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Slovak Republic
Preparing Spending Baselines

David Coady, Christopher Bender, Tim Pyne, Fazeer Rahim, and Natalia Zbirciog-Vandenberghe

Technical Assistance Report

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CONTENTS

ACRONYMS

CoM   Council of Ministers
CPI   Consumer Price Index
EC   European Commission
EU   European Union
FAD   Fiscal Affairs Department
IMF   International Monetary Fund
MoF   Ministry of Finance
MoH   Ministry of Health
NPC   No Policy Change
PFM   Public Financial Management
TA   Technical Assistance
SER   Slovak Expenditure Review
SRSS   Structural Reform Support Service
VfM   Value for Money
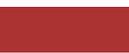
PREFACE

In response to a request from the Ministry of Finance (MoF) of the Slovak Republic, a joint International Monetary Fund (IMF) and European Commission (EC) technical assistance (TA) mission visited Bratislava from May 29 to 31, 2018, to advise on the development of expenditure baselines and explore areas for further collaboration in support of the Slovak Expenditure Review project. The mission comprised David Coady and Fazeer Sheik Rahim (IMF staff), Natalia Zbirciog-Vandenberghe (EC/SRSS), and Tim Pyne and Christopher Bender (IMF experts). The mission participated in a series of workshops organized by staff of the MoF's Value for Money (VfM) Division and wishes to express its appreciation to Stefan Kiss, Juraj Mach, Matej Kurian, and Zuzana Dancikova for their excellent support prior to and during its visit to Bratislava.

I. BACKGROUND

1.   A joint IMF/EC technical assistance team visited Slovakia from May 29 to 31, 2018, as part of its ongoing support for the Slovak Expenditure Review (SER) project. Since 2016, the Slovak government has initiated a series of spending reviews with the aim of improving the efficiency of public expenditure. To enhance the budget process and provide a strong basis for the recent round of reviews, the authorities have started preparing no policy change (NPC) expenditure baselines in three sectors: health, agriculture and rural development, and public wages. They expect this exercise to provide a basis for upcoming budget discussions. The purpose of the mission was to discuss and provide guidance to the teams developing baselines for each sector. This report summarizes the key issues discussed during the mission, including areas where further action is needed to enhance the effectiveness of baseline preparations.

II. EXPENDITURE BASELINES

A. Why Prepare Baselines?

2.   Expenditure baselines provide an important starting point for budget planning. Expenditure baselines are bottom-up expenditure forecasts for each agency or spending area based on a NPC assumption. They provide an indication of the future cost of ongoing policies and are usually prepared early in the budget process. Baselines can also: (i) serve as benchmarks against which to measure the fiscal impact of changes in policies or service; (ii) help to identify sources of fiscal pressure and inform measures of fiscal space; (iii) improve costing across agencies and spending areas; (iv) facilitate budget negotiations, in part by focusing discussions on discretionary changes; and (v) improve planning by improving the predictability of future resources.

3.   The Ministry of Finance (MoF), in collaboration with line ministries, has started preparing expenditure baselines with the aim of:

- Simplifying budget negotiations by shifting the focus away from discussing the budget item-by-item to developing new policies and evaluating the quality of existing policies;

- Enabling the early identification of pressures in key spending areas, such as health and wages, as well as the sources of those pressures;

- Identifying the fiscal space available in the medium term;

- Providing a sound basis for undertaking subsequent spending reviews.

B.   Defining Baselines

4.   The NPC assumption is a fundamental feature of baselines. Baselines represent neither the future spending allocations nor the most likely outcomes. Instead, they represent the best estimate of the cost of continuing existing policies at currently agreed levels of service.

5.   While for the majority of spending what constitutes NPC may be clear, there can be areas where the future level of spending is not explicit in existing policies and therefore difficult to pin down. These include situations where:

- **The state of existing policies may not be clear.** This is the case for new policy decisions already announced, which may not be well-defined or properly costed. A general rule is that unless a policy is properly costed and credibly announced, it should not be included in the NPC scenario.[1]

- **Currently agreed level of services may not be clear.** For instance, while legislation may define a given level of service, this may not be consistent with budget allocations. The default presumption should be the continuation of the current level of service. As such, the current budget funding level should be viewed as the best indicator of the current policy of the government.

- **Existing policies are set to expire during the baseline horizon.** The decision here is whether or not to assume that esisting policies are likely to continue. A general rule is that mandatory programs (e.g. transfers defined in law) are expected to continue after their scheduled expiry dates, while spending requiring annual appropriations are not. Exceptions to this rule should be clearly defined.

- **Budgetary rules are breached.** A general principle is that compliance to budgetary rules and targets should not be assumed unless they are automatic (e.g., expenditures in a certain category are blocked once the budget line has been exhausted) or there is a rock-solid track record of enforcement, and the government is not required to make major choices regarding policy orientation.

6.   The authorities have prepared a manual that defines NPC to ensure adherence with the principles set out by the EC.[2] These principles have been elaborated for the purpose of NPC scenarios to be reported in the Convergence Program of EC member states. The principles, summarized in Box 1, provide sufficient guidance on developing NPC scenarios when faced with the issues listed above.

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[1] The EC recommends taking into account only "*interventions by the government to change past policy orientations that is specified in sufficient detail, as well as adapted or at least credibly announced and has a direct incremental budgetary impact compared to the baseline*" (European Commission, *Vade Mecum on the Stability and Growth Pact*, 2017).

[2] European Commission, "Report on Public Finances," 2016.

Box 1. EC's Ten Principles for Preparing Baselines

1. NPC should always be consistent with past policy orientations, unless there are sufficiently detailed and credibly announced policies that change past policies;

2. The starting point is to extrapolate NPC based on past trend or relationships;

3. To complement trend projections, working assumptions can be used, particularly when past relationships are not meaningful because of structural breaks or frequent policy changes. These working assumptions need to be made explicit;

4. NPC should not be constrained by fiscal rules, unless there is a strong record of implementation of these rules;

5. Announced policies can only be included in the NPC if they are sufficiently detailed, and adopted or credible. These actions should be identified as "fiscal policy measures";

6. One-off changes are always considered as fiscal policy measures, even if they are outside of the government's control;

7. Conditional policies (e.g., a legislated automatic increase in tax, or increases in benefit payments triggered when a certain threshold is reached or by the evolution of certain prices) can only be included in the NPC if they are sufficiently operational and detailed;

8. To avoid double-counting, policies included in the baselines following the principles above cannot be considered as "fiscal policy measures";

9. Only the first-round effects of a policy measure should be included in the NPC; the second-round effects should only be mentioned separately;

10. The NPC estimates have to be consistent with their underlying "NPC" macroeconomic forecast, and not with the mostly likely macroeconomic forecast.

C. Methodology for Preparing Baselines

7. **The preparation of baselines involves four key steps.** These are focused on understanding the existing budget and applying the medium-term cost drivers and aggregating baseline estimates. Box 2 details the steps in a commonly used approach that can be applied across spending areas. The reliability of estimates rests upon the consistent application of the methodology across each spending area.

8. **The authorities' NPC manual describes the methodology for baselines using an economic classification of spending.** It identifies the price assumptions to be used in each of the economic classification headings and the indexation assumption for each category:

- Grants and transfers are generally indexed by the Consumer Price Index (CPI);

- Wages are indexed using the projected growth of the average wage in the private sector;

- Expenditure on goods and services are indexed by the CPI; and

- Current transfers are indexed at the rate defined in legislation, which may use the CPI, growth in average wages, or a combination thereof.

Box 2. Major Steps in Preparing Expenditure Baselines

Understand the existing budget

- *Understand the current spending base.* This requires knowing where and on what the agency spends.

- *Choose the level on which to forecast spending.* This need not be based on the lowest level of budgetary appropriation; expenditure items can be grouped so long as they have common cost drivers.

- *Identify past one-off expenditures.* These are to be removed from the spending base if they will not be incurred in coming years (e.g., the cost of elections held in the base year).

Understand and apply medium-term cost drivers

- *Identify price and volume cost drivers.* This should be done for each level of baseline estimates.

- *Link cost drivers to macroeconomic and demographic variables* (e.g., CPI or population growth).

- *Adjust base spending by the price and volume parameters.*

Include the effect of past policy decisions not fully reflected in the base

- Additional costs or savings resulting from past policy decisions that are yet to fully mature should be included in adjusted projected spending (e.g., a policy of increasing transfers which was only implemented halfway through the base year or an IT modernization program that has not been fully implemented). Note that these costs or savings are expected to be already adjusted for price and volume parameters.

Aggregate spending to arrive at an overall baseline for each spending area, ministry, or other administrative unit

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9.   The indexation assumptions appear sound and are broadly consistent with past trends. Indexing wages on average wage growth in the private sector is a realistic assumption, particularly in a fast-growing economy like Slovakia. Indexing other expenditure by the CPI (unless the rate of indexation is set in legislation) is also sound.

10.   Other than for large projects, constructing the baselines for capital expenditure by indexing the current level of expenditure is the commonly used approach. Establishing what constitutes existing policy in the area of capital spending can be challenging. While larger projects can be included in baselines once the individual project is approved, it is necessary to provide for a level of minor capital expenditure in the baseline as current policy. The choice of methodology can include keeping the same real level of spending (i.e., adjust for price only) or keeping the same ratio to GDP (i.e., adjust for price and provide for volume increases in line with real economic growth).

11.   The proposed methodology of indexing capital expenditure to the growth in nominal GDP adjusted for the elasticity of tax revenue with respect to GDP seems sound. It provides for both price and volume growth in capital spending linked to economic parameters, and sets the volume growth at the rate of growth in tax revenue, which recognizes this budget constraint.

12.   **In many cases, preparing baselines for high-level economic classification types provides good estimates.** As mentioned in Box 2, the preparation of baselines need not be based on the highest level of detailed information (e.g., line items), particularly if spending lines have common drivers. This is the case for some types of spending, such as current transfers which are indexed using common factors (e.g., CPI). This is a sensible approach to take in the first few years of preparing baselines, which are quite often undertaken by a small team in the MoF, to avoid using excessive resources within the Ministry.

13.   **In other instances, however, a more detailed approach than that specified in the NPC manual would be required.** This applies particularly to expenditures for goods and services—a broad category that includes a range of different programs driven by different factors. An example is healthcare where pharmaceuticals are driven by the prices of drugs, while payments to medical practitioners are driven by wages. Projections for these should be done separately.

Recommendation 1. Allow for more detailed categories on spending on goods and services in the preparation of baselines. This would allow for different estimated growth rates for these major categories.

14.   **In addition, the methodology does not appear to provide for volume growth in the scenario projections.** This is appropriate in general when population growth in the economy is low. However, this does not apply to age-related spending in the context of an ageing population. There can also be trend changes in volumes for certain social benefits, particularly when the labour market is strong. Therefore, some large areas of expenditure, such as pensions, social benefits, and large components health spending, may require analysis and projection for trend volume growth.

Recommendation 2. Provide for volume adjustors for health care and social benefit spending. This can be prioritized for major programs where there are trend changes in benefit and service recipient numbers.

15.   **The NPC manual covers two other important elements for preparing baselines**

- **The choice of a base.** In Box 3 of the manual, an example illustrates the significance of choosing an appropriate base for a NPC scenario for T+1: either the budget, or the estimate for T. When these differ significantly, the choice matters. The manual does not, however provide guidelines for the choice. Generally, if an expenditure item is demand driven, it is appropriate to base the NPC scenario on the most recent estimate of the current year as this represents the current level of activity. On the other hand, if the expenditure item has an annual budget allocation, the most recent estimate may reflect implementation delays and not represent the policy intention of the previous budget. In these circumstances, it would be better for the NPC scenario to be calculated from the previous budget. However, this should also be considered on a case-by-case basis. For instance, if implementation delays are

persistent, and the budget is not credible, then the estimates would serve as a better guide for the NPC scenario.

- **The update of baselines.** From one year to the next, baselines should reflect changes in economic parameters and assumptions, and integrate new policies. Annex 2 of the manual shows the impact of various measures that explain the difference between the NPC scenario and the budget. An important part of this quantification of the impact of adopted measures is ensuring that the NPC scenario is updated for the latest economic parameters and assumptions, so that the NPC and the budget are calculated on the same basis.

Recommendation 3. Determine when to use the budget numbers as base for the NPC, and when to use the estimates. Consider on a case by case basis whether the most recent estimate for an expenditure item best reflects current policy.

III. HEALTHCARE

A. Background

16.   The VfM team is developing baselines as part of its efforts to improve budgeting and planning for healthcare. To date, budget negotiations have been for the coming year and have focused on government contributions to health insurance (for the economically inactive population) rather than on overall expenditure for health insurance. The VfM team is aiming to move to budgeting for overall healthcare expenditure. This would allow expenditure to be analyzed by major spending area and compared to health insurance income from the economically active population to determine the likely government contribution under current policy.

17.   Key issues considered in the preparation of NPC baselines are the structure of the projections and the methodology to be used. In terms of structure, baselines can be prepared on either an economic classification basis (in categories such as wages, purchases of goods and services, and transfers) or on a functional or program basis (e.g., pharmaceuticals and general primary care). Methodologies considered by the VfM team have included projections based on current expenditure on good and services, increased for expected price changes, and an econometric approach to project expenditure for each category based on past expenditure data.

B. Issues and Recommendations

18.   Baseline projections for healthcare should be prepared on a functional (or program) basis. In the area of healthcare, where most expenditure is classified as payments for goods and services, categorization of projections by economic type results in highly aggregated projections that do not allow for different drivers for major programs. A program categorization

allows a better connection to policy analysis and provides a basis for the costing of policy changes.

19.   The program structure being discussed between the VfM team and the Ministry of Health (MoH) appears to be broadly appropriate for baseline projections. Under this structure, healthcare expenditure is broken down into 14 categories based on the major programs such as pharmaceuticals, medical goods, general primary care, inpatient care and diagnostics. Consideration could be given to breaking down pharmaceutical and inpatient care further because these categories are large, accounting for over 50 per cent of total healthcare expenditure. A further breakdown is most useful where the drivers of expenditure vary by category (e.g., patent medicines and generics within the pharmaceuticals category). Smaller categories, such as those involved in patient transport, could be merged where they have similar drivers.

Recommendation 4. The program structure for healthcare should be agreed between the VfM team and MoH and used as the basis for baseline projections. This would also provide a framework for policy analysis and policy costings.

20.   The econometric modeling undertaken by the MoF provides a high-level projection of expenditures in each major category based on historical trends. The results show that expenditure tends to be related to a macroeconomic variable (either nominal GDP or wages) together with demographic variables, such as the population age 65 and over.

21.   However, the econometric modelling has significant limitations as a basis for an NPC baseline. The historical trends captured by the analysis reflect how policy has changed over the past rather than the underlying drivers of current policy. Economic variables, such as nominal GDP and wages, include both price and volume drivers and so make it difficult to separate these different relationships. Consequently, it does not provide a baseline that can be used for policy costings because it does not differentiate between expected changes in prices and volumes.

22.   An alternate approach being considered for the NPC baseline—whereby current expenditure in each of the major health care categories is increased by expected price increases—is a good initial step. Ideally the objective of the NPC baseline is to estimate the level of price and volume growth under current policy and to project this forward. The most appropriate methodology depends on the availability of data and resources required to undertake the analysis. Settling the appropriate price parameter for each program is an important step, and the quality of the baseline can be further improved by analyzing volume growth.

Recommendation 5. The VfM team should calculate the NPC baseline for each major healthcare category based on current levels of expenditure and projected growth rates

under current policy. *This should include agreement with the Ministry of Health on methodology*.

23.   Baselines prepared under this approach would then be adjusted for estimated savings from the spending review and any other policy measures . This is necessary in order to ensure that the baseline takes into account already taken policy changes that are expected to impact the baseline. A challenge is to decide which savings measures or policies to include, and which not. In line with the NPC manual and the EU guidelines (see section II), policies to be included should have been credibly announced, and fully costed for the period of the expenditure baselines. The policy and its costing should also have been agreed between the MoF and the Ministry of Health. While these policies are included in the baselines, they should be identified separately as "policy measures," following the EU guidelines.

24.   The VfM team has proposed that estimated price increases for hospital care be based on wage increases for staff costs and estimated changes in the CPI for non-wage costs. Wage increases for hospital employees are set by legislation based on changes in minimum and average wages. A broad measure of inflation, such as the CPI, is available from macroeconomic forecasts and should be used consistently for non-wage costs unless there is a demonstrated case that it does not represent the price movements for the program. Use of the CPI can also assist in achieving consistency across line ministries.

25.   The estimated price change for a number of labor-intensive services should also be based on wage increases. Payments to general practitioners and specialized primary care are predominantly payments for personal services and should be treated in the same manner as wages. This ensures comparable treatment of medical staff within hospitals and in projected wage increases.

26.   The NPC baselines should be further enhanced by including changes in volume where this is currently reflected in growth rates. In the short term, that could be done on a selective basis where the volume changes are significant. The need for these adjustments can be easily tested by comparing recent expenditure growth rates with aggregate price increases for the same period. Where there has been recent real expenditure growth, an assessment needs to be made whether this reflects underlying growth or whether the increase is due to the impact of policy changes.

Recommendation 6. As a next step, the VfM team should look to include changes in volume in projections for healthcare. *This should be done where there is evidence of volume changes and use a simple methodology.*

27.   Over the longer term, baseline projections for healthcare should be based on analysis of disaggregated data on health insurance payments. Data is available from the health insurance companies on the number of services and the average price per service for

each of the proposed categories. This would allow analysis of price and volume growth in each of the categories to be used as the basis of the baseline projections.

Recommendation 7. The VfM team should obtain disaggregated data on health insurance payments and use it to project price and volume growth for each program. *This enhanced methodology would provide more accurate projections and a basis for the costing of policy measures.*

28.   Another issue discussed was whether the regular deleveraging of hospitals should be reflected in the NPC baseline. State hospitals continue to fall into debt despite regular injections from the state budget. The causes of the losses in the state hospitals are not clear but they include bad funds management and inefficiency due to low utilization of hospital beds. Some sources of inefficiency are being targeted by measures recommended by the healthcare spending review.

29.   Any additional funding for state hospitals should be treated as a policy proposal rather than being included in the baseline. It is not clear whether the payments to hospitals are insufficient to meet the costs of an efficient service. Addressing hospital debts should be treated as new policy to ensure the causes of those debts are scrutinized. An analysis of international Diagnosis Related Groups data, which provides a classification and information on the costs of procedures, may allow the benchmarking of payments to hospitals.

Recommendation 8. Funding to alleviate state hospital debts should not be included in the baseline projections for healthcare. *This ensures that additional funding is treated as new policy and considered in the budget process.*

IV.   AGRICULTURE

A.   Background

30.   Spending in this sector, is dominated by transfers from the EU's Common Agricultural Policy (CAP). CAP funding, which is agreed upon over a seven-year cycle—currently over 2014–2020—comprises of two main pillars:

- **Pillar 1 - Direct Payments.** Entirely funded by the EU, these consist of payments made directly to farmers, over seven components: (1) a 'basic payment' per hectare; (2) a 'greening' component to offset the cost of providing environmental public goods that are not remunerated by the market; (3) a payment for young farmers; (4) a 'redistributive payment' as support to farmers for a fixed number of hectares of farmland; (5) an income support in particular refions; (6) a production support in particular regions; and (7) a payment to small farmers. The first three components are compulsory for all Member States, while the last four are voluntary.

- **Pillar 2 - Rural Development Programs.** This pillar aims at ensuring balanced territorial development, and sustaining a farming sector that is environmentally sound. There is a higher degree of flexibility (in comparison with the first pillar) which enables national, regional, and local authorities to formulate their individual seven-year plans. Rural development programs are co-financed by EU funds (roughly 75 percent), and national, regional, or local funds.

Figure 1. Slovakia: Spending in Agriculture and Rural Development
(Euros billions)
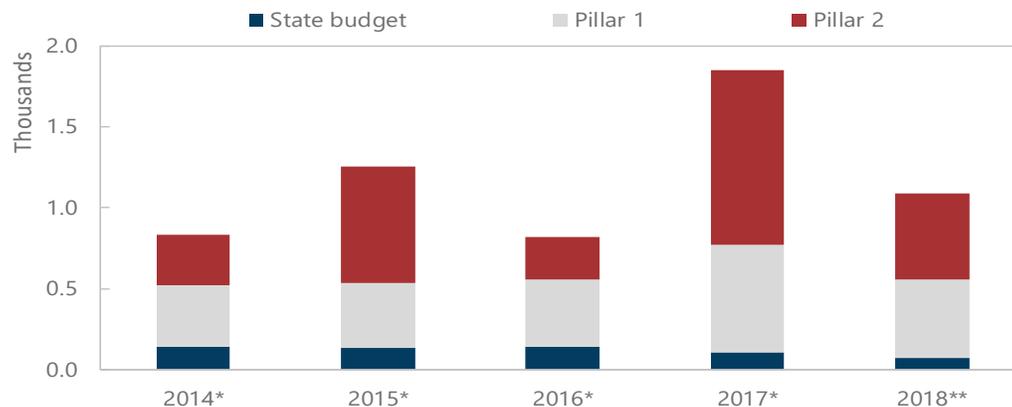
Source: MoF.
Note: *Actual; **Budget.

B. Issues and Recommendations

31.   A team from the VfM department has started preparing three-year spending baselines over the period 2019–2021. For 2019 and 2020,

- **There is a good understanding of expected disbursements under Pillar 1 of the CAP.** As outlined above, Pillar 1 comprises of essentially demand driven transfers, which are a function of volume factors, such as areas under cultivation, and the number of young farmers. These tend to be highly stable from one year to the next, making the calculations of baselines for Pillar 1 straight forward.

- **Preparing baselines for Pillar 2 of the CAP poses challenges given the variability in spending on rural development programs.** Pillar 2 spending is inherently variable – rural spending program generally fund capital spending by large farmers, or regional governments, which compete for the pool of resources available under this Pillar. While the envelope is over the period 2014-2020 is known, the uptake of remaining funds over 2019-2020 is difficult to predict. This would depend on the (i) the quality of the proposals made by farmers and regional governments, and (ii) their capacity to implement on time. An additional complication for Pillar 2 is that carry over from the previous funding cycle is

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possible over the next two years, i.e., any unspent resources made available under that Pillar to Slovakia can be spent until 2022.

Recommendation 9. To prepare baselines on Pillar 2 for 2019-2020, a three-step approach can be followed: (i) ascertain the total available resources over these two years (i.e. resource envelope 2014-2020 less spending over 2014-2018); and (ii) estimate the likely carry over. This estimate could be informed by the extent of the carry over from the first cycle for Slovakia (2007-2013), adjusted upwards by the potential improvement in uptake by farmers and regions through experience; and (iii) apportion the available resources less the carry over the two years, based on information on the current pipeline of projects.

Recommendation 10. For 2021 onwards, projections for Pillars 1 and 2 will require an assumption of the likely modalities of CAP funding under the next phase.

Recommendation 11. Use the standard methodology outlined in Box 2 to prepare baseline estimates for budget funded spending. This essentially consists of wages related to the administration of programs, spending on goods and services, and transfers to lower levels of government. The former can follow the standard approach proposed for wages, while the latter can be based on the assumption that the level of service will remain unchanged, and therefore be simply adjusted for inflation.

V. WAGES

A. Background

32.   The preparation of a baseline for public wage spending is methodologically similar to the approach outlined earlier. The number of workers (i.e., "volume") is generally assumed to remain unchanged except when increases are needed to maintain existing service levels. The number of teachers, for example, is typically assumed to track the number of school-aged children, and the number of healthcare workers is assumed to track changes in the size and composition of the population. The level of wages (i.e., "pricing") is assumed to change in response to existing wage-setting policies, negotiated agreements with public sector unions, or – in the absence of a clear policies or agreements – economic indicators (such as the CPI or private sector wages). These price and volume components of baselines have been discussed above.

33.   Baseline projections for wage spending, however, must also account for the impact of wage drift. Wage drift refers to factors that drive individual wage levels independently of broader wage-setting policies and include: (i) salary increments typically awarded for seniority, (ii) promotions, and (iii) the reclassification of employment positions. Wage drift can be estimated using structural modelling or econometric analysis. Structural modeling estimates the magnitude of wage drift by simulating the movement of individual employees through their respective wage grids reflecting seniority and promotions. These estimates take into account the rules governing

the provision of wage increments and historical patterns of promotion. While econometric analysis provides an alternative reduced-form estimate of wage drift, it does not provide as detailed information on its components (Box 3).

B. Issues and Recommendations

34. **The VfM team is already in the process of developing a structural model.** The mission discussed the key ingredients of such a model and provided a supporting template. Initial simulations undertaken during the mission focused on estimating the impact of seniority-based increments for public sector workers (i.e., excluding the education and health sectors). This estimated wage drift to be approximately 0.5 percent of the wage bill per year. Experience from analysis performed in other countries suggests that similar estimates can be expected across different public-sector workers and that estimates for wage drift will rise slightly once promotions have also been taken into account.

Recommendation 12. Priority should be given to further developing the structural model across the public sector to include the education and health sectors. This will require the construction of micro-databases to back-out patterns for how employees have moved through their wage grids as a result of seniority and promotions, as well as the development of assumptions regarding their movement when data is insufficient to identify those patterns.

Recommendation 13. Use the reduced form econometric estimates to support the structural estimates. These estimates are useful to validate the structural estimates where data (e.g., historical patterns of promotion by age group, grade and occupation) are insufficient or assumptions cannot be made with confidence. The econometric estimates also provide the basis for evaluating the competitiveness of public sector wages (across age, skill, and ministry groups) vis-a-vis comparable private sector employees, thereby informing discussions regarding medium term wage-setting policies.

35. **The mission also discussed the merits of, and methodology for, developing a medium-term forecasting model for wage spending.** Such a model could not only be used for the preparation of a baseline expenditure projection but also for simulating the impact of changes in macroeconomic and policy variables (i.e., conducting "what if" analysis) and evaluating the fiscal implications of changes in employment or wage policy (i.e., costing reforms). Over the medium-term, wage spending projections should be guided by: (i) the human resource objective of ensuring that the legal and composition of government compensation is competitive with that of the private sector (after allowing for nonmonetary benefits, such as stronger job protections), and (ii) the need to align the level and composition of public employment to the services the government chooses to provide.

Recommendations 14. Construct a medium-term forecasting model using individual employee-level data that can be used not only to prepare a baseline but to conduct "what-if" and sensitivity analysis and to cost reforms. This will help to integrate the baselines analysis

with the analysis being undertaken during the current round of expenditure reviews on public sector wages.

<div style="text-align: center;">**Box 3. Econometric Estimates of Wage Drift**</div>

Econometric analysis based on Mincer regressions provides an alternative, typically less resource-intensive, estimate for wage drift. This approach requires survey data on individual wages for public sector employees and basic individual characteristics such as age, occupation, gender, and region of employment.

The coefficient on age in the following regression can be interpreted as an estimate of wage drift:

$$w = \alpha + \beta.A + \gamma.X$$

where w is the log of individual wage, A is employee age in years, and X are other control variables. It is a reduced-form estimate of the percentage increase in average wage as the employee population ages by one year, and it captures the impact of both seniority and increasing prospects for promotion that accrue with age. Additional explanatory variables should be added to control for individual employee characteristics that do not change from year to year (e.g., gender, education, and location) but which may determine wages and possibly be correlated with age. For example, if women are systematically paid less and older cohorts have a lower proportion of women, then failing to control for gender would result in an underestimate of wage drift since the lower average wage of older cohorts would be wrongly attributed to age rather than to a change in employee composition. The regression specification assumes the existing workforce remains fixed with all employees aging by one year. In reality, older workers retire and new, typically younger, workers are hired. This creates downward pressure on average wages which offsets the effect of promotions and the increments in wages awarded for seniority.

A preliminary analysis of wage drift based on 2016 survey data for public sector employees produced estimates in the range 0.6-0.7 (i.e., a 0.6-0.7 percent increase in the wage bill per year). This is slightly higher than what was estimated using the structural approach that focused only on the impact of seniority and excluded the education and health sectors. In addition, when the regressions included a variable for occupation as a proxy for promotion (one of the occupation categories is *manager*) to help isolate the impact of seniority, the estimate of wage drift fell (as expected) to approximately 0.5-0.6. Going forward, the econometric approach should be applied to other years to further validate the approach and evaluate the stability of the estimate.

The mission also discussed the use of Mincer regressions to estimate the public-private wage differential for comparable workers in support of the ongoing wage bill expenditure review. This regression is applied to similar data but includes private sector workers and a binary "dummy" variable for public sector status (or a more detailed variant). The discussion touched upon alternative estimation strategies including: ordinary least squares (OLS), Oxaca-Blinder decompositions, and quantile regressions. It was agreed that the VfM should focus first on the standard OLS approach using a simple dummy structure before attempting more sophisticated approaches using complex dummy variables. It was agreed that estimates should be prepared for different gender groups and across skill and age groups. Similarly, more parsimonious specifications (using, for example, just age, education and location as explanatory variables) should be estimated before including other variables such as occupation, which require a different interpretation of the regression coefficients.