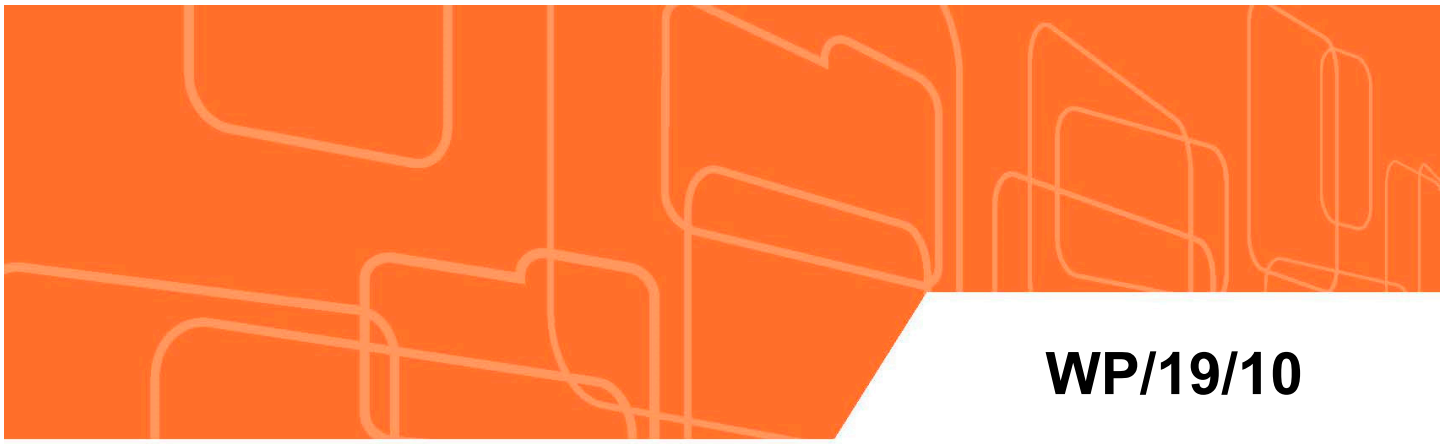

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Fiscal Implications of Government Wage Bill Spending

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Fiscal Implications of Government Wage Bill Spending

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Abstract

This paper discusses the short- and medium-term fiscal implications of government wage bill spending. Working with a sample of 137 advanced, emerging and low-income countries, we use a panel VAR approach to identify differences in the dynamic behavior of revenues, non-wage expenditures, and the overall fiscal balance in response to changes in the wage bill. We show that the interaction between wage bill changes and these three fiscal items is alike and varies overtime. Higher wage bill spending does not revert in the medium term, but the initial worsening of the fiscal balance associated with it, though it persists, eventually halves as revenues increase while non-wage spending remains broadly unchanged. We also show that countries differ in how these three fiscal variables behave following wage bill changes and seek to explain this variation by a set of country characteristics, including the level of development, access to natural resources and public indebtedness levels.

JEL Classification Numbers: E24, E62, H50

Keywords: Fiscal Policy, Public Wages, Public Employment, Government Expenditure

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I. INTRODUCTION

The financing of government wage bill spending is receiving renewed attention as pressures for raising such spending are expected in many countries. In advanced economies, the government wage bill has stabilized over the past decade, but pressures to increase wage bill spending are mounting in response to a growing demand for public services—in particular, in the health sector—due to rapidly ageing populations (IMF, 2016a). In low-income and developing economies, the wage bill has been on an upward trend over the past decade reflecting an expansion in public services in areas such as health and education. Over the coming decades, further increases in wage bill spending in these countries are expected due to continued demands to expand the provision of key public services.

Government wage dynamics could potentially have a large impact on fiscal outcomes. Spending on the wage bill absorbs around one-fifth of total spending on average in advanced economies and nearly 30 percent in emerging markets and low-income and developing countries (IMF, 2016a). Therefore, small increases in compensation or employment levels could potentially have large unintended adverse implications for the fiscal balance, which may require sharp adjustments in revenues or in other spending items in order to ensure fiscal sustainability.

Assessing the behavior of non-wage spending and revenue items following wage bill changes is important as financing modalities could have different macro-fiscal implications. If wage bill increases are associated with a persistent deterioration in the fiscal balance, the result will be a worsening of public debt. If higher wage spending is compensated with cuts in non-wage spending, crucial spending for economic growth and poverty reduction such as public infrastructure or social protection—could be crowded out. Alternatively, an increase in revenues to finance wage bill increases could be pursued but at the cost of eroding private sector competitiveness and ultimately having a negative impact on economic growth. Also, if wage increases are financed with surges in revenues during economic upswings, such wage increases will exacerbate output fluctuations by further stimulating demand and undermine the stabilization role of fiscal policy (IMF, 2015).

The analysis of the short- and medium-term fiscal implications of government wage bill increases has received little attention in the literature. Only a few studies have examined the impact of wage bill spending on the budget and revenues, but the dynamic considerations of the relationship between these variables have been largely ignored. Kraay and Van Rijckeghem (1995) study the determinants of employment and wages in the public sector using a dataset that comprises 34 low-income and developing economies and 21 OECD countries between 1972 and 1992. These authors find a positive association between government employment and the relaxation of resource constraints, in particular, the revenue-to-GDP ratio and foreign financing in the case of developing countries and GDP per capita in the case of OECD countries. Eckardt and Mills (2014) examine the impact of wage bill spending on fiscal discipline. Their results suggest that the effect of wage bill expansions on the overall balance is negative and statistically significant for countries in Europe and Central Asia Region but not for Western European countries. Specifically, their estimates suggest that a one percentage point increase in the wage bill as a share of GDP increases the fiscal deficit by about half a percentage point—which is close to our findings for the average country in our sample (comprising

advanced and non-advanced economies). Finally, Cahuc and Carcillo (2012), using a sample of OECD countries, find a strong positive correlation between the wage bill and fiscal deficits, which is more frequent during booms. These authors also assess if the results vary according to country characteristics and find that the impact is less frequent when governments are more transparent, union's coverage is lower, when there is more freedom of press, and in presidential regimes.

The objective of this paper is to provide empirical evidence on the financing of wage bill increases and to offer additional insights on how non-wage spending and revenue aggregates behave in response to wage bill increases.[1] We aim to answer the following questions. First, how do countries usually finance their wage bill increases—increasing revenues, adjusting non-wage expenditures, or worsening of the fiscal balance? Second, does the increase in the wage bill revert to previous levels shortly after or does the wage bill increase persist? Third, does the relationship between wage bill spending and other fiscal aggregates differ across countries? To address these questions, this paper uses the time-series data on government wage bill spending compiled in previous work on government compensation and employment (IMF, 2016a).

This paper complements the limited existing literature by analyzing, using a PVAR methodological approach, the dynamics of the interaction between the wage bill and the other non-wage budgetary and revenue items for a large sample of countries. We use a panel vector autoregressive (PVAR) approach to analyze the dynamics of the government wage bill and its association with other fiscal aggregates for a broad set of countries. We estimate a PVAR using a large annual panel dataset comprising 137 countries over the period 1992 to 2015 and examine the contemporaneous and lagged responses among revenue, wage bill and other expenditures. The results are presented in the form of responses of individual variables to increases in the remaining endogenous variables. The impact of adjustment in individual variables on the overall budget balance is also derived and analyzed. We also assess if country characteristics matter for the dynamics between the wage bill and the other fiscal variables. To examine this, we compare the results across different types of countries grouped according to their level of development, public indebtedness and access to natural resources.

Our findings support the view that countries exhibit different public financing patterns in response to increases in wage bill spending. On average, increases in wage bill spending do not revert in the medium term, and are roughly equally financed by both larger deficits and additional revenues, while non-wage spending remains broadly unaffected. This said, countries differ in the financing of wage bill changes. Unlike in emerging and low-income economies, in advanced economies wage increases are not associated with a worsening fiscal balance as these countries fully finance wage spending surges by both increasing revenues and cutting non-wage expenditures. We also find that in low-debt as well as in non-resource-rich economies, on average, additional wage bill spending is associated with higher revenue more than in high-debt and resource-rich economies. These results are robust to the ordering of the variables and the use of an alternative definition for non-wage expenditures which excludes interest payments.

[1] Assessing the causal relationships among the four variables as well as the issue of fiscal multipliers and cyclicality of public revenue and expenditure are outside of the scope of our work. Rather, the paper focuses on how fiscal aggregates move in relation to each other.

The structure of the rest of the paper is as follows. Section II discusses the data and presents some stylized facts. Section III describes the methodology used for the analysis. Section IV presents and interprets the empirical results. Conclusions and lessons for economies expecting to see an increase in their wage bill spending are offered in Section V.

II. DATA AND STYLIZED FACTS

For the purpose of our analysis we compile data for three fiscal variables—government wage bill, revenues, and non-wage expenditures—for the general government. The wage bill is defined as the total compensation, in cash or in kind, payable to a government employee in return for work. It includes wages and salaries, allowances, and social security contributions made on behalf of employees to social insurance schemes (IMF, 2014b). Revenue includes taxes, revenues from transfers, income derived from the ownership of assets, and sales of goods and services. Other expenditure comprises all types of expenditures other than the wage bill—for example, use of goods and services, consumption of fixed capital, interest payments, subsidies, grants, social benefits and other expenses. We also collect data on primary non-wage expenditures (e.g., non-wage expenditures minus interest payments) to test the robustness of our findings to using an alternative measure for non-wage expenditures. The wage bill data are drawn from the IMF FAD's Government Compensation and Employment Dataset (IMF 2016a). The source of the data on government revenues, other expenditures and gross domestic product is the IMF World Economic Outlook. We also drew information on election years from the Database of Political Institutions (Cruz, Keefer, and Scartascini, 2016) and constructed a dummy variable with value of 1 for elections years to capture the direct impact of elections.[2]

Our panel dataset sample contains 137 countries from all regions for the period 1992-15 (Table 1). First, the sample selection involves the elimination of outliers, which we define as those observations with annual wage bill changes either below the first or above the 99th percentiles. Second, as we estimate a PVAR of order 3, countries with a number of observations below three consecutive years are also dropped from the sample.[3] Consequently, the original sample of 148 countries is reduced to 137 countries.

To analyze if the interaction between the wage bill and other fiscal variables differs according to country characteristics, countries are grouped according to a few traits. Countries are grouped based on their level of development, sustainability of public finances, and reliance on revenues from natural resources. First, to analyze the association between the level of development and the fiscal financing of the wage bill, we distinguish between advanced and non-advanced economies.[4] In the sample, there are 27 advanced and 110 non-advanced

[2] Studies show that wage and non-wage expenditures and fiscal deficits are affected by political considerations, including elections (Endegnanew, Soto, Verdier, 2017; Eckardt and Mills, 2014; Gupta, Liu, and Mulas-Granados, 2015; and IMF 2016a).

[3] Section IV Empirical Approach discusses criteria used to select the lag length.

[4] The group of non-advanced countries comprises both emerging markets and low-income and developing economies. Although we acknowledge there could be differences in the financing modality of wage bill spending between emerging (e.g. Poland) and low-income and developing countries (e.g. Rwanda), these two groups of countries cannot be analyzed separately due data limitations.

economies (Table 1). Second, the level of a country's public debt is used to categorize economies with the aim of exploring if fiscal sustainability considerations matter for the modality of financing of wage bill changes.[5] Although the sample is roughly equally split between 71 high and 66 low-debt economies, the bulk (around 90 percent) of countries classified as high-debt are non-advanced economies. Third, economies are grouped according to their reliance on revenues from natural resources.[6] There are 25 resource-rich economies in the sample, of which only one is an advanced economy.[7]

Table 1. Size of the Sample and Sub-Samples by Income Level, Access to Natural Resources and Public Debt

	Number of Countries	High Debt	Low Debt
Total	145	76	69
Resource Rich	27	9	18
Non-Resource Rich	118	67	51
Advanced	99	8	21
Resource Rich	1	0	1
Non-Resource Rich	28	8	20
Non-Advanced	116	68	48
Resource Rich	26	9	17
Non-Resource Rich	90	59	31

Source: IMF staff calculations.

Table 2 illustrates the descriptive statistics of the total sample as well as of the sub-samples split according to the three country characteristics. Typically, government revenues, spending on the wage bill and other non-wage expenditures (all expressed in percent of GDP) are higher in advanced than in non-advanced economies, as documented by the average and median values for these variables (Table 2). This is consistent with "Wagner's Law" (Diamond, 1977), which sets that government spending, including the wage bill, tends to increase as a share of GDP as countries develop, reflecting increasing demand for public services. It also worth highlighting that while in advanced economies, minimum and maximum values are not distant from the median and average values, they are quite dispersed in case of non-advanced economies, indicating a large heterogeneity within this group. For example, in countries like Kuwait, Libya and Marshall Islands, government revenues exceed 70 percent of GDP, while in other non-advanced economies, like Democratic Republic of Congo, Zimbabwe and Rwanda, revenues fall below 5 percent of GDP at some point during the period of analysis. Regarding the wage bill, the dispersion among non-advanced economies is alike. While in countries like

[5] We apply the criteria from IMF (2014a) to classify a country as high or low debt. According to that criteria, advanced economies with public debt above 72 percent of GDP are considered to be high-debt countries. In case of emerging, low income and developing countries the threshold of 43 percent of GDP is applied.

[6] We consider a country to be resource rich if revenues from natural resources represent at least twenty percent of total revenues.

[7] Appendix 1 lists all countries within each category defined by income group, access to natural resources and the stock of public debt.

Djibouti, Lesotho, Libya and Marshall Islands, the wage bill as a share of GDP exceeds 20 percent, in other non-advanced economies, like Democratic Republic of Congo, Equatorial Guinea and Zimbabwe, some of the observations for the wage bill are less than 1 percent of GDP.[8]

Table 2. Descriptive Statistics—Levels of Revenue, Wage Bill and Other Expenditure
(Percent of GDP)

	Revenue				Wage Bill				Other Expenditure			
	Min	Med	Ave	Max	Min	Med	Ave	Max	Min	Med	Ave	Max
All	4.9	27.9	30.3	72.1	0.8	8.5	8.4	23.0	3.9	22.6	23.5	62.5
Resource Rich	4.9	30.4	32.0	72.1	0.8	5.8	7.1	17.4	3.9	19.8	21.4	62.5
Non-Resourse Rich	8.3	27.7	30.0	65.5	1.6	8.9	8.7	23.0	5.0	23.0	23.9	46.7
Low Debt	8.4	34.9	33.5	65.5	1.6	9.2	9.0	23.0	6.9	26.4	25.4	51.9
High Debt	4.9	24.9	27.3	72.1	0.8	7.9	7.9	21.4	3.9	20.4	21.7	62.5
Advanced	17.4	41.8	42.4	57.4	3.5	11.0	10.9	17.6	10.4	34.1	32.9	46.7
Resource Rich	51.4	55.1	55.0	57.4	11.6	13.3	13.0	14.0	27.1	30.7	31.0	36.1
Non-Resourse Rich	17.4	41.1	41.8	57.2	3.5	10.8	10.8	17.6	10.4	34.2	33.0	46.7
Low Debt	31.2	41.9	43.6	57.4	6.5	11.1	11.3	17.6	22.2	34.2	33.7	46.7
High Debt	17.4	40.8	38.5	51.5	3.5	10.5	9.6	13.4	10.4	31.6	30.3	42.5
Non-Advanced	4.9	24.4	26.1	72.1	0.8	7.2	7.6	23.0	3.9	18.9	20.2	62.5
Resource Rich	4.9	27.9	30.2	72.1	0.8	5.6	6.7	17.4	3.9	19.2	20.7	62.5
Non-Resourse Rich	8.3	24.0	25.1	65.5	1.6	7.5	7.8	23.0	5.0	18.8	20.1	46.0
Low Debt	8.4	25.1	26.6	65.5	1.6	6.6	7.4	23.0	6.9	18.0	19.6	51.9
High Debt	4.9	24.1	25.8	72.1	0.8	7.4	7.7	21.4	3.9	19.3	20.6	62.5

Source: IMF staff calculations.

The non-stationarity of revenue, wage bill spending and other expenditures, as well as the absence of a cointegration relationship among these variables, calls for transforming the data into first differences. Applying a number of panel unit root tests, we were not able to reject the null hypothesis of the presence of a stochastic trend in our three series. As various panel cointegration tests do not indicate that these variables are cointegrated, all variables are first differenced, and the panel VAR is estimated in first differences.[9]

Summary statistics of the first differences show there is an upward trend in the wage bill for non-advanced economies (Table 3). For the whole sample, the average annual change of the wage bill between 1995–15 was 0.05 percentage point of GDP. While for advanced economies the share of the wage bill to GDP has remained broadly stable, for non-advanced economies the average annual change was 0.07 percentage point of GDP over that period and it was mainly driven by developments in low-income and developing economies rather than emerging markets (Figure 1a). During the same time period, the increase in revenues and other expenditures has been negligible in advanced economies, while the average non-advanced economy experienced an increase in revenues and other expenditures of about 0.41 percentage point of GDP and 0.36 percentage point of GDP, respectively.

[8] Further discussion of developments and trends in wage bill across regions and countries could be found in IMF 2016a.

[9] Section IV discusses results from the panel unit root and panel cointegration tests.

Splitting the sample into high and low-debt economies seems to be relevant when analyzing fiscal responses to increases in the wage bill. Despite the initially higher level of the wage bill to GDP ratio in low-debt economies, the wage bill-to-GDP ratio for these two groups has converged by 2015 (Figure 1b). This convergence has resulted from higher average wage bill annual changes in the case of high-debt economies when compared to the average wage bill change experienced by the average low-debt economy (Table 3). When controlling by the country level of development, low-indebted economies exhibit larger increases in revenues than high-debt economies.

Table 3. Descriptive Statistics—First Differences of Revenue, Wage Bill and Other Expenditure

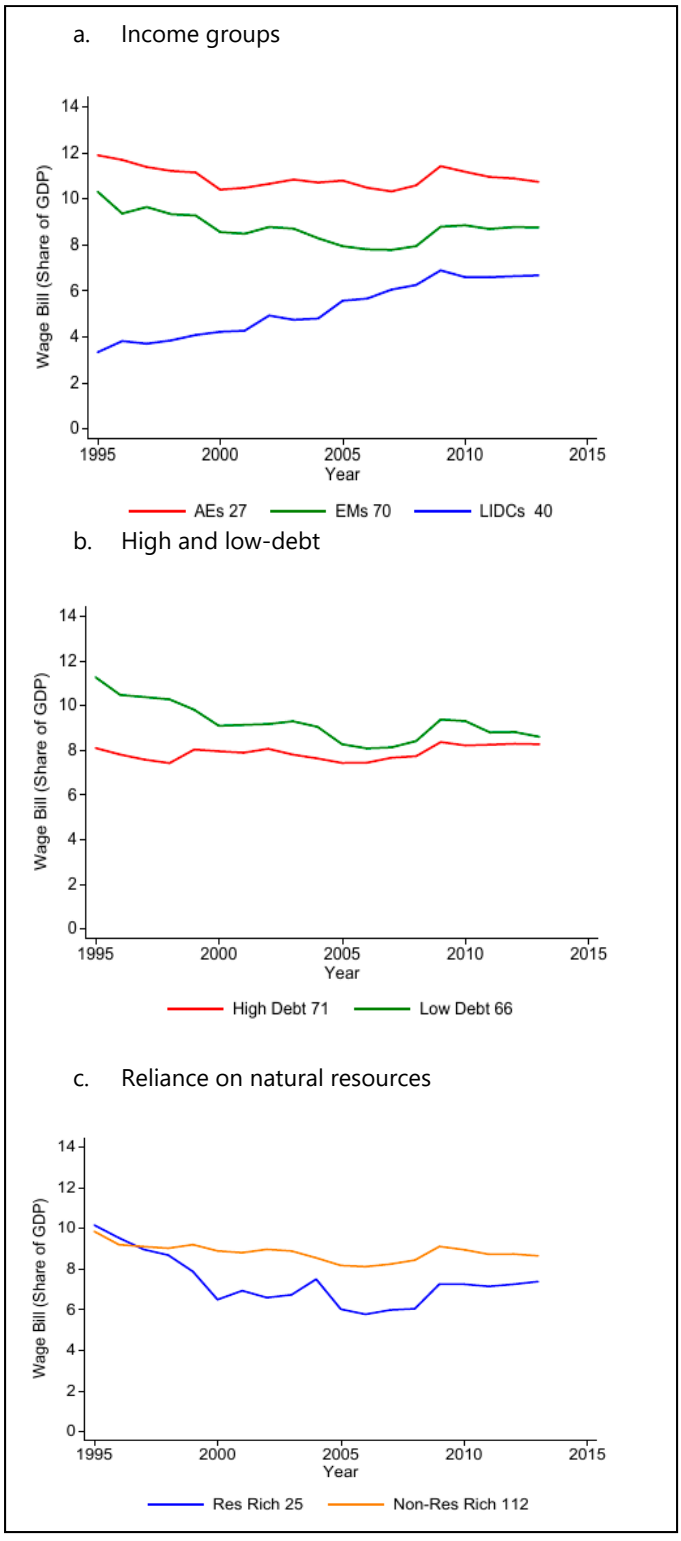
(Percent of GDP)

	Revenue				Wage Bill				Other Expenditure			
	Min	Ned	Ave	Max	Min	Med	Ave	Max	Min	Ned	Ave	Max
All	-10.17	0.20	0.31	41.90	-2.57	0.00	0.05	4.42	-7.71	0.11	0.27	37.88
Resource Rich	-10.17	0.49	0.81	29.21	-2.57	-0.01	0.04	3.26	-7.71	0.24	0.67	37.88
Non-Resourse	-9.87	0.17	0.21	41.90	-2.55	0.00	0.05	4.42	-7.13	1.00	0.19	13.93
Low Debt	-10.17	0.19	0.32	34.70	-2.57	-0.04	0.03	4.06	-6.92	0.09	0.21	13.64
High Debt	-10.12	0.21	0.30	41.90	-2.5.5	0.04	0.07	4.42	-7.71	0.15	0.33	37.88
Advanced	-6.63	0.11	0.02	6.22	-1.58	-0.05	-0.01	1.96	-6.14	-0.12	0.01	10.10
Resource Rich	-2.03	-0.20	0.24	4.27	-1.58	-0.15	-0.02	1.73	-3.57	-0.69	-0.32	4.37
Non-Resourse	-6.63	0.12	0.01	6.22	-1.15	-0.05	-0.01	1.96	-6.14	-0.09	0.02	10.10
Low Debt	-4.20	0.17	0.09	6.22	-1.58	-0.07	-0.01	1.96	-6.14	-0.08	0.00	10.10
High Debt	-6.63	-0.08	-0.22	4.03	-1.02	-0.02	-0.02	1.23	-4.32	-0.22	0.02	5.54
Non-Advanced	-10.17	0.23	0.41	41.90	-2.57	0.03	0.07	4.42	-7.71	0.25	0.36	37.88
Resource Rich	-10.17	0.49	0.85	29.21	-2.57	0.01	0.04	3.26	-7.71	0.28	0.74	37.88
Non-Resourse	-9.87	0.19	0.30	41.90	-2.55	0.04	0.08	4.42	-7.13	0.24	0.27	13.93
Low Debt	-10.17	0.20	0.48	34.70	-2.57	0.00	0.06	4.06	-6.92	0.28	0.35	13.64
High Debt	-10.12	0.25	0.37	41.90	-2.55	0.05	0.08	4.42	-7.71	0.24	0.37	37.88

Source: IMF staff calculations.

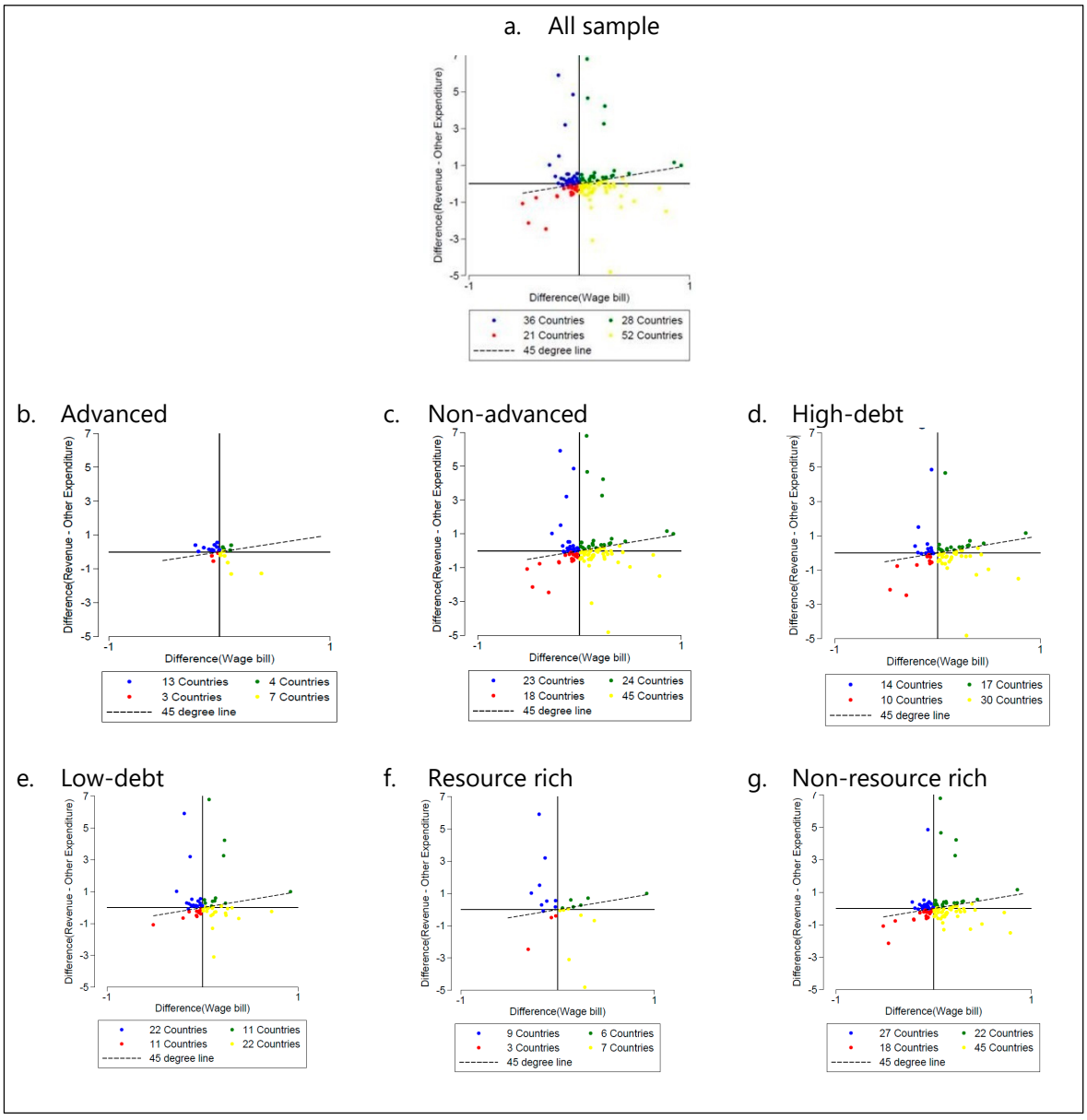
Last, the availability of natural resources could also be an important factor when explaining the association between wage bill changes and other fiscal aggregates. The ratio of the wage bill to GDP in resource-rich economies is lower than the level for non-resource-rich economies by about 2 percentage points of GDP. Also, the average annual change in the wage bill to GDP ratios is smaller in the case of resource-rich than non-resource-rich economies. Regarding the other fiscal variables, non-resource economies display positive increases in revenues and other expenditures of similar magnitude. In contrast, for resource rich, the observed increase in revenues exceeds the average annual change of non-wage expenditures.

Figure 1. The Wage Bill by Country Groups
(Percent of GDP)



Source: IMF staff calculations.

Figure 2. Change in Wage Bill, Revenue and Other Expenditure over the period 1995–13
(Percent of GDP)



Source: IMF staff calculations.

Looking at data for individual countries suggests a negative correlation between wage bill and overall fiscal balance changes in about 65 percent of the countries. Figure 2a shows changes in the wage bill and in revenues minus expenditures over the period 1995–13 for each of the countries in the total sample. It is worth noticing that the wage bill as a share of GDP has increased in 80 out of 137 countries over this period. Second, wage bill increases (decreases) have been associated with a deteriorating (improving) overall fiscal balance in a total of 52 (36) countries indicating that in these countries wage changes have exceeded the adjustments in revenues minus other spending (Figure 2a). In other words, in about 65 percent of countries,

changes in the wage bill do not appear to have been fully financed by adjustments in revenues and/or other budgetary items resulting in a negative co-movement between the wage bill and fiscal balance changes. Such negative association is also displayed in about the same proportion of countries for each of the subsamples (Figures 2b-2g). In the next section, we estimate a PVAR model and analyze the developments in revenue, other expenditures and the overall balance after increases in the wage bill.

III. EMPIRICAL APPROACH

In order to analyze the co-movement of changes in the wage bill and other fiscal aggregates—namely revenues, other expenditures, and the resulting overall fiscal balance—we estimate a PVAR. We prefer a panel version of a VAR for the following reasons: (i) there is no economic theory that would describe what usually happens after periods of the wage bill changes; (ii) the dynamic nature of a VAR allows us to analyze short-term dynamics of adjustments to individual variables; (iii) the system of equations allows for interactions among variables over time; and (iv) a panel version of a VAR provides more robust results compared to a series of VARs of individual countries. In addition, panel-based unit root and cointegration tests should have higher power than those based on single country time series.

More specifically, we estimate the following three-dimensional reduced-form panel VAR of order p:

$$(1) \qquad \mathrm{Y_{it}} = \Gamma(\mathrm{L})\mathrm{Y_{it}} + \Omega(\mathrm{L})\mathrm{X_{it}} + \mathrm{u_i} + \epsilon_{\mathrm{it}}$$

where i refers to country and t to time dimensions. $\mathrm{Y_{it}}$ is a (1×3) vector consisting of three stationary variables $[\mathrm{R_{it}}, \mathrm{W_{it}}, \mathrm{O_{it}}]'$, and $\mathrm{R_{it}}$, $\mathrm{W_{it}}$ and $\mathrm{O_{it}}$ represent government revenue, the wage bill and other non-wage expenditure, respectively.[10] The overall fiscal balance is defined as $\mathrm{R_{it}} - \mathrm{W_{it}} - \mathrm{O_{it}}$. For comparability reasons, we express all variables as GDP shares. To reflect the impact of political factors on the system, a (1×1) vector $\mathrm{X_{it}}$ is included and it represents the election dummy variable. $\Gamma(\mathrm{L})$ and $\Omega(\mathrm{L})$ are matrix polynomials in the lag operator with $\Gamma(\mathrm{L}) = \Gamma_1\mathrm{L}^1 + \Gamma_1\mathrm{L}^1 + \ldots + \Gamma_\mathrm{p}\mathrm{L}^\mathrm{p}$ and $\Omega(\mathrm{L})$ being defined analogously. Individual Γs and Ωs are (3×3) and (1×1) matrices, respectively. $\mathrm{u_i}$ is a vector of country fixed effects and ϵ_{it} is a vector of idiosyncratic forecast errors, both being (1×3) vectors.

Before estimating the reduced-form PVAR, the individual variables were tested for the presence of a unit root and cointegration relationships. A number of panel unit root and cointegration tests have been applied to the data set (Table 4). The results from panel version of the Dickey-Fuller, Levin-Lin_Chu (2002) and Im, Pesaran, Shin (2003) tests suggest that all three variables expressed as a share of GDP contain a unit root. Also, the test by Hadri (2000) supports this hypothesis by rejecting the null hypothesis of stationarity at all conventional confidence levels for all three variables. While the outcomes from the Phillips and Perron test do not provide so clear evidence of nonstationary, we believe there is enough evidence supporting the presence of a unit root in levels of GDP shares of revenue, wage bill and other expenditure. First

[10] As a robustness check we use "primary non-wage expenditures" as an alternative measure for other non-wage expenditure O_{it}. This alternative measure excludes interest payments.

differencing the GDP shares of revenue, the wage bill and other expenditure makes these time series stationary (Table 5).

Table 4. Stationarity Tests of Levels of Revenue, Wage Bill and Other Expenditure

(p-values)

	Revenue	Wage Bill	Other Expenditure
H_0: All Panels Contain Unit Root			
Dickey Fuller	0.63	0.26	0.62
Phillips Perron	0.00	0.23	0.02
Levin-Lin-Chu	0.82	0.16	0.49
Im-Pesaran-Shin	0.39	0.34	0.41
H_0: All Panels Are Stationary			
Badri	0.00	0.00	0.00

Source: IMF staff calculations

Table 5. Stationarity Tests of First Differences of Revenue, Wage Bill and Other Expenditure

(p-values)

	Revenue	Wage Bill	Other Expenditure
H_0: All Panels Contain Unit Root			
Dickey Fuller	0	0	0.00
Phillips Perron	0.00	0	0.00
Levin-Lin-Chu	0.00	0.09	0.01
Im-Pesaran-Shin	0.00	0.00	0.00
H_0: All Panels Are Stationary			
Hadri	1.00	0.25	1.00

Source: IMF staff calculations

Given the non-stationarity of the three variables and no cointegration relationship among them, the VAR was estimated in first differences. Applying four error-correction based cointegration tests by Westerlund (2007), we tested for a presence of cointegration relationship among revenue, wage bill and other expenditure for at least one panel member as well as for the panel as a whole. None of these tests supports the presence of a cointegration relationship among the three variables by not being able to reject the null hypothesis of the absence of cointegration.

Applying the Akaike and the Bayesian information criteria, the lag length was set to three years. The selection of the correct order p—the number of lags in a VAR—is essential as too few lags fail to capture the system's dynamics, while too many lags result in over-parameterization and less efficient estimates. The lag length of three years is supported by the majority of information criteria outcomes. In addition, the cumulative impulse response functions seem to capture the dynamics of the system while confidence bounds are not excessively wide.

We estimate the reduced-form version of the PVAR and quantify orthogonalized impulse response functions applying a standard Cholesky decomposition.[11] Following the discussion in Blanchard and Perotti (2002) and the outcome of the Granger causality tests, we assume the wage bill responds to contemporaneous changes in revenues and other expenditure only with a lag due to long implementation process of approval. Consequently, the wage bill is the most exogenous variable and revenue is the least exogenous variable in the system.[12]

The results are presented in the form of cumulative impulse response functions of revenue, wage bill and other non-wage expenditures. First, using the whole sample of countries, we examine how revenue, wage bill and other expenditure behave in relation to changes in each other. We also examine the dynamics of the overall balance that reflects adjustments in each individual variable—note that the overall balance is not included in the set of endogenous variables in the PVAR but can be derived from the system. By inspecting the responses of the three variables, as well as the overall balance, to increases in the wage bill, we can analyze how increases to wage bill spending have been financed. Next, because the magnitude and shape of responses to the shocks could be significantly affected by a number of factors, we focus on a few country traits: the level of development, high or low-debt, and accessibility to natural resources. To this end, we examine the impulse responses due to wage bill increases separately for each of the following six subsamples: advanced economies, non-advanced economies, high-debt, low-debt, heavy reliance on natural-resources and low reliance on natural-resources. The PVAR was estimated in first differences, and we present the cumulative effect of adjustments in individual variables, i.e. the cumulative impulse response functions, to demonstrate the cumulative effect on levels of GDP ratios of these three variables over time.

IV. RESULTS

The results for the full sample of 137 countries reveal that changes in both revenue and other expenditure do not have a significant bearing on the wage bill development, neither in the short or medium term (Figure 3). Changes in the wage bill do not seem to follow changes in revenue or other non-wage expenditures. This finding suggests that wage bill adjustments are driven by factors other than the overall position of public finances and contrasts with previous findings in the literature, which argued in favor of the cyclicality of wage bill (Eckardt and Mills, 2014; Lamo, Perez, and Schukneckt 2007; Lane 2003; and IMF, 2016a). This result is also supported by the outcomes from the Granger causality tests (Table 6). Specifically, the tests reveal that lagged values of other non-wage expenditure and revenue have very little, if any, predictive content for the wage bill.

Adjustments to the wage bill are usually associated with a deterioration in the fiscal balance that persists in the medium term as these are only partially financed by an increase in revenues while other expenditure items remain broadly unchanged (Figure 3). Charts on the second row in Figure 3 display the development in the fiscal aggregates (revenues, wage

[11] The parameters of the panel VAR were estimated using the GMM style estimator following Abrigo and Love (2015).

[12] Appendix 1 provides impulse response functions obtained under different orderings and confirm that the empirical results described in the next section are robust to alternative ordering options.

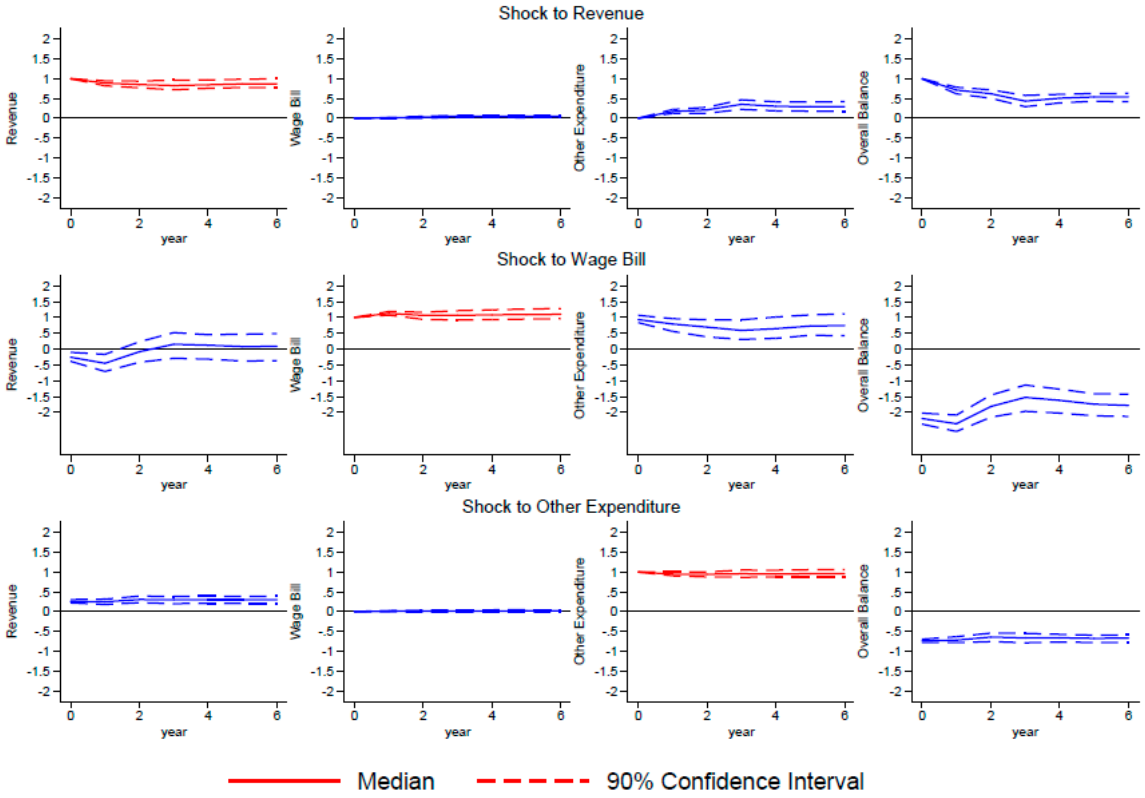
spending, non-wage spending, and overall balance) following wage bill increases. A 1 percentage point of GDP increase in the wage bill, is on average financed by revenue increases of 0.5 percentage points and deficit increases of almost equal magnitude. In other words, increases in the wage bill are associated with a deterioration of the overall balance in the medium term as these spending increases are only partially compensated with additional revenues. The Granger causality tests confirm that past values of the wage bill have some predictive power for revenue, but no predictive power for other expenditures (Table 6). This finding is consistent with previous work (IMF 2016a) and the evidence from a number of country-case studies (Honduras, Portugal and Romania) that accompanied that work (IMF 2016b). Specifically, applying univariate panel fixed effect model, the results in (IMF 2016a) suggest that rather than crowding out other items in the budget, increases in the wage bill have on average been associated with increases in other government spending and with a deterioration of the overall balance as these spending increases are only partially compensated with additional revenues.

An increase in government revenues does not improve the overall balance by the same amount as it tends to be accompanied by persistent spending increases. Revenue surges of one percentage point of GDP are on average associated with other non-wage expenditures being higher by about 0.3 percentage point of GDP, and therefore, the overall fiscal balance improves on average by about 0.7 percentage point of GDP (Figure 3). It is also interesting to note that while other expenditures seem to accommodate quickly to positive surprises in revenues, the wage bill remains unchanged as noted above.

Similar to wage increases, non-wage expenditure increases are associated with some worsening of the fiscal balance in the medium term. About 60 percent of the increase in other expenditure outlays is deficit financed, with the remainder being financed with higher revenues. The deficit financing of other expenditure could have different implications for public debt dynamics as this broad category of expenditure includes government consumption but also capital expenditures, which have the potential—if effectively spent—of having a positive impact on economic growth.

We now turn to examine the financing pattern for the wage bill by different countries according to their level of development. Initially, a higher wage bill is strongly associated with a fiscal balance deterioration in both advanced and non-advanced economies (Figure 4). However, two years after the increase, the impact on the balance seems to disappear in advanced economies as the additional wage spending is fully compensated by higher revenue and lower other expenditures. In contrast, in the case of non-advanced economies, a fiscal balance deterioration (or higher deficit) persists in the medium term as the wage bill surge is only partly financed with revenues while other non-wage expenditures remain broadly unchanged (Figure 4). It is also interesting to note that the adjustment in the revenue in advanced economies exceeds the one observed in non-advanced countries. The composition of financing could reflect differences in the budgetary setting arrangements for the wage bill and medium-term fiscal frameworks, but such analysis is beyond the scope of this paper.

Figure 3. Cumulative Impulse Response Functions—All Countries
(Percent of GDP)



Source: IMF staff calculations.

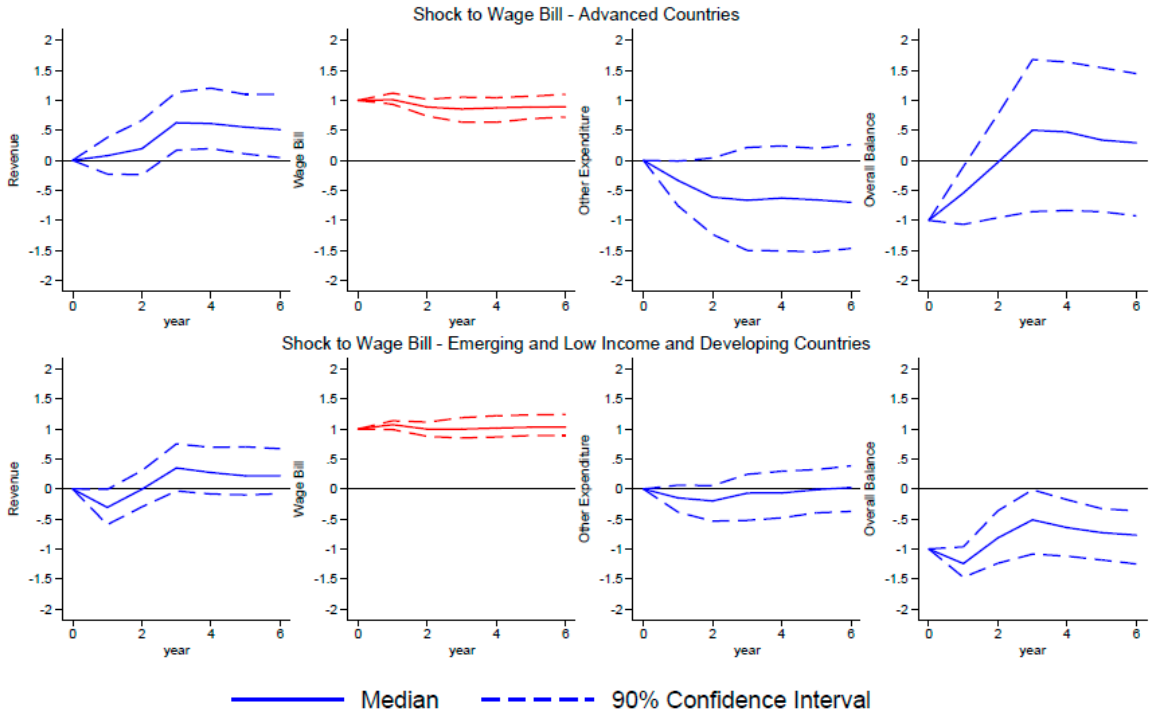
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Table 6. Granger Causality Tests
(p-values)

H_0: Excluded variable does not Granger-cause equation variable		
Equation	Excluded Variable	
Revenue	Wage Bill	0.02
	Other Expenditure	0.31
	Wage Bill and Other Expenditure	0.01
Wage Bill	Revenue	0.09
	Other Expenditure	0.86
	Revenue and Other Expenditure	0.18
Other Expenditure	Revenue	0.00
	Wage Bill	0.99
	Revenue and Wage Bill	0.00

Source: IMF staff calculations.

Figure 4. Cumulative Impulse Response Functions—Advanced and Non-Advanced Countries
(Percent of GDP)

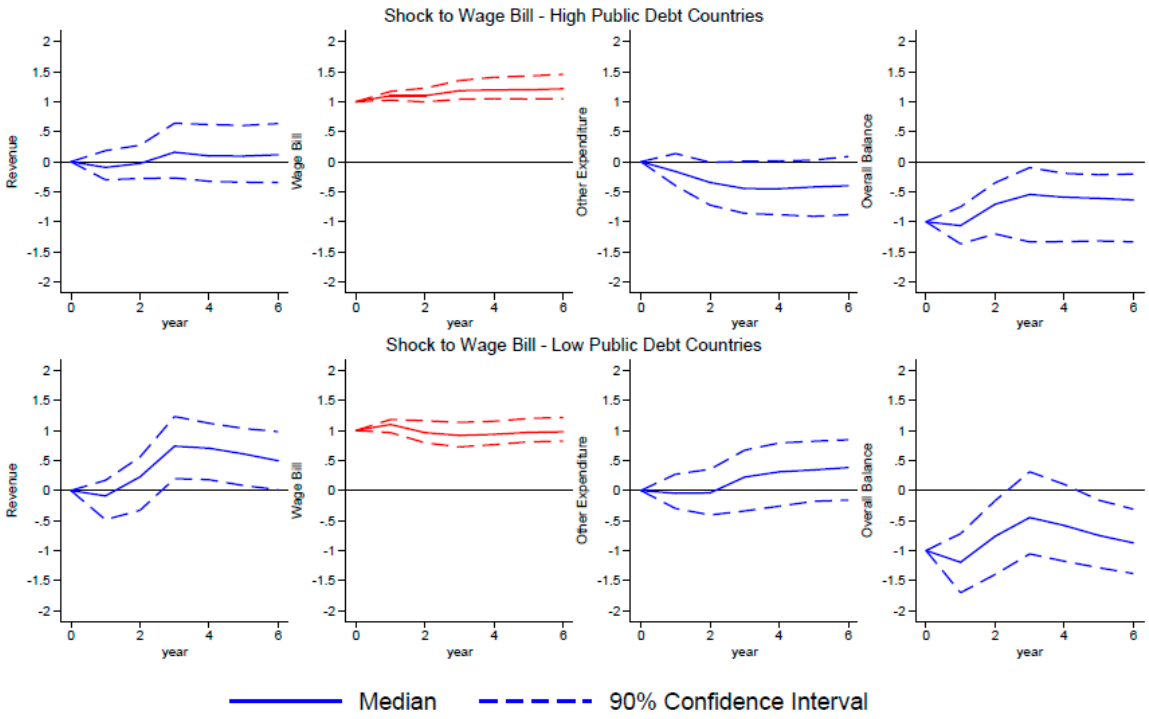


Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

The association between higher wage bill spending and a worsening fiscal balance is comparable in high and low-debt economies, despite some underlying differences in the financing (Figure 5). In the case of high-debt economies, the increase in the wage bill is not associated with revenues adjustment. Instead, in this group of countries about half of the wage bill increase is financed by gradually crowding out of other expenditures and the remaining half by a deteriorating fiscal balance (or higher deficits). On the other hand—in the case of low-debt economies—revenues tend to respond more to increases in the wage bill, while other expenditures seem to increase to some extent too. The result is that the higher wage bill is strongly associated with a larger deficit at the time of the increase and it shrinks to about 75 percent of its initial size after about three years.[13]

[13] Although it seems natural to distinguish between high-debt countries in case of advanced and non-advance economies, we cannot further split our sample due to data limitations.

Figure 5. Cumulative Impulse Response Functions—High-Debt and Low-Debt Countries
(Percent of GDP)



Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations

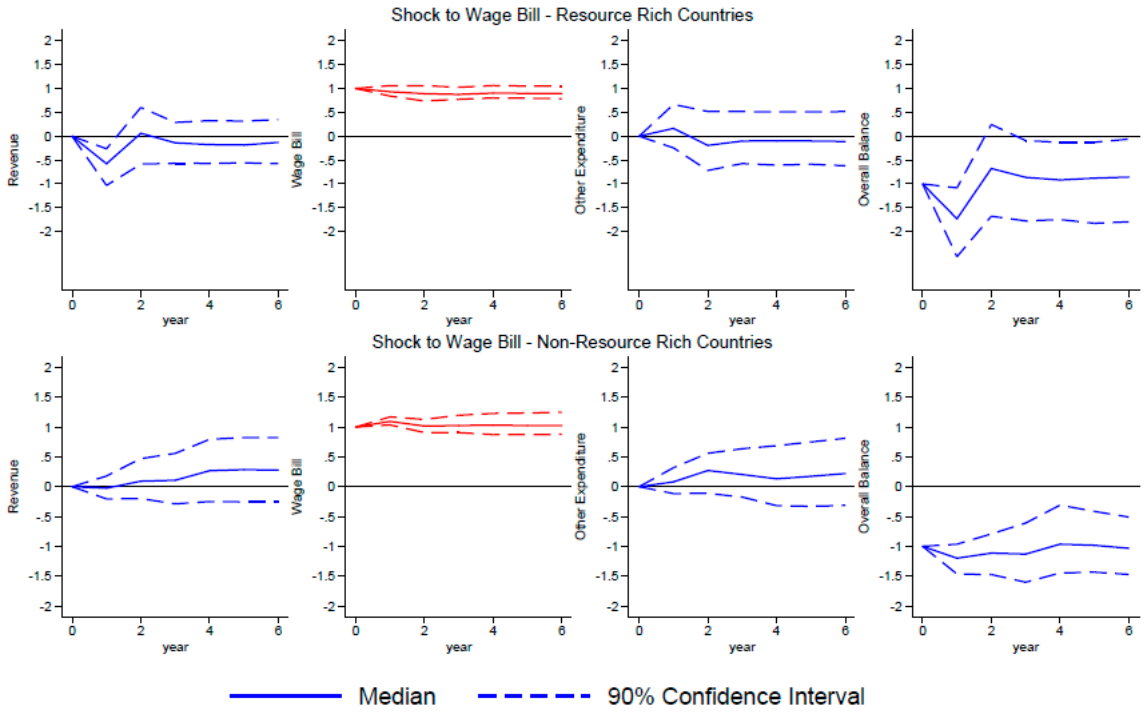
There are also some differences in the financing of the wage bill increases across countries depending on their accessibility to natural resources (Figure 6). The rise in the wage bill in resource-rich economies does not seem to be accompanied by adjustments in either revenues or other expenditures, and thus, it results in a deterioration of the balance of the same magnitude. This finding suggests that these countries tend to leverage their resource wealth to finance increases in wage spending (IMF, 2016a).[14] In the case of non-resource-rich economies, revenues marginally increase over time, but other expenditures increase slightly as well, with the result that wage bill increases tend to be nearly fully financed with larger deficits.

The findings described above are robust to several alternative specifications. As mentioned above, we checked for different orderings of the variables in the PVAR (see Appendix 2). We also tested for the impact of using an alternative measure for non-wage expenditures which excludes interest payments. The use of the primary non-wage expenditure does not have a significant impact on the impulse responses and thus on our main results (Appendix 3). To address the potential endogeneity driven by omitting the economic cycle from the specification, we included real GDP growth in the PVAR. We also dealt with this potential bias by adding the output gap

[14] As there are only 27 resource-rich countries out of 137 countries in our sample, the small precision of the estimated impulse response functions is most likely due to a small number of observations. In addition, 26 out of 27 resource rich countries are non-advanced countries.

instead. None of these robustness tests affected the results and did not provide evidence of a significant impact of either of these two variables on the wage bill and vice versa. Last, the results remain broadly unchanged when reducing the sample to post 2009 data.[15]

Figure 6. Cumulative Impulse Response Functions—Resource Rich and Non-Resource Rich Countries
(Percent of GDP)



Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

V. Conclusion

Using a sample of 137 countries between 1992 and 2015, this paper has analyzed the dynamics of revenues, wage bill and other expenditures with a focus on the financing of wage bill increases. For that purpose, we estimated a panel VAR and present cumulative impulse response functions and Granger causality tests of these three variables. Special attention is paid to developments in revenues, other expenditure and the overall balance after increases in the wage bill. We have also explored if the pattern of wage bill financing differs across types of countries depending on their level of development, access to natural resources and public indebtedness level.

We find that neither in the short or medium run does wage spending seem to be affected by changes in revenues or other spending and also that wage bill increases do not easily reverse. The results suggest that wages—and therefore, compensation and employment—are

[15] The results are available from authors on request.

not affected by changes in the overall budget position, which could reflect for example increases in revenues in the context of buoyant economic conditions. Instead, wage increases seem to be associated with other factors, such as wage negotiations, and political considerations, for example ahead of elections to boost political support (IMF, 2016a). We also find that wage bill increases are difficult to scale back, hence, countries should have in place a strong institutional framework to adequately manage the wage bill.

The results suggest that for the whole sample an increase in wage spending is associated with a worsening of the fiscal balance. For the average economy in the sample, the increase in the wage bill is initially fully deficit financed, but as revenues gradually increase while other expenditures remain broadly unaffected, the higher wage bill is eventually associated with less than a full deterioration in the fiscal balance.

We also find evidence confirming that the pattern of financing for wage spending increases differs across countries depending on their characteristics. Advanced economies tend to fully finance wage bill increases by adjusting revenues and other expenditures in contrast to non-advanced economies, where reflecting a limited increase in revenues a fiscal deterioration is associated with increases in the wage bill. Countries with a low level of public debt tend to increase their revenues following adjustments in the wage bill more than high-debt countries do. But as low-debt economies also see an increase in other expenditures, the association between the wage bill and the overall balance is broadly similar between high and low-debt countries. Finally, increases in the wage bill are associated with a deterioration in the fiscal balance of the same magnitude in resource-rich and non-resource-rich countries, though revenues or expenses do not change in the former and exhibit marginal increases in the later.

Looking ahead, given these results and the potential large fiscal impact of wage bill changes, as countries of all types are expected to face pressures to increase their wage bill, it is crucial for policy makers to adequately manage the wage bill. Increases in the wage bill could potentially have a large fiscal impact, and in particular, lead to a worsening fiscal balance, higher levels of taxation and in some cases also be associated to cuts in other expenditures. Efforts should therefore focus on strengthening institutions—such as those described in IMF (2016a)—that provide for an adequate management of the wage bill.

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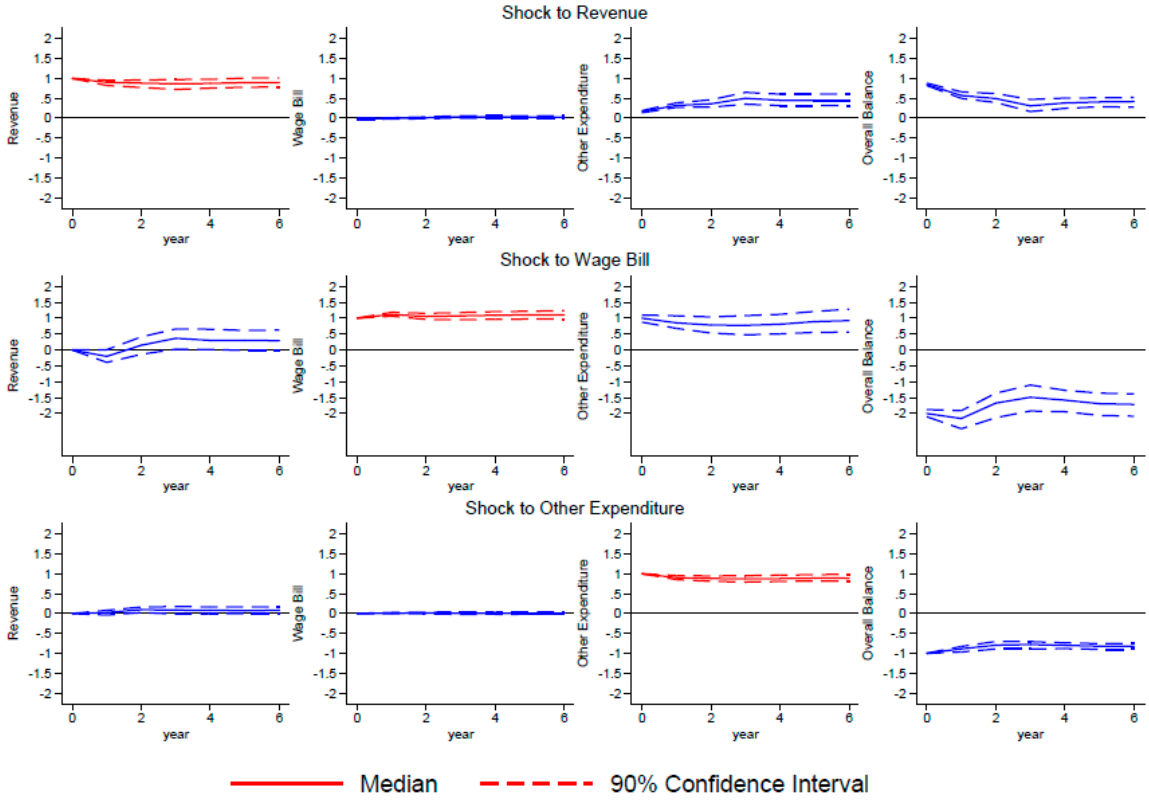
APPENDIX 1. Country Groups by income, Access to Natural Resources and Public-Sector Stock of Public Debt

		High Debt	Low Debt
Advanced			
	Resource Rich		Norway.
	Non-Resource Rich	Belgium, Canada, Ireland, Israel, Italy, Japan, Singapore and United States.	Australia, Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland and United Kingdom.
Non-Advanced			
	Resource Rich	Algeria, Angola, Democratic Republic of Congo, Equatorial Guinea, Guinea, Iraq, Kuwait, Mauritania and Sudan.	Azerbaijan, Bahrain, Botswana, Brunei Darussalam, Cameroon, Chad, Chile, Ecuador, Indonesia, Kazakhstan, Libya, Oman, Qatar, Russia, Saudi Arabia, Trinidad and Tobago and United Arab Emirates.
	Non-Resource Rich	Afghanistan, Albania, Antigua nad Barbuda, Argentina, Barbados, Belize, Brazil, Burundi, Cabo Verde, Central African Republic, Comoros, Croatia, Djibouti, Dominica, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Grenada, Guinea-Bissau, Guyana, Honduras, Hungary, India, Jamaica, Jordan, Kenya, Kyrgyz Republic, Lebanon, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Moldova, Morocco, Mozambique, Nepal, Nicaragua, Niger, Panama, Philippines, Poland, Rwanda, Senegal, Serbia, Seychelles, Sierra Leone, St. Lucia, St. Vincent and the Grenadines, Tajikistan, Thailand, Togo, Tonga, Tunisia, Turkey, Uruguay and Zimbabwe.	Armenia, The Bahamas, Bangladesh, Belarus, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Cambodia, Colombia, Costa Rica, Dominican Republic, Georgia, Guatemala, Haiti, Latvia, Lithuaniam Maldives, Mali, Marshall Islands, Namibia, Peru, Romania, South Africa, Suriname, Swaziland, Tanzania, Uganda, Ukraine, Vanuatu and Zambia.

Source: IMF staff calculations.

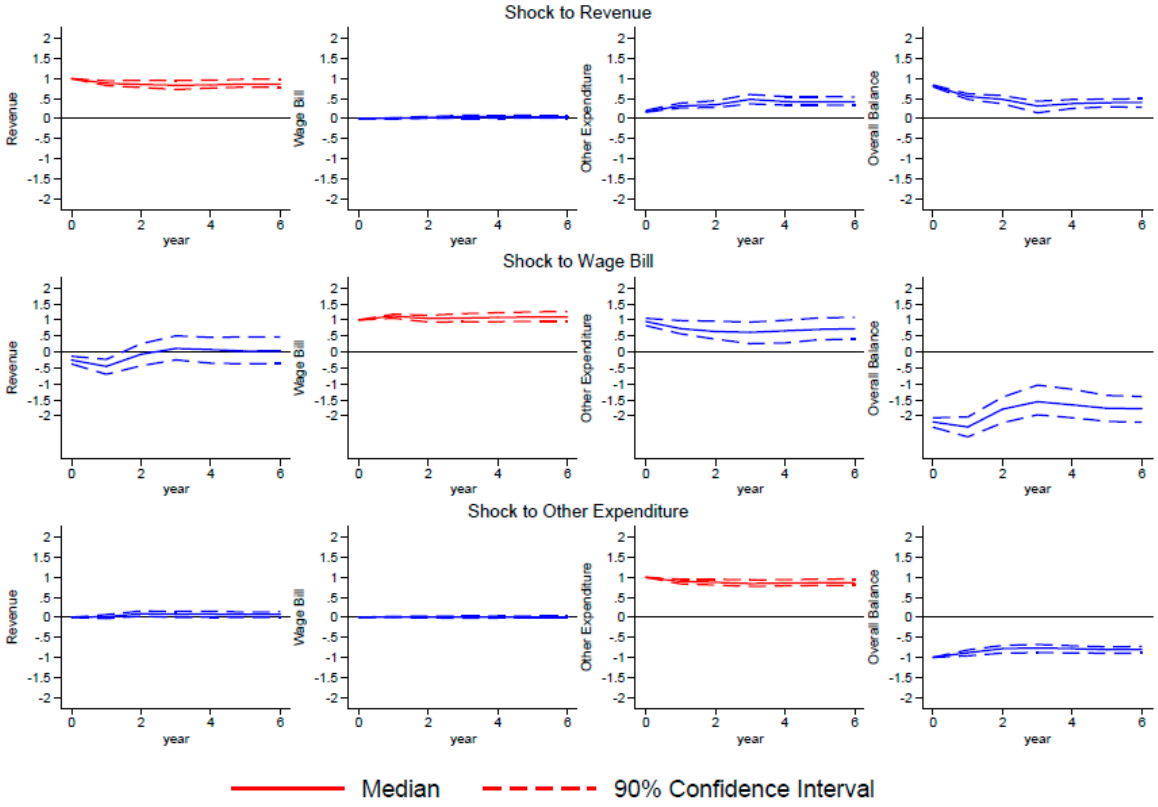
APPENDIX 2. Impulse Response Functions Under Alternative Ordering

Appendix Figure 1. Impulse Response Functions—All Countries
(Ordering: Revenue – Wage Bill – Other Expenditure)
(Percent of GDP)



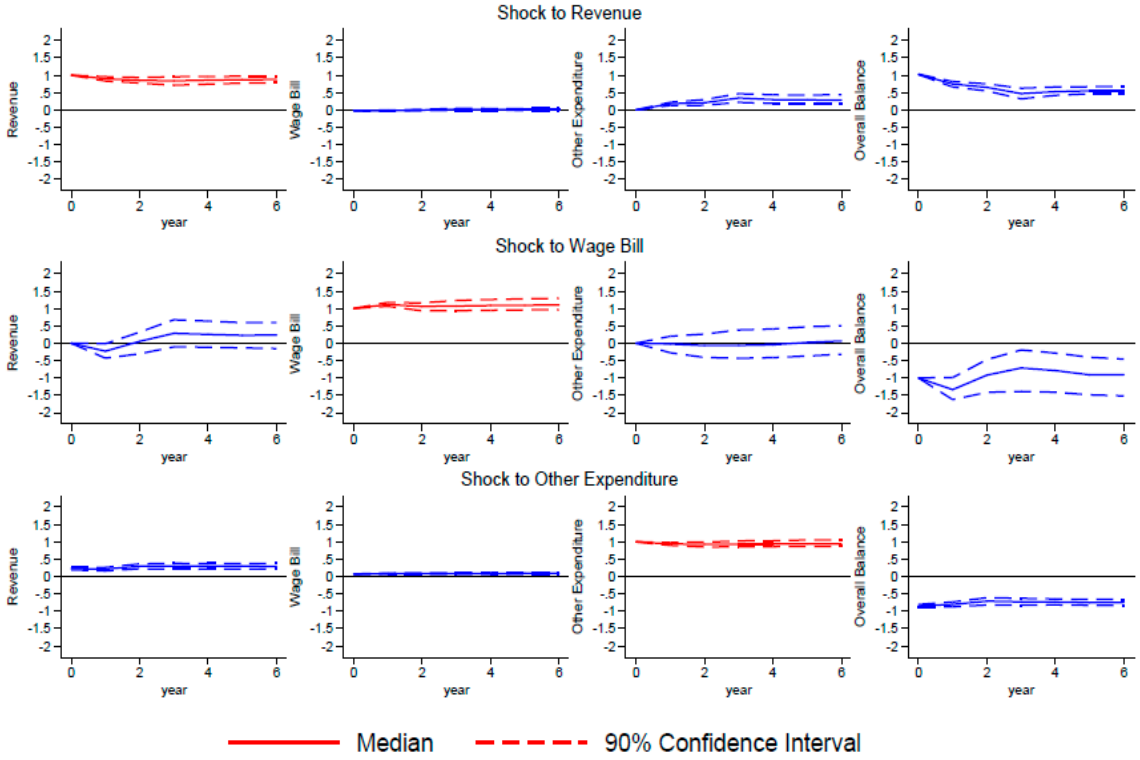
Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Appendix Figure 2. Impulse Response Functions—All Countries
(Ordering: Wage Bill → Revenue → Other Expenditure)
(Percent of GDP)



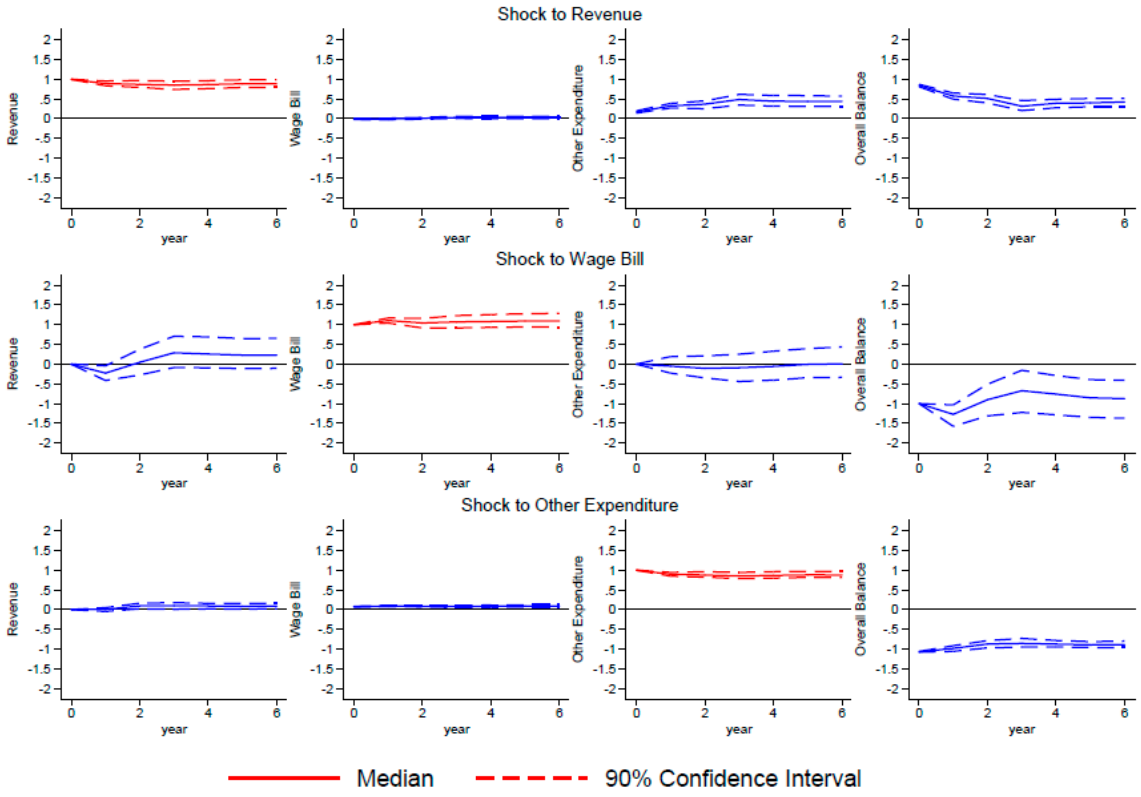
Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Appendix Figure 3. Impulse Response Functions—All Countries
(Ordering: Other Expenditure → Revenue → Wage Bill)
(Percent of GDP)



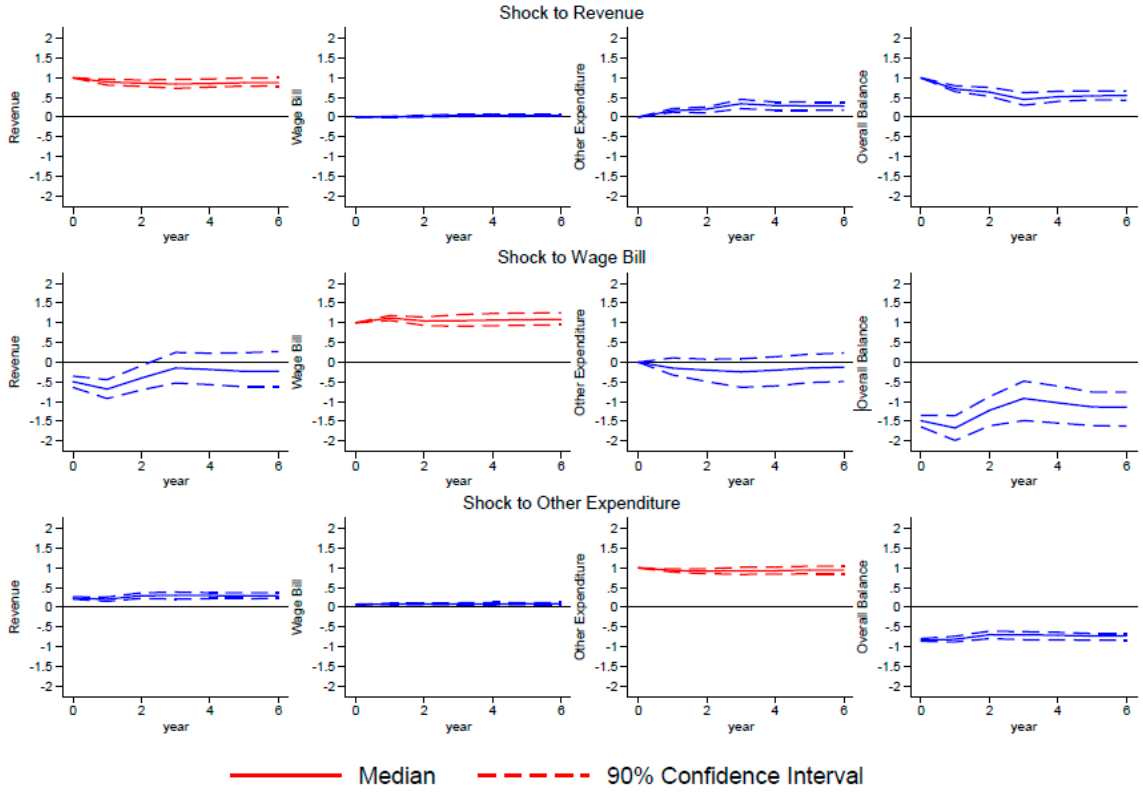
Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Appendix Figure 4. Impulse Response Functions—All Countries
(Ordering: Revenue → Other Expenditure → Wage Bill)
(Percent of GDP)



Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Appendix Figure 5. Impulse Response Functions—All Countries
(Ordering: Other Expenditure → Wage Bill → Revenue)
(Percent of GDP)

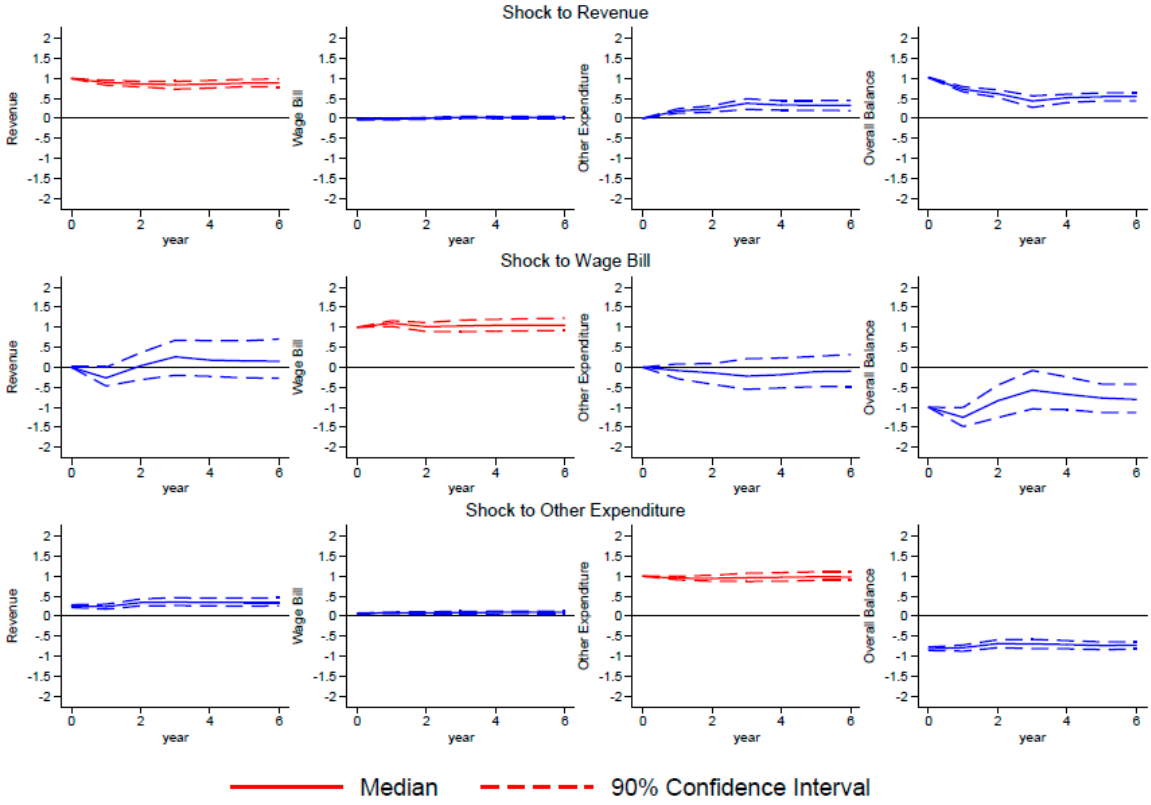


Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

APPENDIX 3. Primary Other Expenditure

Appendix Figure 6. Impulse Response Functions—All Countries (Primary Other Expenditure)

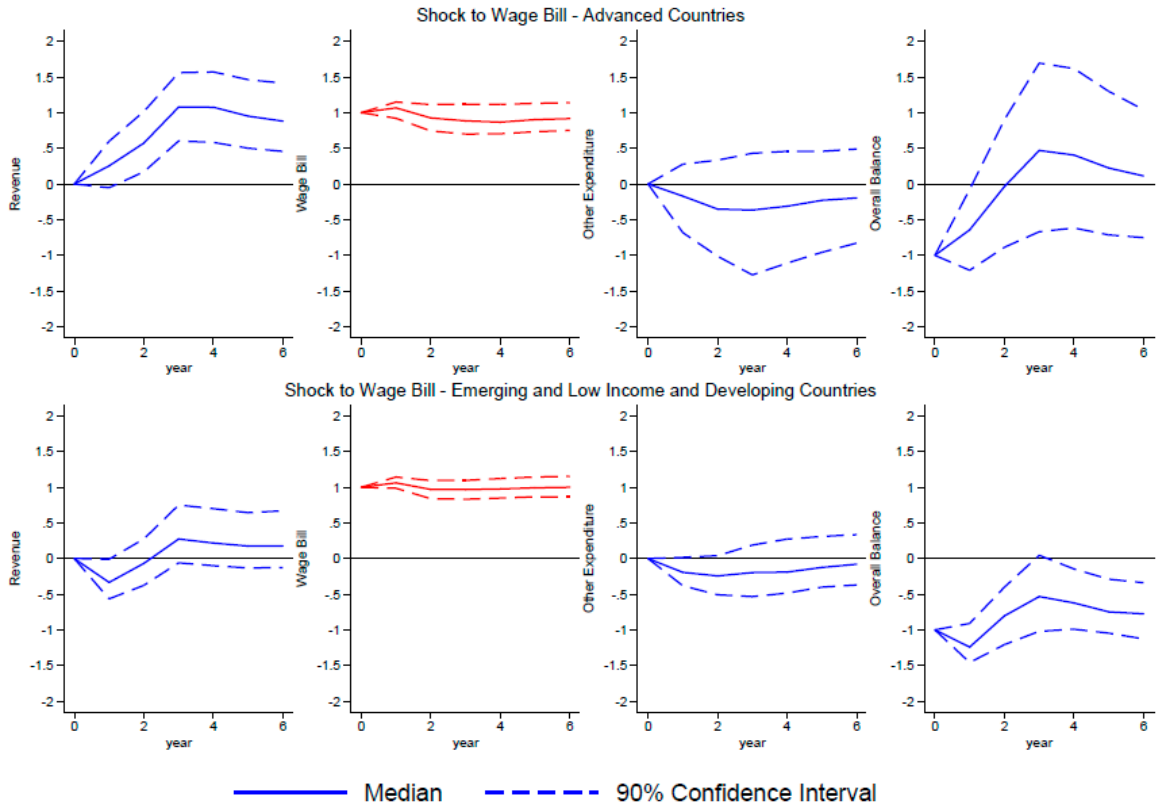
(Percent of GDP)



Source: IMF staff calculations.

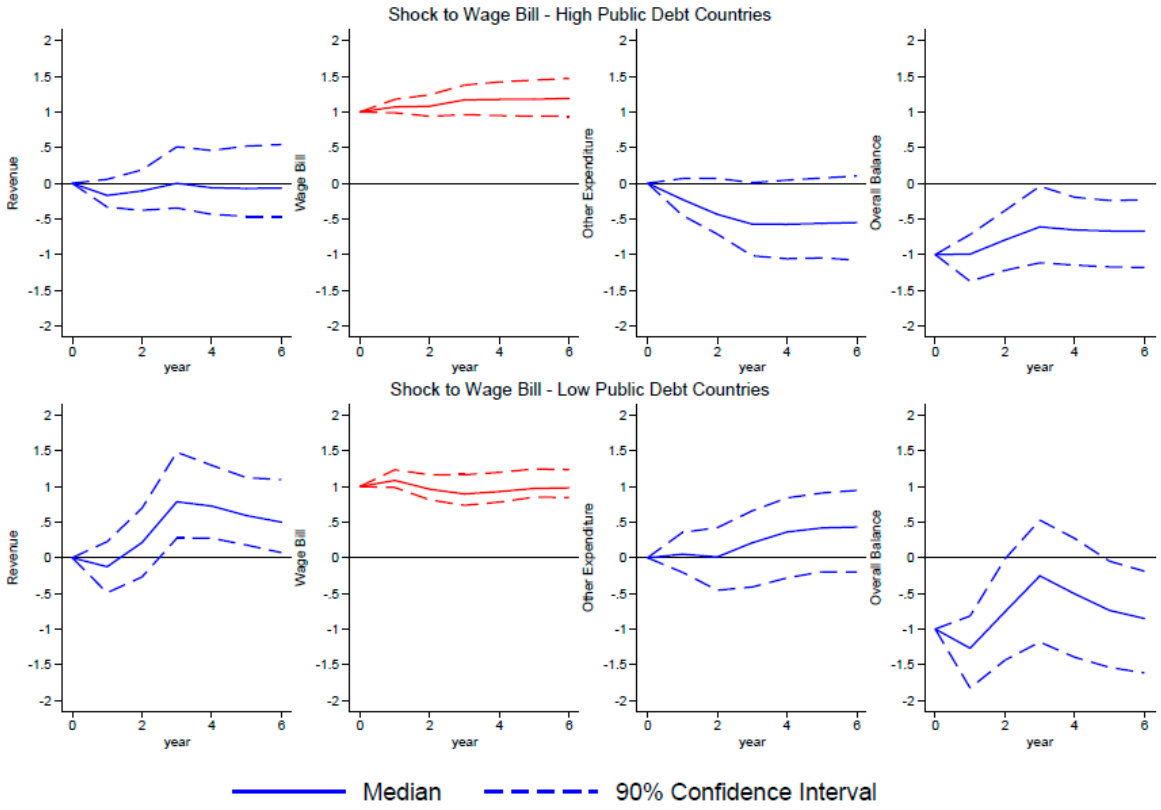
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Appendix Figure 7. Impulse Response Functions—Advanced and Non-Advanced Countries
(Percent of GDP)



Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

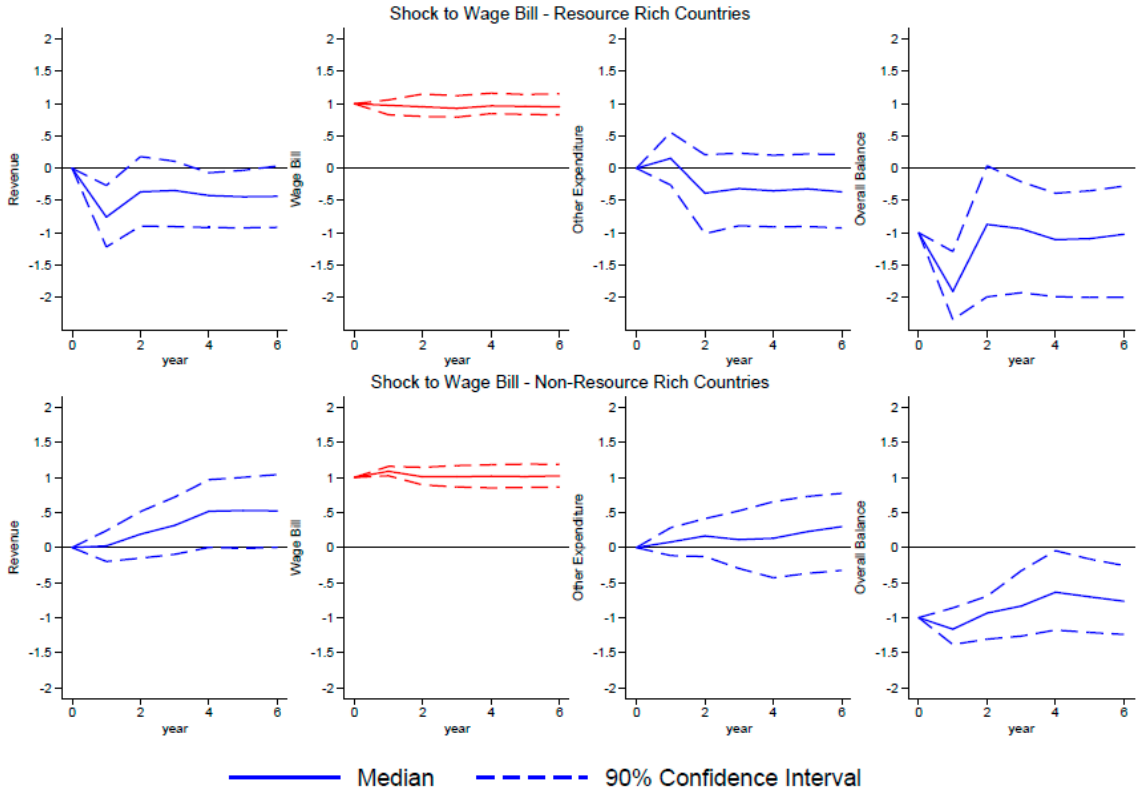
Appendix Figure 8. Impulse Response Functions—High-Debt and Low-Debt Countries
(Percent of GDP)



Source: IMF staff calculations.
Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.

Appendix Figure 9. Impulse Response Functions—Resource Rich and Non-Resource Rich Countries

(Percent of GDP)



Source: IMF staff calculations.

Note: The 90 percent confidence intervals were constructed using Monte Carlo simulations.