	31.7	31.9	31.9	33.3	29.5	31.0
HRV	...	17.8	20.1	20.8	22.8	25.0	26.4	33.9
DMA	...	...	...	...	63.5	51.4	73.6	73.3
DOM	21.6	29.8	25.4	27.2	44.7	25.8	33.0	35.6
ECU	58.2	55.8	55.3	51.2	43.2	35.3	43.8	37.4
SLV	27.4	28.3	25.6	23.9	23.3	20.9	16.8	37.7
ETH	35.1	8.4	33.9	37.3	30.4	31.0	31.0	34.0
FJI	39.1	40.4	32.0	32.5	28.6	25.2	27.8	30.3
GAB	30.7	23.2	...	...	...	...	...	...
GEO	32.5	32.9	32.4	36.3	38.4	33.5	33.5	37.7
GHA	...	...	34.8	25.5	30.5	35.7	27.7	...
GTM	16.5	17.7	17.6	18.8	19.2	16.7	24.8	40.7
GIN	39.7	30.7	32.9	34.9	42.8	39.4	44.2	43.9
GNB	21.9	22.7	20.4	31.3	20.6	21.5	16.6	18.3

(Table continues next page)

TABLE B.4

Evolution of low rigidity, 2015–22 (%) *(continued)*

Code	2015	2016	2017	2018	2019	2020	2021	2022
GUY	...	...	...	32.7	35.0	32.3	37.8	47.9
HTI	33.8	39.3	...	...	...	...	...	...
HND	...	36.6	35.6	37.4	23.1	22.2	26.5	26.6
JAM	...	18.9	19.4	24.9	30.3	31.0	22.6	21.8
JOR	8.9	10.5	10.3	9.6	...	...	...	...
KAZ	51.5	51.7	60.7	41.9	41.4	40.5	...	...
KEN	17.9	13.7	12.4	11.9	10.0	3.6	8.0	6.4
KIR	49.2	46.8	50.4	48.6	59.1	40.2	...	...
XKX	33.9	30.8	32.2	32.1	30.2	23.9	22.6	23.8
KGZ	33.8	33.3	35.1	37.3	35.7	29.8	37.2	...
LAO	39.2	32.0	40.5	38.9	34.8	40.1	...	...
LBN	14.8	16.1	16.4	17.1	...	...	...	...
LSO	23.5	23.3	23.3	22.2	19.5	23.7	22.0	28.1
LBR	65.4	49.8	36.4	26.5	28.2	14.9	29.4	...
LTU	...	...	17.5	18.5	17.4	20.4	16.1	21.4
MKD	11.3	10.7	9.3	8.1	9.6	8.6	10.0	11.5
MWI	20.9	18.7	21.1	25.1	...	...	...	...
MDV	...	...	20.6	15.2	27.2	31.5	31.8	26.2
MLI	32.7	44.0	35.9	41.7	...	...	...	...
MHL	18.3	22.2	22.8	21.1	24.6	23.1	20.4	...
MRT	38.1	39.1	39.1	36.6	34.2	44.9	49.2	55.3
MUS	...	29.9	28.8	31.4	31.5	33.0	39.9	29.8
MEX	5.6	10.8	22.1	22.6	21.6	23.3	31.2	26.3
MDA	21.3	16.6	15.0	15.1	16.3	16.8	16.8	31.8
MNG	17.8	23.9	18.5	16.8	23.1	21.0	19.3	26.6
MOZ	28.9	21.1	19.9	19.9	20.3	18.6	19.2	16.5
MMR	59.5	52.3	53.6	53.4	56.7	...	...	...
NAM	18.5	...	...	...	...	4.9	0.7	3.0
NIC	27.9	28.2	26.6	32.9	30.6	27.2	...	...
NER	43.5	36.6	35.0	...	...	...	...	...
OMN	33.9	26.6	28.9	27.6	26.4	...	...	...
PAK	41.8	46.1	45.3	43.4	36.9	37.9	38.8	...
PLW	24.8	23.4	24.4	25.9	32.3	21.0	30.5	...
PNG	15.5	6.2	6.8	14.8	15.0	13.5	18.9	22.4
PRY	28.4	26.3	24.6	26.2	24.2	21.3	23.5	24.5
PER	34.3	33.5	35.2	35.9	31.6	35.2	38.1	35.8

(Table continues next page)

TABLE B.4

Evolution of low rigidity, 2015–22 (%) *(continued)*

Code	2015	2016	2017	2018	2019	2020	2021	2022
PHL	...	...	...	...	19.6	18.9	18.7	...
POL	8.7	3.9	8.4	10.1	9.4	8.6	8.7	13.8
ROM	26.7	25.6	23.8	22.8	23.8	22.5	20.7	...
RWA	...	...	39.1	44.5	47.9	46.9	43.3	...
WSM	57.5	56.5	54.1	52.1	45.5	44.0	47.6	...
STP	13.8	13.5	4.7	7.9	14.8	15.7	...	...
SAU	19.6	28.6	29.2	29.5	...	...	...	...
SEN	39.8	42.2	40.2	36.0	...	...	...	...
SRB	13.8	14.5	16.7	18.7	20.0	19.6	22.6	24.5
SYC	18.2	22.9	25.2	26.3	23.6	21.3	25.9	23.6
SLE	32.6	38.6	35.9	24.3	18.5	28.5	27.8	...
SVN	22.7	20.1	20.8	22.6	22.7	19.7	...	...
SLB	37.2	44.2	43.1	47.3	40.1	42.5	42.5	...
SOM	...	48.5	41.2	44.2	42.1	33.0	27.1	27.2
ZAF	9.2	9.2	8.1	7.9	7.1	6.6	5.5	5.7
LCA	43.5	...	...	35.4	36.0	28.7	32.8	35.3
TZA	...	...	35.6	34.1	21.5	20.3	15.8	32.3
THA	49.4	48.1	49.3	50.0	49.9	45.9	43.4	50.0
TLS	40.2	50.8	37.5	47.7	46.6	37.5	24.1	36.0
TGO	43.5	45.8	50.9	48.9	48.5	48.9	55.9	...
TON	16.6	17.1	20.0	22.4	23.1	22.4	24.0	...
TTO	16.9	13.7	11.7	12.5	12.2	13.2	10.2	10.2
TUN	38.8	35.4	40.5	42.1	29.4	34.2	29.7	38.5
TUV	30.8	41.2	34.3	43.2	34.3	35.1	...	...
UGA	47.8	49.6	40.8	43.9	46.4	50.3	48.3	40.3
UKR	7.9	8.9	11.3	14.1	22.4	18.9	18.7	16.9
URY	18.2	18.3	17.4	18.8	16.6	15.4	15.6	16.0
UZB	42.7	27.2	29.6	32.8	35.2	30.1	...	...
CAF	...	10.0	17.4	19.0	24.6	31.1	22.0	...
MNE	...	...	...	...	...	23.1	18.5	19.8
NGA	16.7	18.2	24.3	36.8	38.4	27.6	34.7	...
ZWE	...	...	...	47.0	57.4	47.1	50.9	45.9

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