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SELECTED ISSUES

November 10, 2023

Approved By
Asia and Pacific Department

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THE PHILIPPINES QUANTITATIVE INTEGRATED POLICY PILOT: INCREASING ANALYSIS SCOPE AND DEPTH[1]

The quantitative model for the integrated policy framework (IPF) developed for Philippines (PHL QIPF) has continuously evolved since it was first used to assess risk scenarios during the 2022 Article IV mission.[2] The aim of this selected issues paper is to provide some background on that evolution, highlight the rationale behind the key changes, describe the most important extensions and their implications, and to then present several policy applications, which played a part in informing the 2023 Article IV discussions with the Philippine authorities.

A. Towards a QIPF Model for the Philippines

1. According to the standard workhorse macroeconomic model, dating back to Mundell (1963) and Fleming (1962), countries with flexible exchange rates should allow them to adjust freely to economic shocks. Crucially, the original analysis abstracts from realistic distortions, which may imply that shocks are not easily absorbed by financial markets, amplifying their impact on the domestic economy, and potentially creating a rationale for deploying alternative policy tools.

2. Related considerations led IMF staff to develop an Integrated Policy Framework (IPF), to provide a systematic approach to selecting an appropriate mix of policies in the presence of empirically relevant market imperfections. To that effect, Basu et al. (2020) characterized optimal policy in an analytically tractable three-period model, while Adrian et al. (2020) developed a quantitative model for the integrated policy framework (QIPF), which highlighted tradeoffs facing policymakers in both advanced (AE) and emerging market economies (EMEs), emphasizing the remedial potential of different tool combinations.[3]

3. A key contribution of the IPF is to highlight market imperfections that engender considerable cross-country heterogeneity in optimal policy responses. These "frictions" are common to both the conceptual and quantitative IPF models (and their extensions), and they comprise currency mismatches, foreign exchange market illiquidity, as well as producers' and exporters' invoicing and pricing practices. In the presence of FX mismatches, for example, an exchange rate depreciation may be a source of vulnerability as it increases the value of foreign

[1] Prepared by Tristan Hennig, Shanaka J. Peiris (both APD), and Marcin Kolasa, Jesper Linde and Pawel Zabczyk (all MCM). Special thanks to Kaili Chen, Agnes Isnawangsih and Patricia Tanesco for excellent research and editorial assistance. The authors additionally thank the Philippine authorities, colleagues from SPR and the IPF Secretariat for constructive comments and suggestions, while claiming full responsibility for any remaining errors.

[2] The QIPF model is maintained and developed by the Monetary Policy Modeling Unit of the IMF's Monetary and Capital Markets Department. IMF (2020) provides an overview of the Integrated Policy Framework approach, with related materials available from the IPF webpage: https://www.imf.org/en/Topics/IPF-Integrated-Policy-Framework.

[3] More formally, the QIPF is a New Keynesian open economy model tailored to key features of AEs and EMEs (see Adrian et al., 2020, 2021). The assumption that FX traders have limited risk-bearing capacity (which follows Gabaix and Maggiori, 2015) helps generate realistic exchange rate volatility, implies that sterilized FX interventions have real effects, and creates a role for policy interventions by generating inefficient fluctuations in the UIP risk premium.

currency debt and the associated risk of default. Relatedly, FX interventions have more traction in shallow markets, while trade volumes are less sensitive to exchange rate changes when exports are priced in dollars, which occurs under the dominant currency paradigm (DCP).

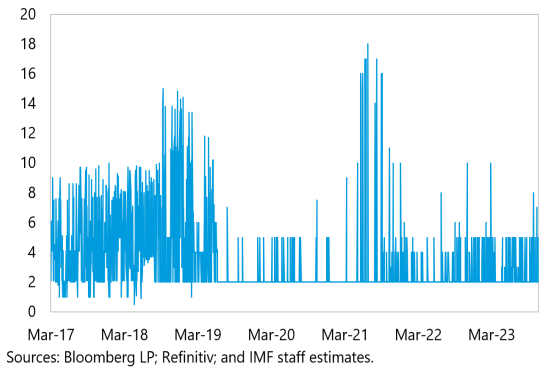
4. The QIPF model developed in Adrian et al., 2021, was a non-linear, two-country setup, featuring nominal and real rigidities, financial frictions, and occasionally binding constraints.[4] Because of the richness of the underlying specification, estimating and applying the original model in country work would have entailed significant costs. Accordingly, considerable effort was initially devoted to deriving a simplified, "empirical" specification (discussed in more detail in Chen et al., 2023). The latter was a more tractable, linearized version, in which the small open economy assumption was imposed. These changes facilitated Bayesian estimation, with extra features–e.g., imported inputs in the production of export goods, and behavioral discounting–added to help account for the dynamics of observable variables.

5. The resulting "empirical" QIPF specification was estimated on data for 12 EMEs, including Philippines, as well as 5 AEs, and it was this version of the PHL QIPF that was first discussed with Philippine authorities during the 2022 AIV Mission. The IMF analysis suggested that—even though flexible exchange rates continued to provide significant benefits in the presence of relevant frictions—tools such as foreign exchange interventions could play a useful role in response to certain shocks. Notably, however, neither the broad IPF principles, nor the Philippine-specific analysis rationalized indiscriminate use of multiple policy tools, nor did they support deployment in all circumstances, stressing instead costs associated with delayed transition towards deep FX markets, healthy balance sheets, and strong institutional arrangements.

6. An impulse to intensify IPF-related work came from the Philippine authorities, who welcomed IMF staff efforts, and suggested customization to salient features of the economy. The authorities noted, in particular, that the foreign exchange market was subject to periods of illiquidity, in line with spread fluctuations depicted in Figure 1, and they also highlighted the importance of US dollar invoicing, which characterized 92% of imports and 87% of exports. The growing exposures of the corporate sector to external FX debt and underdeveloped hedging markets were also a concern. In addition, there was interest in extending QIPF applicability beyond scenario analysis, to generate

Figure 1. Philippines: Ask-Bid Spot Rates Spread

(In basis points, calculated as ask minus bid)



Sources: Bloomberg LP; Refinitiv; and IMF staff estimates.

[4] More specifically, the non-linear specification comprised habits, price and wage stickiness, price and wage indexation, strategic complementarities in price setting, an agency friction in the cross-border flow of funds, as well as an external debt limit that triggered "sudden stops" whenever binding.

conditional baseline forecasts and shock decompositions, and to also allow for more tailored conjunctural applications. These suggestions were reflected during the "IPF pilot" phase.

7. The remainder of this note sheds light on modeling work designed to increase the descriptive realism of the PHL QIPF and showcases several of the IPF Pilot applications. Section B provides more details on the wage block as well as five new extensions: i) a fully-fledged supply side, ii) commodity prices, iii) Keynesian households, iv) Government, and v) the flex-price block.[5] Section C focuses on estimation, discussing the broad principles governing the choice of observables and values for calibrated parameters, priors on the estimated parameters, as well as assumptions made about foreign exchange interventions. It also provides an overview of the estimation results, including a discussion of what properties are assumed, coefficient stability, and previews some findings from the Markov switching version of the model. In Section D we look at the transmission mechanism through the lens of the QIPF, focusing on foreign monetary policy shocks and FXI shocks. Section E covers policy applications such as conditional forecasts, shock decompositions and risk scenarios. Finally, Section F discusses potential extensions and concludes.

B. The 2023 Philippines QIPF Extensions: A Closer Look

8. The broad goals of the PHL QIPF Pilot were two-fold: to address the Philippine authorities' suggestions by enriching the empirical specification of the Chen et al. (2023) model, and to apply the resulting framework in Article IV analysis. Customization started well ahead of the 2023 AIV Mission, with some of the authorities' recommendations already reflected in the PHL QIPF version used during the 2023 Staff Visit. For example, priors on import price flexibility were adjusted consistent with the high degree of dominant currency pricing.

9. The supply-side extension addressed one of the key questions pervading applied analysis, i.e., how to reconcile a stationary model with non-stationary / trending data. Per the simple "gaps" approach, implemented in Chen et al. (2023), growth was abstracted from the model setup, and the data were detrended to make them stationary. The alternative "supply side / levels" approach, undertaken in the PHL QIPF pilot, was to write down a non-stationary model with aggregate growth occurring through rising population and non-stationary productivity shocks, with model equations then re-written in a stationary form (as originally proposed in Smets and Wouters, 2007). While this way of proceeding engendered non-trivial technical difficulties, particularly in an open economy setting, it proved very important when it came to decomposing data and generating baseline forecasts and it eliminated a degree of ad-hocness associated with detrending being orthogonal to the specification of the QIPF model.[6]

[5] The main role of the flex-price block is to allow for the definition of a model-consistent output gap, which can have important normative implications.

[6] Expressed alternatively, the differences in estimated parameter values subsequently reported in Table 3 in part reflect the move away from pre-filtered data. Relatedly, if the model has predictions for deviations of variables from an ad-hoc trend (e.g., one implied by the HP filter), then that trend would need to be extrapolated to construct a "full" baseline forecast. Arguably, the fact that the model specification is mute on how that extrapolation should be conducted increases the degree of arbitrariness.

10. The addition of commodity prices constitutes another important extension of the PHL QIPF, with the final QIPF Article IV forecasts conditioned on WEO paths for oil price growth. Price pressures stemming from food and oil prices were playing an important role in the 2023 policy landscape, which meant that the benefits from including them were deemed to exceed the costs due to increases in modeling complexity. Broadly, commodities were modeled as tradable endowments whose world prices were endogenously determined by global demand and supply (with local subsidies or quotas having the potential to affect prices faced by domestic users).[7]

11. One of the original modeling ambitions was to use the PHL QIPF to additionally analyze fiscal scenarios. From that point of view, breaking Ricardian equivalence, to allow for realistic fiscal multipliers, posed an immediate challenge. To achieve that goal, Keynesian (aka rule-of-thumb) households were added to the model. These households were assumed to be hand-to-mouth consumers with no access to financial markets, and they were further assumed to supply labor inelastically. The fact that Keynesian consumers were poorer than (optimizing) Ricardian agents, and that net government transfers that they benefitted from could differ from those received by their optimizing counterparts allowed for an analysis of the redistributive impacts of various policies.

12. The consolidated government budget constraint in the extended QIPF contains several additional terms and the setup also featured a model-consistent output gap. Aside from accounting for rollover and interest payments, as well as taxes on consumption and labor income, the government budget constraint explicitly listed public purchases and net transfers to both types of households, commodity price subsidies (or taxes), fiscal revenues associated with oil production (playing a fairly limited role in the Philippines), as well as carry-costs associated with keeping a significant stock of FX reserves. To ensure non-explosive debt trajectories, taxes on Ricardian households were used as a medium-term debt stabilizer. In addition, the extended model featured a flex-price block in which inefficient shocks and frictions were absent, and which helped pin down potential output and a model-consistent output gap, both relevant for welfare analysis.

13. By virtue of having an estimated wage block, the updated QIPF model was also well suited to analyze the transmission of changes in minimum wages debated by Congress at the time of the 2023 Staff Visit. The results of the simulations were presented to the authorities and compared to those from a calibrated QPM-style model, with the ensuing discussion focusing on the response of domestic demand and the role of Keynesian households (arguably relevant in the Philippines given the thick left tail of the income distribution). One implication was that if minimum wage hikes were to initiate a wage-price spiral, domestic demand could fall, resulting in a so-called stagflation scenario with higher inflation and lower growth.

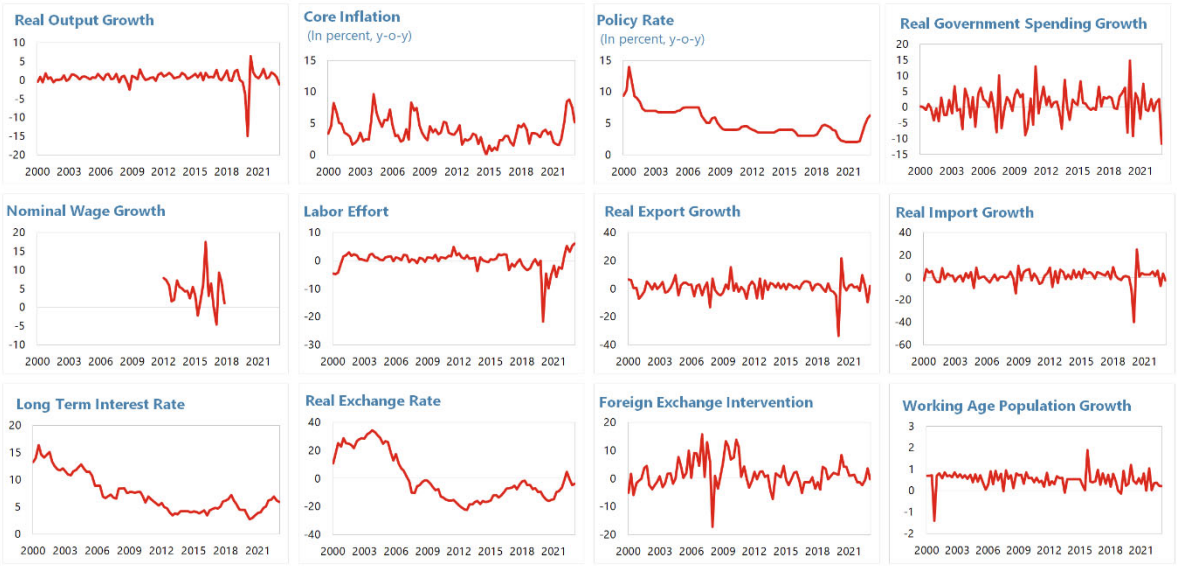
[7] All types of commodities were assumed to be directly consumed by households, with energy commodities further distinguished by the fact that they were used by firms to produce output.

C. Estimation of the Philippines QIPF Model

14. Bayesian estimation of the IMF's PHL QIPF model followed the two-step procedure outlined in Chen et al. (2023).[8] First a foreign block was estimated using US data, followed by the domestic economy (assumed to be small vis-à-vis the US). Originally, data spanned the period 2000Q2 – 2022Q1, but, ahead of the AIV mission, coverage was extended to Q2 of 2023.[9]

15. Before conducting model re-estimation, the set of variables to be used as observables needed to be determined. The work of Guerron-Quintana (2010) clarified that different choices of observables could have a significant effect on the parameter estimates, which is why several "rules-of-thumb" were followed when determining the precise composition of the data set. More specifically, observables were chosen to restrict the behavior of new or interesting model features (i.e., they were related to "standard" as well as new frictions), with national accounts series with a good signal-to-noise ratio preferred over less reliable alternatives.

Figure 2. Philippines: Domestic Variables Used to Estimate the QIPF



Source: IMF staff estimates.

16. Twelve domestic series (depicted in Figure 2) and eight foreign series (depicted in Figure 3) were used to re-estimate the PHL QIPF. For consistency, and ease of cross-model comparisons, the set of observables was kept unchanged throughout, though, naturally, going

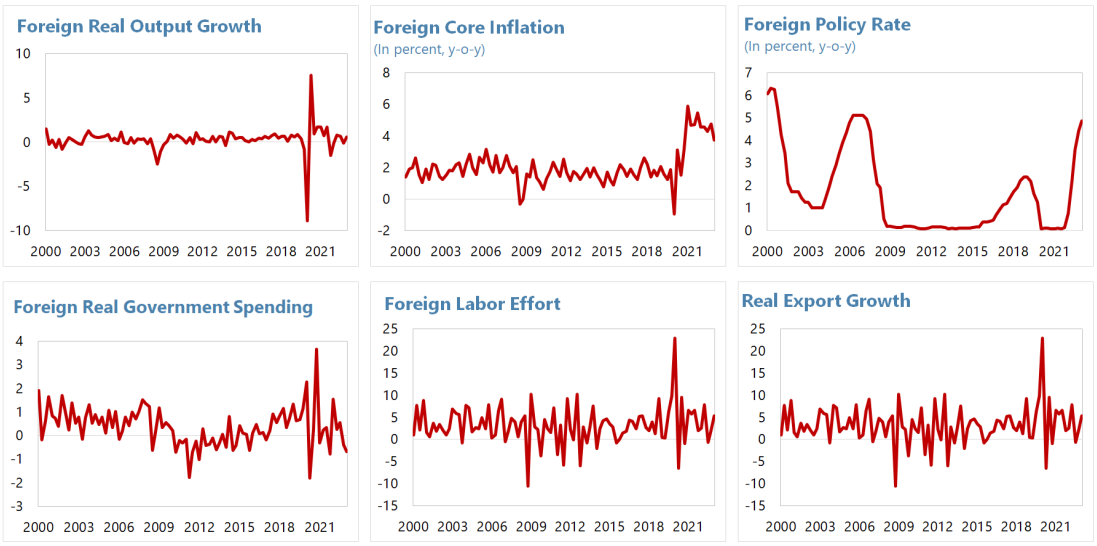
[8] Bayesian estimation has multiple advantages, including i) the ease of imposing theory-consistent parameter restrictions, ii) its well-documented ability to generate useful results in small samples, and iii) evidence of improved forecasting performance.

[9] Notably, the latter relied on an update of the Philippine proxy for FXI, kindly shared by the authors of the original Adler et al. (2021) study, where the value for the final month of the second quarter was extrapolated from those of the preceding two months.

forward, the extended QIPF model could benefit from the inclusion of more variables, speaking more directly to the added elements such as commodity prices and a richer set of fiscal variables.

17. The paucity of nominal wage data proved to be consequential, particularly in the context of attempts to quantify the impact of wage pressures on the Philippine economy. Estimation relied on the discontinued, average daily wage series provided by Haver Analytics (N566EM@EMERGEPR). Unfortunately, the series only spanned the subperiod 2012Q1 – 2018Q2, which meant that it didn't provide a reliable read on the latest labor market developments. As such, efforts were made to use the minimum wage series instead, either when estimating and conditioning, or only when conditioning. However, the non-negativity and strong cyclical pattern pervading the minimum wage growth series generated a host of issues, all of which suggest that finding a reliable and up-to-date average wage measure remains a first-order priority going forward.

Figure 3. Philippines: Foreign Variables Used to Estimate the QIPF



Source: IMF staff estimates.

18. The extended PHL QIPF model contains more than 150 parameters, begging the question of where to take their values from. The fairly large number of parameters, certainly relative to observables, makes it clear that not all their values could be reliably estimated using the short, quarterly data set outlined above. Accordingly, and in line with much of the empirical DSGE literature, where applicable, values of Philippine parameters were set to long-run means, or average ratios of key macroeconomic series, with Table 1 providing an overview of some coefficients determined this way (comparing their values to those in other EMEs, see also Chen et al., 2023 for more details).

Table 1. Philippines: A Comparison of Calibrated Country-Specific Parameter Values

Parameter	Description	BRA	CHL	COL	IDN	KAZ	MEX	MYS	PER	PHL	THA	TUR	ZAF
$\overline{b_M}$	Reserves relative to quarterly GDP	0.496	0.608	0.492	0.464	0.680	0.460	1.500	1.076	0.916	1.476	0.464	0.464
β	Household subjective discount factor	0.9867	0.9975	0.9975	0.9950	0.9902	0.9963	0.9970	0.9963	0.9950	0.9975	0.9902	0.9926
$\overline{\pi}$	Steady-state inflation (annual percentage points)	4.5	3.0	4.0	3.0	4.0	3.0	2.5	2.0	3.0	2.0	5.0	4.5
$\bar{r}$	Steady-state real rate (annual percentage points)	5.39	1.00	1.00	2.01	3.96	1.49	1.20	1.49	2.01	1.00	3.96	2.98
g_y	Share of government expenditure in GDP	0.190	0.130	0.143	0.080	0.090	0.120	0.110	0.160	0.109	0.145	0.138	0.050
ω_x	Share of imports in exports	0.107	0.160	0.095	0.150	0.130	0.270	0.400	0.130	0.240	0.370	0.180	0.214
m_y	Share of exports & imports in GDP	0.120	0.290	0.184	0.200	0.520	0.310	0.610	0.230	0.290	0.690	0.238	0.290
ω_c	Share of import goods in consumption	0.13	0.28	0.19	0.18	0.50	0.26	0.41	0.24	0.25	0.51	0.23	0.24
$\overline{tp}$	Term premium (annual percentage points)	1.0	1.5	2.5	1.0	1.0	1.5	1.0	2.0	2.0	1.0	1.5	1.0
$\bar{I}$	Gross steady-state nominal interest rate	1.025	1.010	1.013	1.013	1.020	1.011	1.009	1.009	1.013	1.008	1.023	1.019

Source: IMF staff estimates.

19. Priors chosen for the remaining 35 coefficients of the Philippines QIPF were identical to those used in the eleven other EMEs studied in Chen et al. (2023) and are listed in Table 2. In many cases reasonable ranges for parameter values, or at least their signs, were clear ex ante, with Bayesian estimation facilitating the imposition of such beliefs. Notably, the fact that common priors were used in the initial estimation meant that any differences in posterior distributions were driven by differences in country data.[10]

Table 2. Philippines: Bayesian Priors on QIPF Parameters

Parameter		Prior Distribution		
		Type	Mean	Std. dev.
Calvo parameter for import prices	ξ_m	beta	0.75	0.05
Calvo parameter for export prices	ξ_x	beta	0.75	0.05
Calvo parameter for domestic prices	ξ_p	beta	0.75	0.05
Calvo parameter for wages	ξ_w	beta	0.75	0.05
Imported goods price indexation	ι_m	beta	0.7	0.2
Domestic price indexation	ι_p	beta	0.7	0.2
Exported goods price indexation	ι_x	beta	0.7	0.2
Wage indexation	ι_w	beta	0.7	0.2
Wage sensitivity to exchange rate	ν	beta	0.1	0.05
Habit formation	$\varkappa_c$	beta	0.7	0.15
Discount factor	δ_c	norm	0.985	0.0075
FX market friction	Γ	beta	0.05	0.0125
Domestic risk premium shock persistence	ρ_ψ	beta	0.75	0.1
Consumption demand shock persistence	ρ_v	beta	0.85	0.05
Govt. expenditure shock persistence	ρ_g	beta	0.85	0.05
Import demand shock persistence	ρ_m	beta	0.85	0.05
Export demand shock persistence	ρ_{m^*}	beta	0.85	0.05
Exchange risk premium shock persistence	ρ_{b_p}	beta	0.85	0.05
Consumption demand shock	σ_c	invgamma	0.5	200
Import markup shock	σ_{π_m}	invgamma	0.1	200
Domestic markup shock	σ_π	invgamma	0.1	200
Wage markup shock	σ_{π_w}	invgamma	0.1	200
Domestic risk premium shock	σ_ψ	invgamma	0.1	200
Govt. expenditure shock	σ_g	invgamma	0.5	200
Import demand shock	σ_m	invgamma	1	200
Export demand shock	σ_{m^*}	invgamma	1	200
Exchange risk premium shock	σ_{b_p}	invgamma	1	200
Interest rate policy shock	σ_i	invgamma	0.1	200
FXI policy shock	σ_{fx}	invgamma	1	2
Interest rate reaction to CPI inflation	γ_π	norm	0.5	0.34
Interest rate reaction to output gap	γ_y	beta	0.125	0.05
Interest rate smoothing	γ_i	beta	0.75	0.05
FXI response to change in exchange rate	$\gamma_{\Delta S}$	beta	0.5	0.125
FXI persistence	$\rho_{\Delta R}$	beta	0.5	0.15
FXI rule error correction	ρ_R	beta	0.05	0.025

Source: IMF staff estimates.

20. To estimate the PHL QIPF, assumptions needed to be made about the conduct of foreign exchange interventions. This created a practical conundrum, as neither official foreign exchange intervention data, nor practical intervention guidelines are public knowledge. As alluded to previously, a proxy for FX interventions

[10] Differences in calibrated values of parameters could have, arguably, also played a role, but, and importantly, these were either assumed identical in all jurisdictions or pinned down by the data and so the differences identified were, arguably, entirely data driven.

constructed by Adler et al. (2021) was used to deal with the data issue. To account for uncertainty regarding the implementation of FXI, estimation proceeded conditional on two different intervention rules: one positing that the BSP systematically responds to changes in the nominal exchange rate, with the intervention coefficient jointly estimated with other variables, the other assuming no systematic dependence of FXI on any macroeconomic variable.[11] It is worth stressing, particularly in the IPF context, that neither of these rules was meant to characterize optimal policy and that their main goal was descriptive accuracy.[12]

21. Before applying the PHL QIPF model, sensitivity analysis was undertaken to ensure that none of the key properties were assumed by choosing too tight prior variances. The analysis confirmed that this was not the case, additionally highlighting that "prior" impulse responses were consistent with both contractionary and expansionary depreciations in the Philippines. Furthermore, the analysis indicated that FX interventions had the potential to improve output-inflation trade-offs (as in Adrian et al., 2021) as the prior spanned parameter values corresponding to fairly shallow FX markets (in addition to the "deep" / frictionless case, of course).

22. Given the extensive modifications of the PHL QIPF, a natural question pertained to the stability of the estimated coefficients. To address that question, Table 3 compares the latest estimates (column PHL EXT) to those underlying the analysis in Chen et al. (2023) and additionally contrasts them with the priors and averages for EMEs and AEs reported in that paper. While, as expected, the estimated coefficient values were not invariant to the model used, most changes proved relatively modest, highlighting a fair degree of estimate stability. Overall, the coefficients suggested that Philippine interest rate policy was responsive to inflation and the model consistent output gap, with foreign exchange interventions aimed at mitigating exchange rate volatility both sizeable (response coefficient of 0.81) and persistent (AR(1) coefficient exceeding the AE and EM average).

23. In line with other emerging market economies, allowing for an endogenous FX intervention rule in the Philippines significantly increased the estimated market depth coefficient. Intuitively, this occurs because the model attempts to rationalize the same nominal exchange rate path "knowing" that the central bank is aiming to mitigate exchange rate volatility, which would tend to imply a combination of either greater shock variance or a shallower FX market. Overall, the Philippine economy thus provides another stark example of the importance of endogeneity issues and potential pitfalls associated with trying to infer market depth directly from the data.

24. An oft-heard narrative both before and during the Article IV visit was that FX markets can be subject to periods of illiquidity. Observations based on exchange rate volatility and UIP

[11] Both specifications included an additional error-correction term meant to ensure that FX reserves remain stable in the long-run.

[12] With the caveat above in mind, it is also worth noting that in a model in which fundamental shocks were absent and the exchange rate was entirely driven by inefficient "risk-off" shocks, a rule mitigating nominal exchange rate volatility could well provide a passable approximation to optimal policy.

premium dynamics are consistent with evidence presented in Figure 1, showing large spikes in FX market bid-ask spreads. These spikes could reflect a large underlying shock or a change in FX market depth. To try and discriminate between these two potential explanations, two Markov-switching versions of the PHL QIPF model were estimated. In the first, the FX market was allowed to jump from liquid to illiquid, while in the second both the market depth and the central bank's FX intervention rule were assumed to be state dependent. While this strand of work is relatively preliminary–and hence the results may well be sensitive to the exact assumptions governing the jump process–the log-marginal likelihood criterium in the Philippines favored the specification in which market depth was constant and "illiquidity" was associated mainly with large capital outflow shocks (in stark contrast to some other emerging market economies in the Chen et al., 2023, study).

Table 3. Philippines: A Comparison of Estimated QIPF Coefficients

Parameter		Prior Distribution			Posterior Distribution			
		Type	Mean	Std. dev.	PHL EXT	PHL GAP	EMEs	AEs
					mean	mh mean	average	average
Calvo parameter for import prices	ξ_m	beta	0.75	0.05	0.71	0.86	0.77	0.85
Calvo parameter for export prices	ξ_x	beta	0.75	0.05	0.77	0.94	0.85	0.89
Calvo parameter for domestic prices	ξ_p	beta	0.75	0.05	0.89	0.89	0.92	0.84
Calvo parameter for wages	ξ_w	beta	0.75	0.05	0.81	0.72	0.72	0.79
Imported goods price indexation	ι_m	beta	0.7	0.2	0.74	0.79	0.74	0.73
Domestic price indexation	ι_p	beta	0.7	0.2	0.55	0.21	0.48	0.54
Exported goods price indexation	ι_x	beta	0.7	0.2	0.51	0.78	0.66	0.79
Wage indexation	ι_w	beta	0.7	0.2	0.52	0.75	0.57	0.36
Wage sensitivity to exchange rate	ν	beta	0.1	0.05	0.05	0.07	0.05	0.00
Habit formation	$\varkappa_c$	beta	0.7	0.15	0.28	0.36	0.37	0.23
Discount factor	δ_c	norm	0.985	0.0075	0.97	0.97	0.97	0.97
FX market friction	Γ	beta	0.05	0.0125	0.04	0.06	0.03	0.02
Domestic risk premium shock persistence	ρ_ψ	beta	0.75	0.1	0.89	0.85	0.75	0.83
Consumption demand shock persistence	ρ_v	beta	0.85	0.05	0.94	0.96	0.91	0.94
Govt. expenditure shock persistence	ρ_g	beta	0.85	0.05	0.91	0.89	0.85	0.92
Import demand shock persistence	ρ_m	beta	0.85	0.05	0.90	0.70	0.80	0.81
Export demand shock persistence	ρ_{m^*}	beta	0.85	0.05	0.93	0.87	0.86	0.93
Exchange risk premium shock persistence	ρ_{b_p}	beta	0.85	0.05	0.97	0.93	0.91	0.91
Consumption demand shock	σ_c	invgamma	0.5	200	4.30	3.69	3.55	2.50
Import markup shock	σ_{π_m}	invgamma	0.1	200	0.18	0.46	0.51	0.55
Domestic markup shock	σ_π	invgamma	0.1	200	0.53	0.60	0.51	0.42
Wage markup shock	σ_{π_w}	invgamma	0.1	200	1.40	1.38	1.86	0.71
Domestic risk premium shock	σ_ψ	invgamma	0.1	200	0.75	0.85	1.32	0.48
Govt. expenditure shock	σ_g	invgamma	0.5	200	4.69	4.75	3.31	1.03
Import demand shock	σ_m	invgamma	1	200	4.56	3.88	4.95	3.23
Export demand shock	σ_{m^*}	invgamma	1	200	5.25	20.57	30.03	17.06
Exchange risk premium shock	σ_{b_p}	invgamma	1	200	0.45	0.62	0.82	0.78
Interest rate policy shock	σ_i	invgamma	0.1	200	0.07	0.08	0.17	0.08
FXI policy shock	σ_{fx}	invgamma	1	2	0.90	5.86	6.00	2.01
Interest rate reaction to CPI inflation	γ_π	norm	0.5	0.34	1.39	0.74	0.62	1.10
Interest rate reaction to output gap	γ_y	beta	0.125	0.05	0.09	0.08	0.09	0.10
Interest rate smoothing	γ_i	beta	0.75	0.05	0.89	0.90	0.82	0.85
FXI response to change in exchange rate	$\gamma_{\Delta S}$	beta	0.5	0.125	0.81	0.86	0.45	0.13
FXI persistence	$\rho_{\Delta R}$	beta	0.5	0.15	0.57	0.53	0.45	0.25
FXI rule error correction	ρ_R	beta	0.05	0.025	0.01	0.01	0.02	0.04

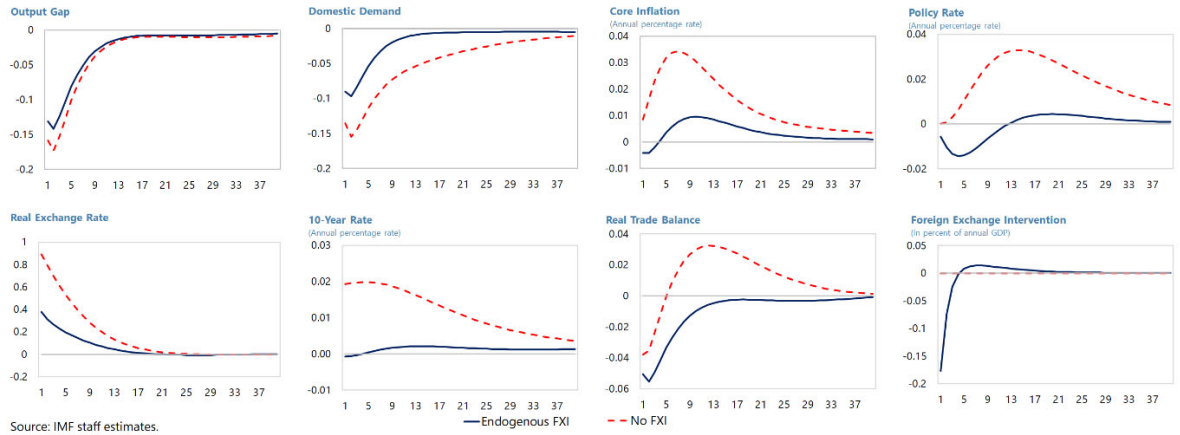
Source: IMF staff estimates.

25. The authorities also stressed the role of non-linear exchange rate pass-through, with changes up to a certain threshold believed to have a negligible impact on expectations. While the PHL QIPF is a linear model, and hence such threshold effects are conspicuous by absence, it is nevertheless worth stressing that the size of an exchange rate move is insufficient to glean the impact on inflation expectations even in the simplest version of the model. More specifically, the IRF evidence covered in the next section makes clear, broadly in line with the empirical work of Forbes et al. (2020), that the source of the shock plays a key role, hinting at a potentially different explanation of why some exchange rate changes may have a bigger impact on expectations than others. Further work to distinguish between these potential explanations thus appears warranted.

D. Transmission Mechanism Through the Lens of the Philippines QIPF

26. The Article IV dialogue with the authorities highlighted many dimensions along which the extended QIPF model could be applied. At the same time, it also left open the question of the transmission of foreign monetary policy shocks and foreign exchange interventions, both of which are scrutinized next.

Figure 4. Philippines: Impact of Foreign Monetary Policy Shock



Source: IMF staff estimates.

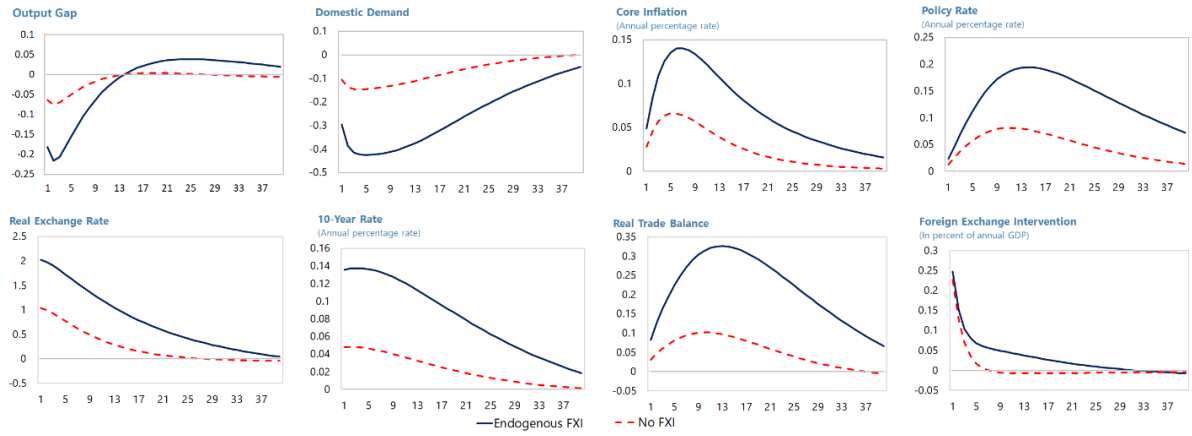
27. Simulations conducted using the estimated PHL QIPF model confirm that US monetary shocks that are not sufficiently accommodated by Philippine monetary authorities have stagflationary potential. As shown in Figure 4, monetary tightening in the US met with a less than 1-1 domestic policy increase is associated with capital outflows and results in a substantial (close to 1%) real exchange rate depreciation. Notably, and despite the exchange rate adjustment, the real trade balance response is initially negative because foreign demand weakness more than offsets the expenditure switching effect.

28. In a variant of the model in which the BSP follows the endogenous FXI rule, foreign exchange sales worth around 0.175% of GDP help cut the exchange rate depreciation by more than half. The smaller depreciation and correspondingly smaller changes in inflation expectations (and inflation itself) create space for the Philippine central bank to mildly stimulate the domestic

economy, mitigating the contractionary impact of the US shock. A comparison of the exogenous / no FXI (dashed red) and endogenous (solid blue) impulse responses for the output gap and core inflation make it clear that, at least according to a simple loss function, foreign exchange sales supporting conventional policy would be preferrable to purely interest rate-based interventions.

29. There are several reasons why the BSP could prefer to aim off these suggestions. Most obviously, a simple quadratic loss function depending on the output gap and inflation may not provide a very good approximation to welfare in the multi-friction environment described by the PHL QIPF. Second, changes in US monetary policy are unlikely to purely reflect an exogenous shock, and with different external factors driving US interest rate changes, the optimal response of the Philippine authorities could well differ from the one just described. Finally, and as stressed by both the authorities and IPF operationalization guidelines, the desirability of intervention would likely also depend on the size of the shock and its potential to dislodge inflation expectations, with important medium-term costs associated with stunted FX market growth needing to be fully reflected.

Figure 5. Philippines: Impact of Foreign Exchange Intervention Shock



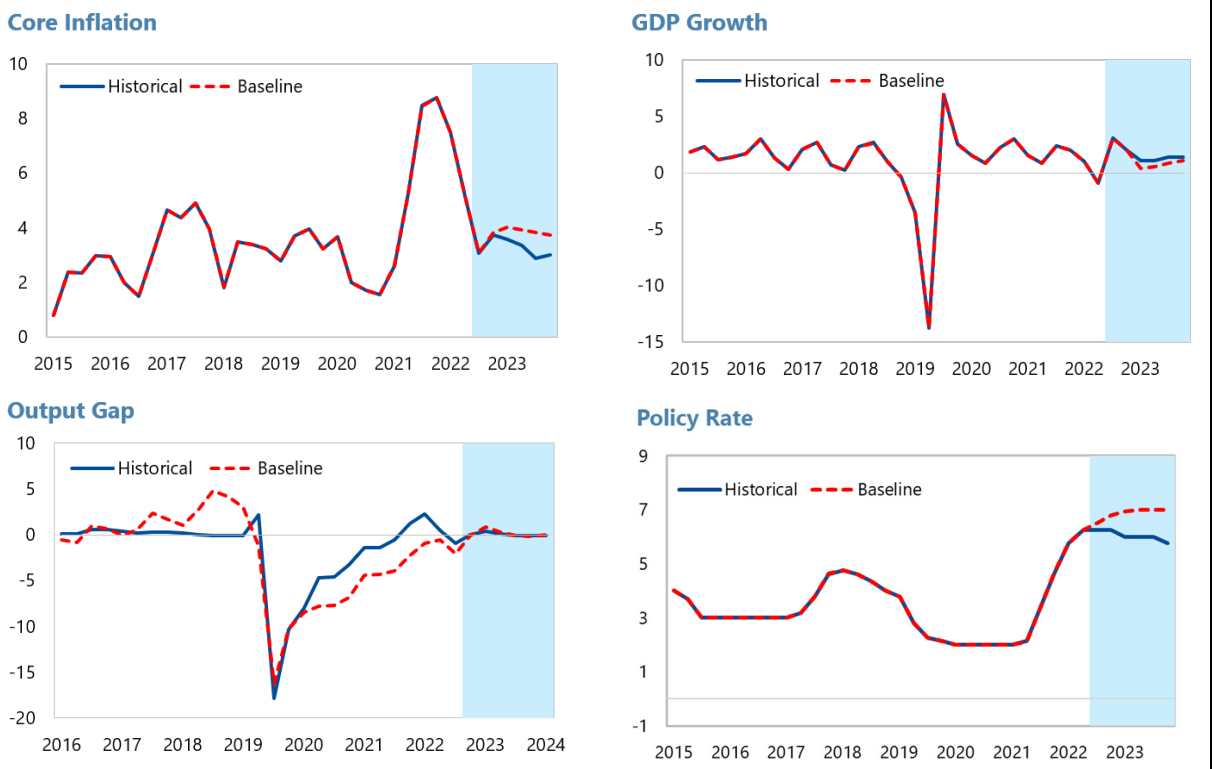
Source: IMF staff estimates.

30. The impulse responses in Figure 5 also compare the transmission of foreign exchange purchases, intended to build up the stock of FX reserves, under an endogenous and exogenous FXI rule. As the bottom right panel in Figure 5 makes clear, while the initial intervention is worth 0.25% of GDP, it would tend to be much more persistent in the scenario in which the BSP follows the estimated FXI rule. The greater cumulative purchases translate into a doubling of the size of the real exchange rate depreciation on impact. While this boosts trade competitiveness and is reflected in the trajectory of the real trade balance, it is also estimated to be inflationary, leading the central bank to increase interest rates by around 20bp (peak effect), more than double the hike with no systematic FXI in place (red dashed line). Largely via the expectations hypothesis, the higher short rate trajectory translates into a higher path for the 10Y rate, dampening domestic demand and leading to negative values of the Philippine output gap.

31. The PHL QIPF simulations point to substantial costs associated with transitioning to a higher level of FX reserves.[13] This is one reason why the IPF only prescribes FX interventions in certain circumstances, in which the welfare benefits of intervention outweigh the costs. While not formally a proof, this example is also suggestive of why FXI could be particularly effective in the Philippines in offsetting other trade-off-inducing shocks, such as in the risk-off shock scenario discussed later. In essence, and in contrast to standard interest rate policy, FXI pushes output and inflation in opposite directions and so can efficiently mitigate other shocks propagating similarly.

E. Policy Applications

Figure 6. Philippines: Conditional Forecast



Sources: Haver Analytics; and IMF staff estimates.

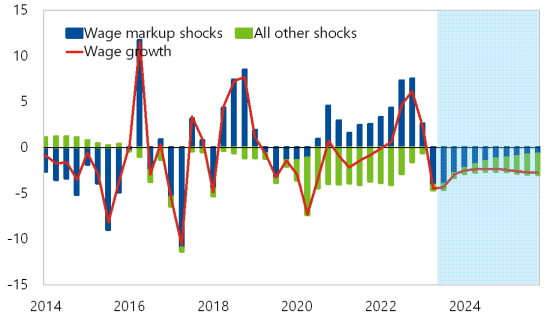
32. The presence of a fully-fledged supply side implies that the extended PHL QIPF model can be estimated on non-detrended data and can easily generate conditional forecasts. Figure 6 showcases forecasts for core inflation, GDP growth, output gap and the policy rate presented to the authorities during Article IV discussions. For reference the solid blue line denotes both historical values (prior to 2023Q2) and the IMF Philippine teams' econometric forecast (from 2023Q3 onwards). The dashed-red lines are the PHL QIPF forecasts for those variables conditional on short term inflation and output growth forecasts. Broadly, the figures suggest that the model sees relatively greater inflationary headwinds facing the Philippine economy, which call for a

[13] Importantly, these are separate from carry costs which would accrue even in the steady state for a positive level of reserve holdings, as long as there was a strictly positive interest rate differential.

somewhat higher interest rate path. While tighter policy ultimately subdues inflation, bringing it under control is assumed to take longer and is associated with a harder landing featuring below average growth.

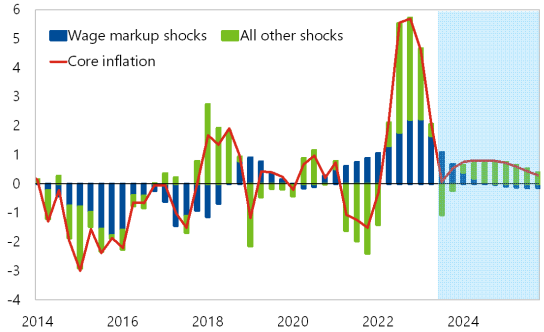
33. A key question pertained to the extent of wage pressures built into the conditional forecast. According to Figure 7, and largely driven by the weak Q2 numbers, the PHL QIPF pointed to weak wage growth mainly on account of a persistently weak sequence of negative markup shocks. This weakness was also reflected in the decomposition of core inflation in Figure 8.

Figure 7. Philippines: Wage Growth Decomposition



Source: IMF staff estimates.

Figure 8. Philippines: Core Inflation Decomposition

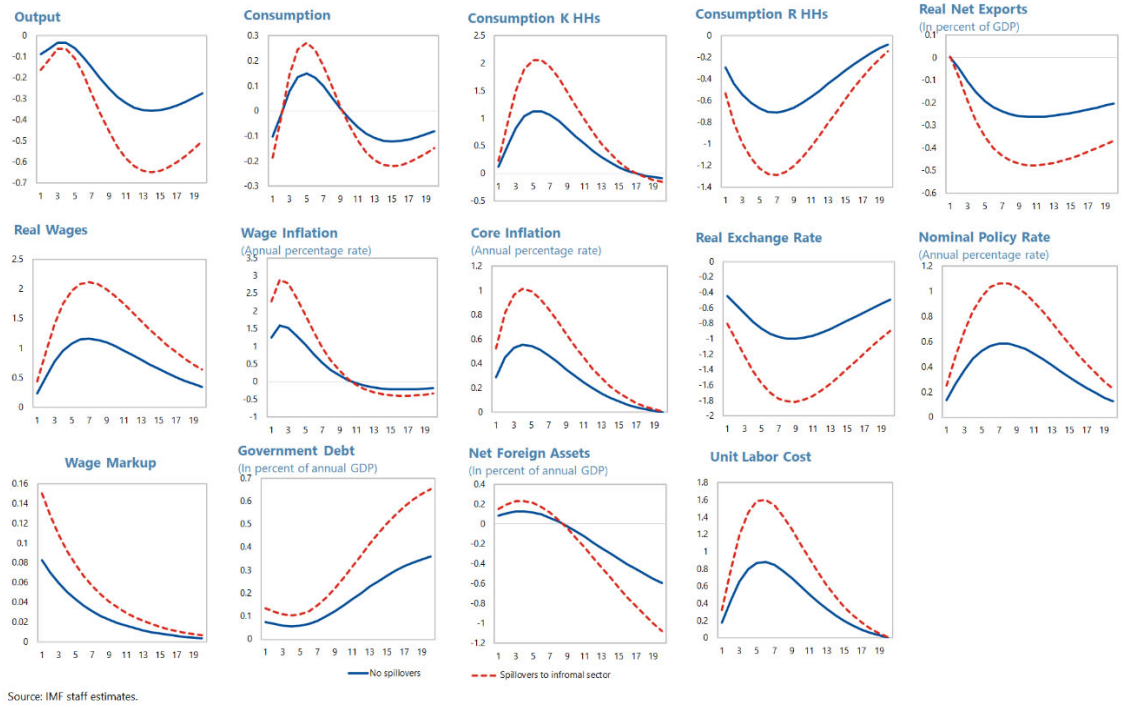


Source: IMF staff estimates.

34. The paucity of available Philippine average wage data implies that the results above should be treated with a high degree of caution. While available wage growth data was used as an observable in estimation, and hence matched by construction, the troubling aspect is that the series was discontinued in 2018Q2 making it hard to determine whether the solid red line in Figure 7, i.e., the PHL QIPF-implied smoothed wage growth series, tracks actual developments in the Philippine labor market well. Robustness analysis conducted using extrapolated wage series as well as growth rates of the minimum wage painted a somewhat different picture of labor market developments suggesting interpretative caution and reiterating the importance of constructing a good proxy for average wages going forward.

35. The uncertainty alluded to above meant that it was important to ascertain the likely implications of higher wage pressures. This is precisely what the risk scenarios depicted in Figure 9 aimed to evaluate. Broadly, the assumption of sticky wages in the PHL QIPF gives rise to a wage Philips curve, in which nominal wage inflation depends on future wage inflation and the gap between the marginal costs of work and the consumption real wage. The experiment considered in Figure 9 was to shock nominal wages by introducing a persistent change in the wage markup. The assumption was that around 2.4 million Filipinos receive the minimum wage, with around 8 million shadow economy workers paid less, implying that around 10% of the labor force would stand to benefit from a stipulated 15% increase (linearity implies that this number can be easily scaled). This meant aggregate wages would increase by around 1.5% on impact (solid blue line), with an alternative scenario with spillovers to twice that share of workers depicted using the red-dashed line.

Figure 9. Philippines: Impact of a Rise in the Minimum Wage



Source: IMF staff estimates.

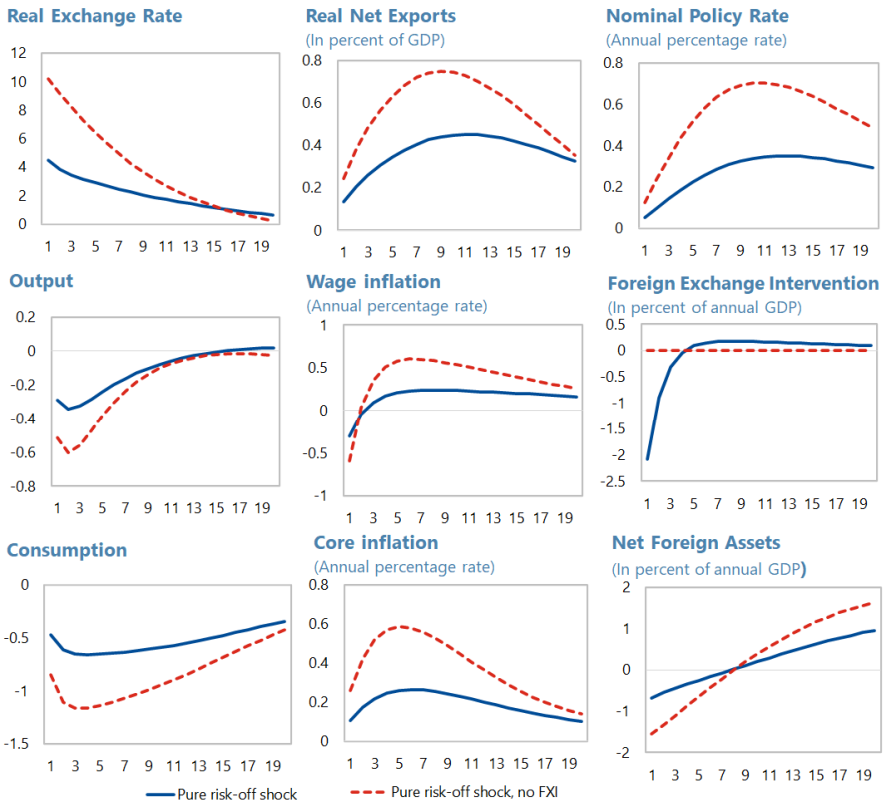
36. Given the high estimated degree of wage indexation in the extended PHL QIPF, the wage markup shock is persistent and requires considerable interest rate tightening to contain. While real wages increase on impact, only the consumption of Keynesian households increases in line with the wage, with their Ricardian counterparts cutting down on consumption instead. The monetary contraction necessary to contain the inflationary impulse causes the real exchange rate to appreciate and has a negative impact on output, via net exports, and, in the medium run, also on domestic absorption, as well as net foreign assets. Overall, core inflation increases by between 0.5-1pp depending on the share of workers directly affected, pointing to significant risks associated with such a scenario.

37. In the second scenario, financial conditions around the world suddenly tighten, triggering a "risk off" environment with significant and disorderly capital outflows from emerging market economies including the Philippines. The shock to the Philippines' UIP risk premium causes a 10 percent nominal exchange rate depreciation absent FXI, with the rise in exports insufficient to prevent an output contraction, and with three policy rate hikes (by around 75bp at their peak) proving insufficient to fully mitigate inflationary pressures.

38. In line with the IMF's IPF, foreign exchange sales, here worth around 2 percent of GDP, help cut the depreciation in half, taking two of the three policy rate hikes off the table. Smaller reliance on interest rate policy coincides with lower core inflation, smaller contraction of output and consumption, and a smaller initial hit to net foreign assets, coupled with a slower NFA rebound. By limiting exchange rate and inflationary pressures, FXI thus eases the inflation-output trade-off for monetary policy and allows more output stabilization. In the process, FXI attenuates the impact of

shocks on the UIP risk premium and private borrowing spreads. This benefit is potentially larger if inflation expectations are less anchored or are at risk of being de-anchored, or if the level of exchange rate pass-through to inflation is high.

Figure 10. Philippines: Global Risk Shock Scenario



Source: IMF staff estimates.

F. Conclusions and Next Steps

39. As our analysis demonstrated, the extended PHL QIPF framework is capable of generating baseline forecasts, analyzing risks around them and contributing to the policy debate beyond the narrow purview of optimal responses to capital flow shocks. Overall, the results reinforce previous findings that coordinated use of multiple tools may help alleviate policy tradeoffs. More specifically, given the relatively shallow estimated depth of FX markets in the Philippines, the QIPF suggests that the use of FXI may create more interest rate policy space. Even so, monetary policy should be the first line of defense against persistent inflationary pressures, and the exchange rate should be allowed to absorb fundamental shocks.

40. Since it can now be estimated on non-detrended data, and since detailed forecast decompositions are readily available, the PHL QIPF can be used as a handy tool to summarize the Philippine economy's "initial conditions" and it can also provide a read-out on the empirical relevance of various frictions. In our view, this makes the model a valuable addition to

the IMFs policy toolkit and helps ensure the robustness of conclusions based on less structural attempts to summarize the state of the Philippine economy and its most relevant frictions.

41. As the nuanced discussion above suggests, a degree of caution is needed in using the IPF framework and its tools, given the complexity of real-time decision-making. The macroeconomic and financial stabilization benefits of IPF policies need to be balanced against potential costs in terms of market development and other possible unintended consequences, such as creating moral hazard risks and encouraging speculation. Explaining the use of multiple policy instruments to market participants and the public may give rise to communication challenges and prudent use should account for the fact that not all tradeoffs and sources of uncertainty have been fully accounted for.

42. There are a number of avenues for further work. Most immediately, to allow for sharper inferences both the set of observables as well as the set of estimated parameter values could be extended, paying close attention to the quality of the underlying data and continuing to closely monitor the implications for the transmission mechanism. In addition, and as alluded to previously, while focus so far has been mainly on interest rate policy and foreign exchange interventions, going forward the PHL QIPF could also be used to shed light on fiscal policy as well as monetary-fiscal interactions. Such applications would ideally be conducted in close collaboration with Filipino decision makers to ensure that the model-implied economic narrative is consistent with their views, helping generate buy-in and facilitating an open and constructive discussion.

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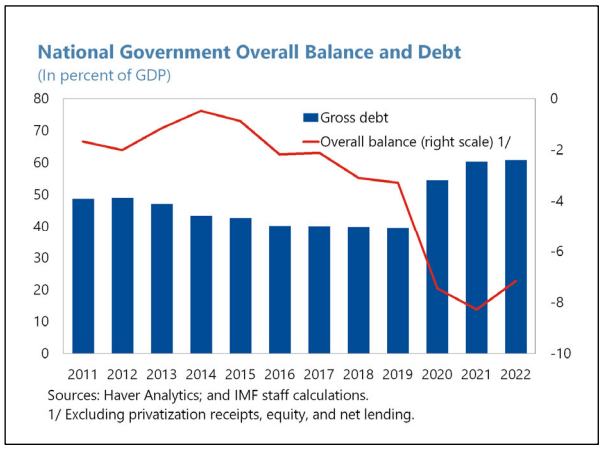
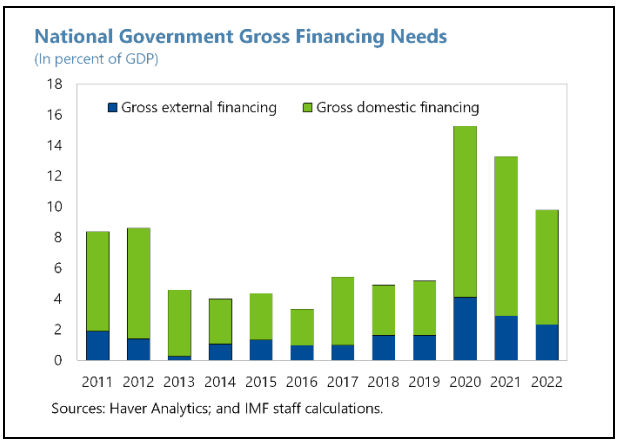
THE MEDIUM-TERM FISCAL FRAMEWORK IN THE PHILIPPINES[1]

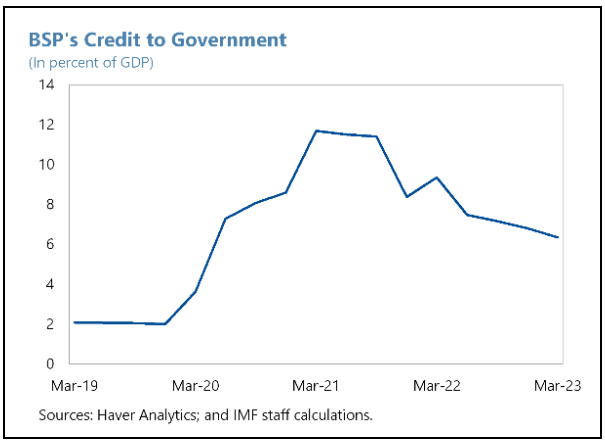
In 2022, the Philippines introduced a medium-term fiscal framework (MTFF) covering 2022–2028. Adopted by Congress for the first time, the MTFF underscores the authorities' commitment to fiscal consolidation and debt sustainability while allocating at least 5 percent of GDP annually to infrastructure spending. It is also designed to reinvigorate job creation and alleviate poverty through physical and human capital investments. This paper assesses the MTFF against the general principles of rule-based fiscal frameworks and analyzes what needs to be done to achieve the fiscal targets and the risks involved in achieving them. The paper concludes with some policy recommendations.

A. Introduction

1. Fiscal space in the Philippines has narrowed in the wake of the COVID-19 pandemic. Prudent fiscal management in the period leading up to the pandemic bestowed the Philippines with fiscal space to respond forcefully to the pandemic. The fiscal support measures were well-targeted and focused on social spending for the most affected sectors. However, the increased spending coupled with lower revenues caused by the sharp decline in economic activities resulted in more than doubling of the national government (NG) fiscal deficit-to-GDP ratio in 2020–2021 and a significant increase in the NG debt-to-GDP ratio. The higher fiscal deficit also translated to higher gross financing needs, which increased from 5.2 percent in 2019 to 13.3 percent of GDP in 2021. The NG fiscal deficit-to-GDP ratio and gross financing needs have since declined, and the Bangko Sentral ng Pilipinas (BSP) has started to wind down the monetary financing.







[1] Prepared by Yinqiu Lu (APD).

2. The authorities introduced an MTFF in 2022 with the overarching objective of reinvigorating job creation and reducing poverty. The MTFF was adopted by Congress in the third quarter of 2022.[2] It is formulated to "attain short-term macro-fiscal stability while remaining supportive of the recovery and to promote fiscal sustainability". It "aims to consolidate the national government's resources so that these are mobilized and utilized in order to gain the maximum benefit and high multiplier effects for the economy", as it includes a commitment to allocate at least 5 percent of GDP annually to infrastructure spending to enhance the quality of spending in the midst of fiscal consolidation while remaining supportive of growth. It is envisaged to steer "the economy back to its high-growth path in the near term and sustain the high—but inclusive and resilient—growth all through 2028". The goals set in the 2022-2028 MTFF include:

- 6.5–7.5 percent real GDP growth in 2022; 6.5-8 percent real GDP growth annually between 2023 to 2028;
- 9 percent (i.e., single-digit) poverty rate by 2028;
- 3 percent national government deficit to GDP ratio by 2028;
- Less than 60 percent national government debt-to-GDP ratio by 2025;
- At least $4,256 income (GNI) per capita (attainment of upper middle-income status).[3]

These targets are subject to review and update in 3 years, or in 2025, prior to the 20th Congress. Should there be a need to update them, a revised MTFF will be submitted to Congress. The MTFF also includes near-term and medium-term socioeconomic agendas, and corresponding legislative measures to achieve the macroeconomic objectives.

3. Both revenue efforts and expenditure policies are included in the MTFF to help achieve fiscal consolidation. Revenue mobilization includes a value-added tax (VAT) on digital service providers, excise tax on single-use plastic bags, and strengthening tax administration. Expenditure policies include improved spending efficiency and alignment of budget priorities that are anchored on the administration's 8-point socioeconomic agenda. Key reform agenda includes the passage of Progressive Budgeting for Better and Modernized Governance Bill and National Government Rightsizing Bill, the reform of the military and uniformed personnel (MUP) pension system, and localization of investment and growth programs.

4. The fiscal targets presented in the MTFF underscore the authorities' commitment to fiscal consolidation. Within the MTFF, there are two fiscal targets, i.e., a reduction of the NG deficit-to-GDP ratio to 3 percent by 2028, and a reduction of the NG debt to less than 60 percent of GDP by 2025. In addition, the MTFF includes a medium-term fiscal program (MTFP) and a series of

[2] Concurrent Resolution No. 3, "Supporting the 2022–2028 Medium-term Fiscal Framework of the National Government."

[3] Based on the classification as of July 1, 2022, the World Bank defines upper middle-income economies as those with gross national income (GNI) per capita between US$4,256 and US$13,205.

macroeconomic assumptions spanning from 2022 to 2028. It is a longer timeframe compared to the three-year NG fiscal program presented in each budget,[4] albeit the latter features a more detailed breakdown.

Table 1. Philippines: Summary of the MTFP
(In percent of GDP)

	2022	2023	2024	2025	2026	2027	2028
Revenues	15.2	15.3	15.6	16.0	16.5	17.0	17.6
Disbursements	22.9	21.4	20.7	20.2	20.0	20.2	20.6
In which:							
Infrastructure program	*5.5*	*5.4*	*5.4*	*5.3*	*5.5*	*5.8*	*6.3*
Fiscal balance	-7.6	-6.1	-5.1	-4.1	-3.5	-3.2	**-3.0**
National government debt	61.8	61.2	60.0	**58.3**	56.6	53.4	51.1

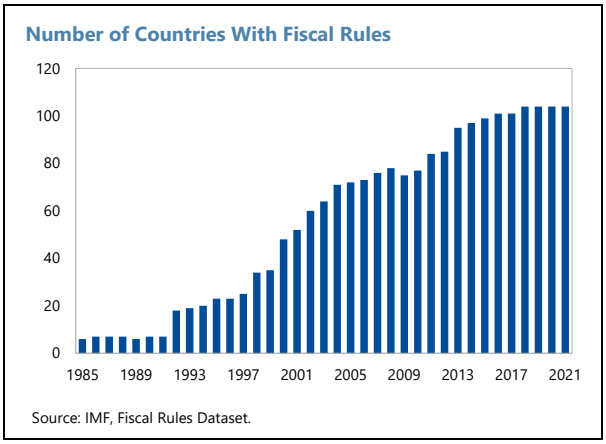
Source: Philippine authorities, as of July 8, 2022.
Note: Bolded numbers are the MTFF targets.

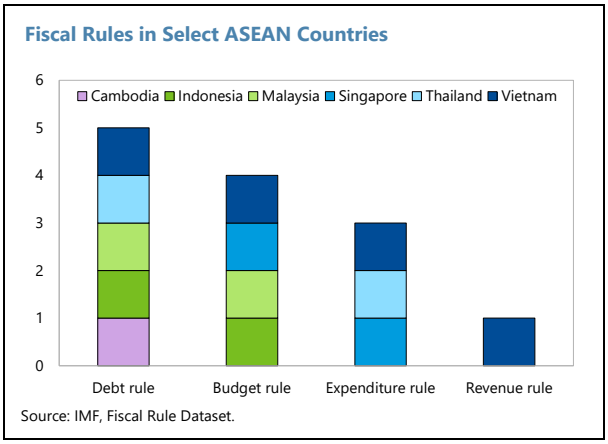
5. Fiscal consolidation is underway. The NG fiscal deficit narrowed from 8.3 percent of GDP in 2021 to 7.2 percent of GDP in 2022,[5] as revenues recovered to the pre-pandemic levels (reflecting a strong rebound in domestic consumption and higher prices of imported commodities), and current spending restraint (in particular, spending on goods and services). The deficit was smaller than the MTFP target for 2022. The NG debt-to-GDP ratio increased slightly from 60.5 percent of GDP in 2021 to 60.9 percent of GDP in 2022 but was close to one percentage point of GDP lower than the target in the MTFP. In the first half of 2023, the fiscal deficit was 18 percent lower than the same period in 2022, as revenues improved by 7.7 percent while spending was only higher by 0.4 percent, led by the 1.4 percent lower current spending, largely due to lower transfers to the local government units (LGUs).[6]

B. Assessment of the Framework

6. Embedding two fiscal targets within the MTFF marks an important step in the direction of establishing explicit fiscal rules. Prior to the pandemic, the government had an indicative debt ceiling of 60 percent of GDP, accompanied by an indicative deficit ratio of around 3 percent of GDP. The MTFF's ambition to reinstate these two fiscal aggregates to their previous indicative benchmarks is not by mere chance; it reflects a concerted effort to reestablish fiscal space. This development is close to setting up explicit numerical fiscal rules, a trend embraced by many countries (including those in the ASEAN) to improve policy credibility and make the conduct of fiscal policy more transparent. Therefore, an assessment of these two fiscal targets against the best practices would be useful even though they do not constitute fiscal rules.

[4] The NG fiscal program is typically updated in mid-year to account for actual accomplishments, and developments and prospectives in the macroeconomic and fiscal landscapes.
[5] Based on the Government Finance Statistics (GFS) 2014 definition, which excludes privatization receipts from revenues, and equity and net lending from expenditure.
[6] The national tax allotment of LGUs is calculated based on national tax collected in the third year immediately preceding the budget year.





7. Caselli and others (2022) argued that fiscal rules will need to allow flexibility when needed while promoting larger fiscal buffers during normal times. Based on international experiences including fiscal policy response during the pandemic, they proposed that for a medium-term fiscal framework to be more effective, it should include "(i) medium-term fiscal plans that are feasible and stable, (ii) flexibility in response to shocks, (iii) transparency on fiscal anchors, (iv) risk-based rules that ensure a path to debt sustainability and buildup of fiscal buffers, and (v) checks and balances to promote accountability". Incorporating a medium-term perspective into budget process improves fiscal management, as it allows the adjustment of policy trajectories while aligning with medium-term anchors that reflect economic conditions. Risk analysis helps manage shocks and identify when fiscal buffers are low. In the case of large shocks, escape clauses provide flexibility to adopt countercyclical fiscal policies. Finally, independent fiscal institutions provide additional checks and balances to enhance accountability and transparency.

8. Measured against these principles, it will be helpful for the authorities to identify the fiscal anchor with an operational (secondary) target to guide fiscal policy over the medium term. The choice of anchor depends on a country's priorities. A debt rule remains the prevailing choice, as it helps steer fiscal policy over the medium term. As the debt anchor is not meant to provide short-term guidance to policymakers, a fiscal framework often includes a limited number of operational rules (Eyraud and others, 2018). Having fiscal balance as a medium-term anchor tends to present more challenges, as it could potentially induce procyclical fiscal policy. As such, clarifying that the fiscal anchor is the government debt ratio and deficit as an annual operational target is helpful.

9. Consistent with the best practice, the authorities' MTFF includes a MTFP. The MTFP outlines multiyear projections from 2022 to 2028 for key fiscal aggregates such as revenues, expenditure, and fiscal balances, all of which work towards reducing the deficit to 3 percent of GDP by 2028. It also introduces tax measures and expenditure policies for better mobilizing resources and rationalizing spending. Serving as an important input, the MTFP informs the annual budget process. For example, the 2024–2026 projections for key fiscal aggregates included in the Budget of Expenditures and Sources of Financing FY2024 approved by the House of Representatives in September 2023 are in line with the MTFP.

10. The incorporation of medium-term macroeconomic objectives in the MTFF helps guide the annual budget process. The macroeconomic assumptions in the MTFF are prepared by the Development Budget Coordination Committee (DBCC) with key macroeconomic indicators including real GDP growth rates, inflation rates, oil prices, exchange rates, and growth rates of imports and exports. Some indicators are presented as ranges given uncertainty while a concrete set of macroeconomic variables are usually finalized in the annual budget process.[7] The annual budgets include information about budget sensitivity to macroeconomic parameters, and a Fiscal Risks Statement is published annually with analysis of key fiscal risks and mitigation measures, which include more details following the 2015 Fiscal Transparency Evaluation (IMF, 2015).

11. As economic conditions are prone to changes and shocks, it would be helpful if the authorities could periodically assess the realism of the macroeconomic assumptions underpinning the MTFF. For instance, the MTFF's aim of achieving an annual real GDP growth rate of 6.5-8 percent between 2023 and 2028 is likely to be missed for 2023. In this context, including alternative scenarios and risk analysis within the MTFF and its time horizon would facilitate a comprehensive evaluation of risks in reaching the fiscal targets, a practice advocated as "risk-based" fiscal frameworks (Caselli and others, 2022). The authorities are working with the Fund technical assistance (TA) teams to enhance their macro fiscal modeling capacity to better align fiscal and macroeconomic projections.

12. The fiscal deficit projections in the MTFP do not seem to be affected by the revisions made to the revenue and expenditure projections. While the DBCC has revised the annual revenue and expenditure forecasts on multiple occasions since the inception of the MTFF, the annual deficit-to-GDP projections have remained unchanged. For instance, the projected revenue-to-GDP ratio for 2028 has been revised downward from 17.6 percent to 17.4 percent of GDP within a year, while the fiscal deficit for 2028 remains at 3 percent of GDP, as the decline in revenues is offset by the corresponding adjustment in expenditure. This approach helps emphasize the importance of fiscal deficit as an important target, a point emphasized in the joint statements of the DBCC.

13. Even though escape clauses are not necessary for a country with fiscal targets (i.e., not fiscal rules), the budget documents could explain deviations from the MTFF. As the Philippines does not have a numerical legislated fiscal rule, the authorities' ability to respond to shocks by implementing countercyclical policies will not be compromised; therefore, there is no need to establish a fiscal escape clause. To enhance the credibility of the MTFF, it could be more closely integrated into the budget documents, which should present any deviations from the MTFF and provide a path for getting on track if actual aggregates deviate from projections.

14. While the MTFF is not legally binding, the government's reputation risk acts as strong incentives for enforcement. It was adopted by Congress for the first time and endorsed by the new administration. To achieve the fiscal targets of the MTFF, the government has also outlined strategies to augment revenues and policies to improve the efficiency in government spending. The

[7] A review of the macroeconomic assumptions and fiscal targets is conducted periodically by the DBCC within a fiscal year to take account of the implications of emerging macro-fiscal developments. The revised and updated projections feed into the annual budget preparation process which generally starts in January.

MTFF, in conjunction with the Philippine Development Plan (2023–2028), reflects the current administration's vision for a prosperous society where no Filipino is left behind. The accountability and reputation costs for noncompliance are high.

Table 2. Philippines: Vintages of the MTFP

(In percent of GDP)

		2023	2024	2025	2026	2027	2028
August 2022	Revenue	15.3	15.6	16.0	16.5	17.0	17.6
	Disbursement	21.4	20.7	20.2	20.0	20.2	20.6
	Deficit	6.1	5.1	4.1	3.5	3.2	3.0
December 2022	Revenue	15.4	15.8	16.0	16.4	16.9	17.4
	Disbursement	21.5	20.9	20.2	19.9	20.1	20.4
	Deficit	6.1	5.1	4.1	3.5	3.2	3.0
April 2023	Revenue	15.2	15.7	16.1	16.5	16.9	17.2
	Disbursement	21.3	20.8	20.2	20.0	20.1	20.2
	Deficit	6.1	5.1	4.1	3.5	3.2	3.0
June 2023	Revenue	15.2	15.9	16.2	16.6	16.9	17.3
	Disbursement	21.3	21.0	20.3	20.1	20.2	20.4
	Deficit	6.1	5.1	4.1	3.5	3.2	3.0
July 2023	Revenue	15.2	16.1	16.3	16.6	17.0	17.4
	Disbursement	21.3	21.2	20.4	20.1	20.2	20.4
	Deficit	6.1	5.1	4.1	3.5	3.2	3.0

Source: Philippine authorities.

15. The focus on the national government using unconsolidated data is appropriate at this juncture. The coverage of the fiscal aggregates in the MTFF is at the national government level, and the stock of government debt does not consolidate holdings of government securities by other tiers of government (e.g., social security institutions) and assets in the bond sinking fund. While a broader coverage of fiscal activities—such as general government—would yield a more comprehensive assessment of a country's overall fiscal risk, limitations in the availability of detailed fiscal accounts across all tiers of government and the limited control of the national government on the fiscal activities of the LGUs precludes this broader coverage. Given that the main remaining segments of the public sector, particularly the LGUs and social security institutions (SSIs), currently generate fiscal surplus, the narrow coverage of the MTFF probably means a higher bar for the authorities. Furthermore, the decentralization process would incentivize the national government to rationalize spending, ensure the LGUs to deliver their share of public services, and improve the fiscal statistics (see Paragraph 32).

C. What is Required to Meet the Fiscal Targets in the MTFF

Fiscal Deficit Target of 3 Percent of GDP By 2028

16. The MTFF is underpinned by both revenue and spending measures. As delineated by the MTFP, the fiscal deficit is projected to decline from 7.3 percent in 2022 to 3 percent of GDP in 2028.[8] Revenues are projected to increase from 16.1 percent in 2022 to 17.4 percent of GDP in 2028, contributing about a quarter of total consolidation efforts. The remaining consolidation is to be contributed from control and prioritization in current expenditure, as the authorities aim to keep infrastructure spending within the range of 5 to 6 percent of GDP annually.

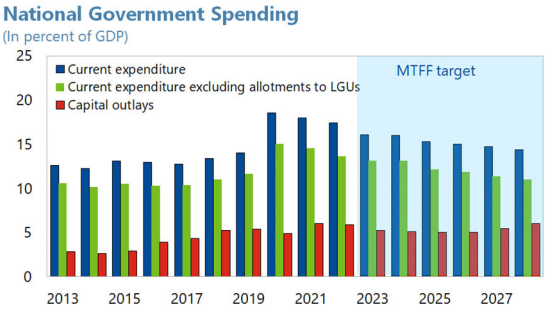
17. About half of the revenue mobilization is expected to be contributed by identified tax policy measures. The tax policy measures in the pipeline are expected to yield 0.6-0.7 percentage point of GDP while the remaining 0.6 percentage point of GDP revenue mobilization is expected to be achieved through improved revenue administration.

List of Revenue Measures
(In percent of GDP, cumulative)

	2024	2025	2026
VAT on digital service providers	0.06	0.06	0.06
Passive income and financial intermediary taxation	0.01	0.00	-0.01
Excise tax on single-use plastics	0.02	0.02	0.02
Excise tax on pre-mixed alcoholic beverages	0.001	0.001	0.001
Excise tax on sweetened beverages and junk food	0.29	0.31	0.34
Mining fiscal regime	0.05	0.04	0.04
Excise tax on pick-ups	0.02	0.02	0.02
Motor vehicles road user's tax		0.05	0.10
Total	**0.45**	**0.53**	**0.58**

Sources: Philippines authorities, and IMF calculations.
Note: IMF staff projections for 2024-2026 GDP are used to calculate the percentage of GDP.

18. Ambitious reduction in current expenditure as a percent of GDP will be required to achieve the deficit target by 2028. To safeguard capital spending given the infrastructure gap, achieving the desired consolidation would require that current expenditure as a percent of GDP be moderated from 17.4 percent of GDP in 2022 to 14.4 percent of GDP in 2028.[9] The adjustment will need to come from spending controls and prioritization on expenditure items such as personnel services and maintenance and other operating expenses (MOOE), which will cause the sum of their GDP ratios to drop below their pre-pandemic ratios. It is because other items in the current spending have little room to consolidate. Nevertheless, based on the authorities' current projection, the current expenditure in nominal terms is expected to grow by an average of about 6 percent annually from 2023 to 2028. The interest payments are likely to be larger given the higher interest rates for new borrowings starting from 2021 (Paragraph 25), allocations to the LGUs



Sources: Philippines authorities; and IMF staff calculations.
Note: Equity, net lending, and capital transfers to LGUs are included in capital outlays; while in IMF definition, equity and net lending are excluded from spending and capital transfers to LGUs are included in current spending.

[8] Based on the authorities' definition, which includes privatization receipts in revenues and equity and net lending in expenditure.

[9] Based on the authorities' definition.

will be higher as they are based on the growing tax revenues, and there is limited room to trim the already low subsidies (0.9 percent of GDP in 2022).

Debt Below 60 Percent of GDP by 2025

19. Achieving the debt target by 2025 is in line with the authorities' fiscal projections and macroeconomic assumptions. Based on the authorities' projected fiscal deficits, interest payments, macroeconomic assumptions, and the assumption of the redemption of the bond sinking fund[10] as cash financing to reduce the debt financing needs, the NG debt is likely to progress towards reaching the 60 percent of GDP target by 2025.

D. Achieving Fiscal Targets: Realism of the Baseline and Risks

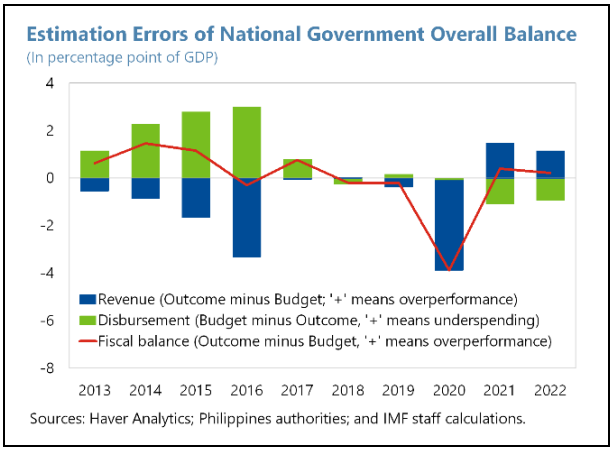
Fiscal Deficit Target of 3 Percent of GDP By 2028

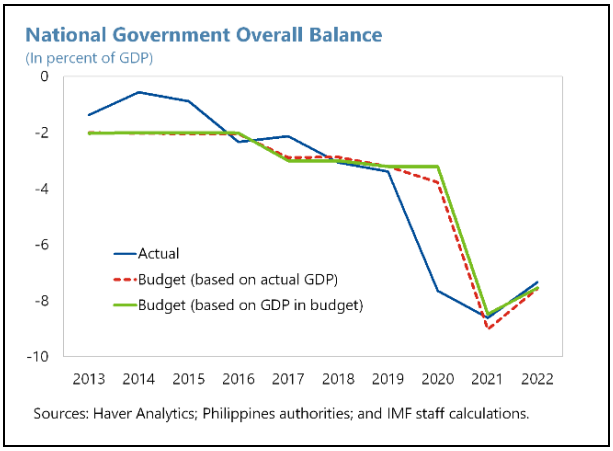
20. Prior to delving into an examination of the realism and risks of achieving the deficit target, it would be helpful to evaluate the track record of past fiscal projections. A comparative analysis of the fiscal forecasts presented in each budget against the realized outcomes will help identify any potential forecast bias—instances where there are consistent overestimation and underestimation. Such patterns, if present, have the potential to impact the realism of the deficit target. It is in line with the recommendation to incorporate an assessment of past budgetary outcomes in fiscal plans (Caselli and others, 2022).

Previous Forecast Errors

21. A comparison between the fiscal projections and outcomes over the past ten years indicates an improvement in the overall accuracy of one-year ahead projections. Overtime, forecast errors have declined except for 2020—the year marked by the COVID-19 pandemic. Within 10 years spanning from 2013 to 2022, there are six instances of fiscal overperformance. The difference between the actual nominal GDP and nominal GDP projections employed in the budgets only accounted for a small portion of the difference. The fiscal overperformance during 2013–2015 and in 2017 stemmed from underspending, as revenue collection underperformed in these years. The pattern shifted after the pandemic, as fiscal overperformance arose from revenue overperformance.

[10] The Bond Sinking Fund serves as the lender of last resort facilities for the Treasury Department in case there is a refinancing risk. Its portfolio is composed of both cash and bonds, in which the bond portfolio was about 3.2 percent of GDP at end-2022.

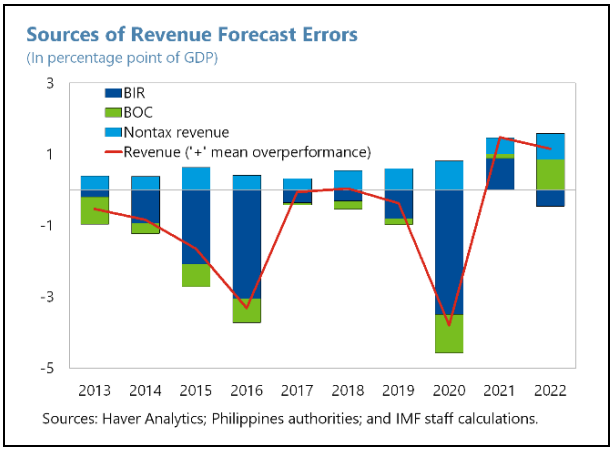


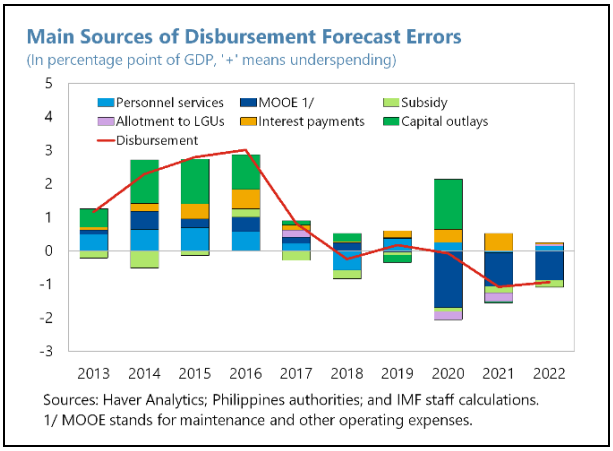


22. An analysis breaking down the sources for revenue forecast errors reveals a recurrent pattern of underestimation of non-tax revenues and Bureau of Internal Revenue (BIR) collections. Given that nontax revenues only accounted for on average 1.5 percent of GDP (equivalent to 10 percent of total revenues) during 2013–2022, the extent of the underestimation remains substantial. This reflects a conservative approach, whereby the investment income from the Bond Sinking Fund is understated. Taxes collected by the BIR consistently fell short of expectations except the instance of 2021. After years of underperformance, the tax collection by the Bureau of Customs (BoC) started to beat expectations from 2021, and the large overperformance in 2022 could be partly attributed to the larger-than-expected exchange rate depreciation and the elevated prices of goods imports (including oil).

23. A notable shift towards overspending took place after the pandemic. The primary factor contributing to this overspending in both 2021 and 2022 was the shift of the MOOE from slight underspending to substantial overspending, partly related to the continued implementation of some social subsidy programs under the *Bayanihan II*.[11] Capital spending has been more aligned with the budget (instead of underspending) starting from 2021, probably reflecting improved public investment management. In the pandemic-afflicted year of 2020, the underutilization of capital funds more or less offset the MOOE overspending as funds for capital outlay projects which could no longer be completed or continued during the pandemic were pooled as savings and rechanneled to COVID-19 response (largely under the MOOE), resulting in a spending outcome closely aligned with the budget.

[11] It is the social assistance package to those affected by the COVID-19.



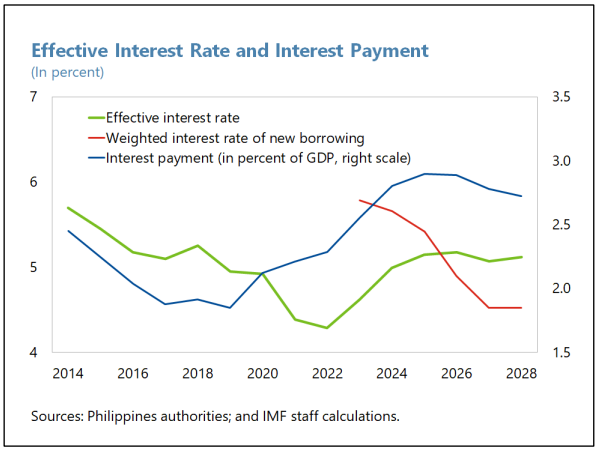


Risks Around Meeting the Deficit Target

24. There are risks related to revenue underperformance in the MTFF but these seem to be limited. The authorities have specific tax reform measures delivering about 0.6-0.7 percentage points of GDP in tax revenues (Paragraph 18). This revenue yield seems within reach; however, the overestimation bias from taxes collected by BIR confirms one crucial obstacle identified by recent Fund TA, which is that the BIR and BoC treat revenue targets required by the budget as projection instead of based on specific and quantifiable information. As the authorities are taking efforts to improve tax administration (e.g., BIR's Digitalization Program and BoC's Computer-Aided Risk Management System), delivering additional 0.6 percentage point of GDP over the MTFF horizon from improved tax administration may not be that difficult based on country experiences (Adan and others, 2023). However, the Fund TA pointed out the Philippines has not managed to realize significant tax administration gains in the past based on the analysis from the Department of Finance's costings. The analysis shows that in the absence of any tax reforms (i.e., excluding gains from tax reforms), the tax to GDP ratio would have remained at 13.6 percent of GDP (the ratio in 2017) in the past 6 years (from 2017 to 2022), suggesting no material improvement due to tax administration efforts.

25. Risks to overspending are likely to come from items under current spending:

- **Interest payments**. The overall fiscal balance is influenced by interest payments, which are not entirely under the government's full control. The authorities' assessment indicates that each percentage point rise in interest rates for all new borrowings will result in a corresponding increase of 0.1 percentage point of GDP in fiscal deficit in 2024. Based on staff estimates, interest payments are projected to increase from 2.3 percent in 2022 to 2.7 percent of GDP in 2028 under the assumption of a gradual reduction in the weighted interest rates of new borrowings, as



both domestic and foreign interest rates are projected to decline starting in 2024. However, there is risk that future interest rates will stay high for a longer period than in the baseline, resulting in even higher interest payments.

- **MUP pension system**. The current MUP pension system is one of the main risks of consolidating spending on the personnel services. Currently the pensions of MUPs are automatically indexed to the salaries of active personnel (which doubled in 2018). In addition, MUPs become eligible for retirement pensions after completing 20 years of service, and they do not contribute to their pension funds. During 2018–2022, the MUP and veteran pension grew at an average rate of 12 percent annually. The authorities are in the process of reforming the pension system to enhance its sustainability.

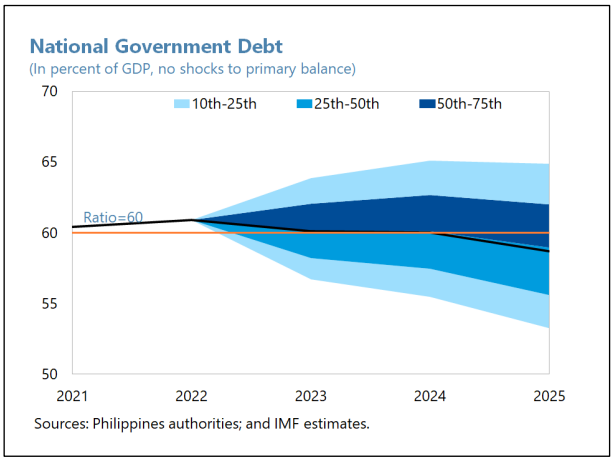
- **Decentralization**. An additional concern for the MTFF is the potential inability to reallocate expenditure to the LGUs in alignment with the Supreme Court ruling on the Mandanas-Garcia cases. Such risk, if realized, could exacerbate the recent overspending pattern of the MOOEs (Paragraph 23). As a way to mitigate the fiscal implications of the ruling, the national government gradually shifts fiscal responsibilities to the LGUs. However, the LGUs only assume their new responsibilities in a phased manner, as they need to build capacity to properly manage their fiscal resources to maintain essential public services and accountability, requiring the national government to continue to finance devolved functions and services in the interim. Similarly, the national government agencies need time to prepare their devolution transition plans (DTPs). To address this challenge, the authorities are working on clarifying spending responsibilities with the LGUs and providing support for capacity building on budgeting, execution, and reporting. The whole process could take time. As of August 31, 2023, 18 out of the 20 national government agencies submitted the DTPs and three were approved, compared with two approvals six months ago. As 40 percent of net tax revenues[12] will be allocated to the LGUs, in which 80 percent are for current spending and the rest for capital spending, the continued support of the national government will add spending pressure for the national government.

26. The potential adverse repercussions from fiscal consolidation on economic growth also pose a risk. Given that growth is an important channel to reduce fiscal aggregates as a percent of GDP, the impact of fiscal consolidation on growth would need to be considered, in particular, the authorities assume the growth rate between 6.5 and 8 percent for the medium term. Tang and others (2010) estimated that the short-term fiscal multiplier stands at 0.4 percent for government spending and 0.1 percent for tax collection. While the authorities' emphasis on pursuing productive investment spending which often has higher fiscal multiplier could help mitigate any adverse growth effects from fiscal consolidation, the risk could not be ruled out and the pace and composition for consolidation need to take macroeconomic conditions into consideration.

[12] Net of allowable deductions, such as those tax revenues already earmarked for specific expenditures or special purpose funds.

Debt Below 60 Percent of GDP by 2025

27. Achieving the debt target entails risks related to the uncertainty in the macroeconomic environment. With the NG debt-to-GDP ratio standing at 61 percent at end-June 2023, reducing it below 60 percent leaves limited safety margin, as the ratio is susceptible to policy uncertainties and exogenous shocks. Even in a baseline scenario with no shocks to primary balance, uncertainties in the macro-financial environment related to economic growth, inflation, interest and exchange rates will influence the debt ratio. Using the authorities' assumption for the primary deficit as of September 2023, and incorporating the historical behavior of the Philippines' macroeconomic variables, the fan chart based on a stochastic simulation (Acosta-Ormaechea and Martinez, 2021) demonstrates that adverse macrofinancial developments could prevent the debt-to-GDP ratio from reaching 60 percent in 2025.



E. Recommendations

28. The newly adopted MTFF stands as an important milestone for the Philippines to secure debt sustainability and increase fiscal space. It will help consolidate national government resources to achieve a high, inclusive, and resilient growth. Recognizing the risks, the authorities are pursuing reforming the MUP pensions to enhance fiscal sustainability. To adeptly navigate the process of decentralization, the authorities are actively clarifying spending responsibilities with the LGUs and providing support for capacity building. The authorities' ongoing reforms to enhance expenditure control and efficiency (through the Progressive Budgeting for Better and Modernized Governance Bill, National government Rightsizing Bill, and digitalization efforts) are commendable.

29. The authorities could usefully identify a fiscal anchor with an operational (secondary) target. Many countries have adopted a combination of two or more rules, one as an anchor and the others as operational targets (e.g., a debt anchor combined with budget balance rule). For instance, the Philippines could usefully communicate that the 60 percent of GDP debt ceiling will be the fiscal anchor while the fiscal deficit will be an operational target to guide fiscal policy over the medium term. In addition, the inclusion of alternative scenarios and risk assessment within the MTFF will facilitate a comprehensive evaluation of risks in reaching the fiscal targets.

30. The MTFP could be more integrated into the budget documents. For annual disbursements, deviations from the approved program are discussed in regularly published reports such as NG Disbursement Performance Reports, Mid-Year Report, and Annual Fiscal Report. Budget documents, currently with three-year ahead fiscal program projections, could present projections till 2028 (i.e., in with the MTFP horizon), explain deviations (if any) from the MTFP, and provide a path for getting on track if actual fiscal aggregates deviate from projections.

31. Ideally, the MTFF should incorporate fiscal impact from climate change. The Philippine economy is highly vulnerable to extreme weather-related events. Damages caused by these events will negatively affect government fiscal position through reconstruction costs and social support to affected households. Additional investment in climate adaptation and mitigation will be needed to enhance the economy's resilience to climate change. These costs and investments should be integrated in the MTFF, and measures should be taken to ensure the long-term fiscal sustainability. Analytical tools such as the Fund's Debt Investment Growth and Natural resources (DIGNAD)[13] model can be helpful in this regard.

32. Reforms in other fiscal areas will help achieve the fiscal targets in the MTFF and reduce fiscal risks:

- **Introducing a medium-term revenue strategy (MTRS)**. A tax-policy oriented MTRS with concrete targets and explicit revenue measures could lay out more ambitious tax measures to protect and finance more social spending and create fiscal space to respond and recover from natural disasters while keeping the consolidation path unchanged (IMF, 2022).

- **Better managing contingent liabilities**. It includes improvement in the oversight of the GOCCs, having a complete fiscal risk register on all PPPs, and close monitoring and analyzing the actuarial soundness of the three social security institutions.[14] A unit could be set up in the Department of Finance to monitor fiscal risks from the LGUs.

- **Further improving the fiscal data**. The current work towards including the extrabudgetary funds and some identified GOCCs in the general government data will help expand the coverage of the MTFF to the general government. Collecting fiscal data from the barangays will allow the authorities to have a comprehensive overview of LGU spending and to identify areas where spending efficiency could be enhanced and facilitate the decentralization process.

[13] See the companion Selected Issues Paper, "Building Resilience to National Disasters and Climate Change: A Model Application".

[14] They are the Government Service Insurance System, Social Security System, and Philippine Health Insurance Corporation.

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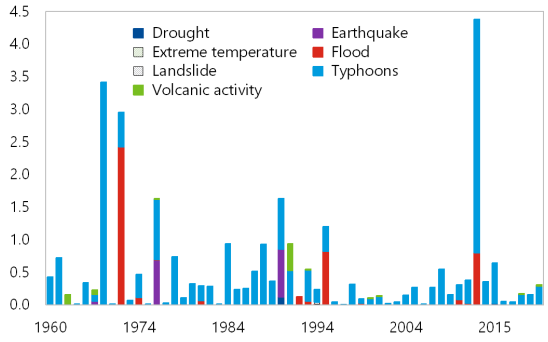
BUILDING RESILIENCE TO NATURAL DISASTERS AND CLIMATE CHANGE: A MODEL APPLICATION[1]

The Philippines is one of the most vulnerable countries to the impacts of climate change. Applying a dynamic general equilibrium model—Debt, Investment, Growth, and Natural Disasters (DIGNAD) Model—this paper shows that investing in climate-proof infrastructure, although costly, can make the Philippine economy resilient to disasters, limiting the post-disaster economic losses, recovery costs, and a rise in public debt. The analysis also shows how timely reforms, including those that strengthen public investment management, and increase tax collection efficiency, boost the gains from such investment. Without adequate action, climate change and natural disaster could worsen poverty and inequality in terms of access to resources and opportunities. This further stresses the importance of rationalizing public spending and undertaking revenue mobilization reforms to create more space for prioritizing resources towards building resilient infrastructure with significant dividends. The authorities should tap concessional and grant-based financing sources, in partnership with other development partners to help improve resilience to disasters.

A. Vulnerability to Natural Disasters and Climate Change

1. The Philippines is exposed to various types of disasters. The Philippines is one of the most vulnerable countries to the impacts of climate change. It ranked, together with India and Indonesia, as having the highest disaster risk among 193 countries covered in the latest World Risk Index (World Risk Report, 2022). This is due to its high exposure to natural hazards, dependence on climate-sensitive natural resources, and vast coastlines where all of its major cities and the majority of the population reside. Some estimates suggest that 60 percent of the Philippines' land area and 74 percent of its population are exposed to numerous hazards, including floods, cyclones, droughts, earthquakes, tsunamis, and landslides. Since 1990, the country has faced 565 such disasters, killing 70,000 people and costing $23 billion in damages (WB CCKP, 2023). With the exception of earthquakes and volcanic eruptions, the multiple natural hazards facing the Philippines are projected to intensify under climate change, including sea-level rise, increased frequency of extreme weather events, rising temperatures, and extreme rainfall. The country is particularly prone to cyclones due to its location in the Northwestern Pacific Basin, the most active tropical cyclone basin in the world, with the country

Figure 1. Philippines: Total Economic Damages from Disasters
(In percent of GDP)



Sources: EM-DAT; and IMF staff calculations.

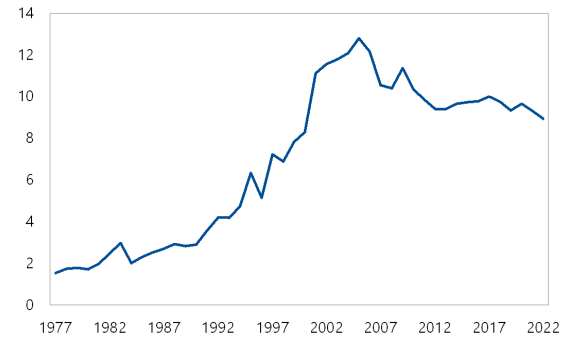
[1] Prepared by Azar Sultanov (RES).

experiencing an average of 20 cyclones per year, with approximately 8 making landfall.

2. Climate change is expected to significantly reduce GDP. Although there is a high level of uncertainty about what the costs of climate change will be, current data sources point towards potentially substantial costs. According to World Bank's Country Climate Development Report (CCDR) for Philippines, annual losses from typhoons are already estimated at 1.2 percent of GDP, and can be as high as 4.6 percent of GDP,[2] as in the extreme case of Super Typhoon Haiyan (Yolanda) in 2013, the recent strongest recorded typhoon, that killed 6,000 people devastated nine regions, and resulted in 1.1 million homes damaged (WB CCKP, 2023). The frequency and severity of typhoons are likely to increase, with higher costs in terms of damages to capital stock. The average loss of GDP by 2030 estimated to be at least 3.2 percent, annually rising to at least 5.7 percent by 2040, according to the World Bank's CCDR for Philippines published in November 2022. However, according to the same report the impacts could be much worse, reaching 7.6 percent of GDP by 2030 and 13.6 percent of GDP by 2040. Without adequate action, climate change could worsen poverty and inequality, including in terms of access to resources and opportunities, highlighting the importance of investing in resilience.

3. International migration and large remittance flows have been prominent features of the Philippine economy for many decades. The Philippines is the third largest remittance receiver country in the world after India and Mexico measured in volume.[3] The number of emigrants was close to 6 million and accounted for almost 6.2 percent of total population in 2022. The top destination countries are the United States, United Arab Emirates, Saudi Arabia, Canada, Malaysia, Japan, Australia, Qatar, Kuwait, and Italy. According to the Bangko Sentral ng Pilipinas (BSP), personal remittances reached $36.1 billion in 2022, up from $34.9 billion in 2021.

Figure 2. Philippines: Personal Remittances Received
(In percent of GDP)



Sources: World Bank staff estimates; Knomad; and IMF staff calculations.

4. Analysis of cross-country macroeconomic data shows that remittances increase in the aftermath of disasters in countries that have a larger number of migrants abroad (Ratha et al., 2009). Evidence suggests a positive role of remittances in protecting households against disasters and in coping with the loss afterwards, remittances are a lifeline for many poor households to buy food and meet their basic needs (Kpodar et al., 2021) and provide an insurance against bad shocks

[2] 4.37 percent of GDP based on The International Disasters Database (EM-DAT), CRED / UCLouvain, Brussels, Belgium – www.emdat.be. Also, in Ritchie et al (2022)

[3] The top five recipient countries for remittances in 2022 were India (receiving $111 billion), Mexico ($61 billion), China ($51 billion), the Philippines ($38 billion), and Pakistan ($30 billion) according to WB's Migration and Development Brief 38.

(Amuendo-Dorantes and Pozo,2006). In addition, it is estimated that in the Caribbean, a 1 percent decrease in real gross domestic product (GDP) is associated with a 3 percent increase in migrant remittances with a two-year lag (Mishra, 2005). Yang (2007) provides cross-country evidence on the response of international flows to typhoons, and concludes that for poorer countries, increased typhoon exposure is associated with greater remittance flows. Remittances have played an important role during and in the aftermath of disasters in the Philippines. Yang and Choi (2006) show for the Philippines that remittances help to compensate for nearly 65 percent of the loss in income due to rainfall shocks.

B. Growth-Investment-Debt Tradeoff: A Model Application

5. This paper uses the DIGNAD model that extends the DIG[4] framework to study the macroeconomic challenges related to the vulnerability to natural disasters. Marto, Papageorgiou, and Klyuev (2018) extended the DIG framework of two-sector small open economy model with traded and non-traded goods sector by introducing natural disasters and allowing the government to invest in both standard infrastructure (e.g., roads) and adaptation capital (e.g., seawalls or climate-proof roads) as well as building financial buffers. Investment in adaptation infrastructure is costlier than investment in standard infrastructure. However, adaptation infrastructure mitigates productivity losses during a natural disaster episode by allowing standard infrastructure to function better. Besides reducing the damages inflicted by a natural disaster, resilient infrastructure depreciates at a lower rate. Previous applications of the model have shown how investing in adaptation infrastructure is useful in raising the marginal product of other capital by helping withstand the impact of disaster, and crowds in private investment. The model also puts together several channels helping to capture the linkages between public investment, growth, and debt, such as the investment-growth nexus, the fiscal adjustment, the private sector response. The model captures the challenges of closing infrastructure gaps in developing countries that frequently face natural disasters. In addition to permanent damages to public and private capital, disasters cause temporary losses of productivity, inefficiencies during the reconstruction process, and damages to the sovereign's creditworthiness. DIGNAD has become a workhorse model in the IMF to study the effects of climate risk due to natural disasters and how investments in adaptation infrastructure can help mitigate these risks.

6. The model is calibrated to the Philippines. The model can be calibrated using country-specific macroeconomic indicators, and users can additionally calibrate the size and timing of disaster, and the various mechanisms through which they affect macroeconomic aggregates. The calibration of initial values and parameters is reported in Table 1 and is based on historical averages to capture the Philippines' steady state in the data. For example, the steady state of public standard investment infrastructure as a share of GDP is set at 4 percent, in accordance with the historical average from 2015 to 2019, before the COVID-19 pandemic. Parameters that determine the

[4] The Debt-Investment-Growth (DIG) model was developed to study the macroeconomic impact of public investment in emerging and developing economies. It is a general equilibrium growth model which captures the macroeconomic impacts of scaling up public investment, as well as implications for debt. For more information see Buffie et al. (2012).

standard and resilient infrastructure are calibrated as follow: (i) the average return on standard infrastructure is set at 25 percent at the initial steady state versus that for adaptation infrastructure as per Buffie et al (2012) and Marto, Papageorgiou, and Klyuev (2018); and (ii) adaptation capital depreciates at a lower rate than standard infrastructure implying that the former is more resilient (Marto, Papageorgiou, and Klyuev, 2018). Efficiency of standard public investment is calibrated at 50 percent (Aligishiev et al., 2023). Adaptation investment is assumed to be 25 percent expensive than standard one according to literature (Aligishiev et al., 2023). All other parameters are in line with Aligishiev et al. (2023), Buffie et al (2012) and Marto, Papageorgiou, and Klyuev (2018). While the simulation findings are influenced by the assumptions made under different scenarios, the model provides a framework for thinking through the macroeconomic effects of natural disasters under various scenarios. The results are robust within a reasonable range of values for the relevant parameters.

7. All simulations explicitly consider the impact of a natural disaster shock.[5] We calibrate the size of the shock to mimic one of the most powerful typhoons experienced in the Philippines. Super Typhoon Haiyan, a Category 5 typhoon[6], hit the Philippines on November 8, 2013 and lowered GDP by about 4.3 percent (EM-DAT).

Table 1. Philippines: Calibrated Parameters and Initial Values

(In percent)

Definition	Value
Return to standard infrastructure	25.0
Return to adaptation infrastructure	30.0
Public standard infrastructure investment to GDP ratio	4.0
Grants to GDP ratio	0.5
Consumption tax (VAT) rate	12.0
Labour income tax rate	25.0
Public domestic debt to GDP ratio	41.4
Public concessional debt to GDP ratio	0.1
Public external commercial debt to GDP ratio	19.6
Remittances to GDP ratio	8.9
Imports to GDP ratio	38.0
Real interest rate on public domestic debt	2.7
Real interest rate on public external commercial debt	2.2
Depreciation rate of standard public infrastructure	7.5
Depreciation rate of resilient public infrastructure	3.0
Public investment efficiency	50.0

Source: IMF staff calculations.

[5] The scope of analysis in the paper is limited to rapid-onset disasters.

[6] Storms, hurricanes, and typhoons are the same weather phenomenon and the only difference between them is the location where the storm occurs. They are ranked from one to five on the Saffir-Simpson Hurricane Wind Scale which estimates potential property damage. Typhoons reaching Category 3 and higher are considered major typhoons because of their potential for significant loss of life and damage. See National Weather Service.

8. The natural disaster shock is assumed to inflict an average damage equivalent to 4.3 percent of GDP encompassing: (1) permanent damages to public infrastructure; (2) permanent damages to private capital; and (3) temporary losses of productivity. It is assumed that there is no impact of natural disaster on reconstruction efficiency and on the external public debt risk premium. It is assumed the government aims to fully rebuild the damaged infrastructure in 5 years. Reconstruction after the disaster begins the same year as when the disaster hits.

C. Scenario-Based Analysis

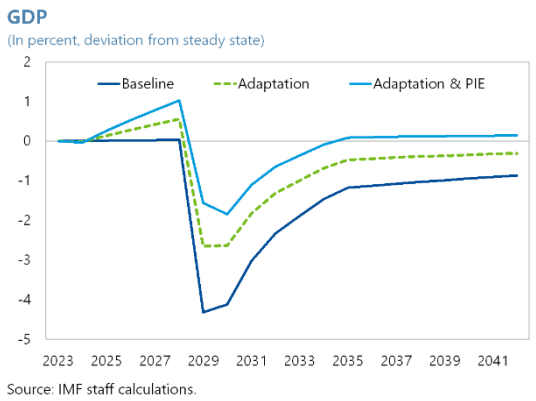
9. Adaptation to the risks of climate change is critical for the Philippines. It cannot completely eliminate the costs of climate change, but it can substantially reduce them. Scenarios are designed to show the impact of the natural disaster (assumed to strike in year 5) on macroeconomic variables under different assumptions for investment in resilient infrastructure. We consider three scenarios. First, we consider a baseline scenario in which no infrastructure investment is undertaken, and the economy remains on its steady state growth path. Second, we consider a scenario where the government invests in adaptation infrastructure. We assume that the budget envelope for this investment is 1.2 percent of GDP per year for five years. Lastly, in the third scenario, we consider a higher infrastructure plan (relative to the second scenario) of 1.7 percent of GDP per year, accompanied by reforms related to Public Financial Management (PFM) which substantially increases the efficiency of public investment (by 20 percentage points). This means that for every dollar invested in public infrastructure, it gets an additional 20 cents of effective investment relative to the previous scenarios. In the last two scenarios we consider investment in resilient capital is financed by grants. Scenarios when investment in resilient capital financed by domestic and external commercial debt is presented in an alternative simulation.

10. We consider different financing scenarios for reconstruction. The government can resort to several instruments to finance reconstruction. One of them is debt, either domestic, if possible, external, or concessional, if available. Absent all of these, the government can finance reconstruction by revenue mobilization, though of course this imposes a burden on households. Another approach is to use the mix of debt and fiscal instruments. And each of these, given the interdependence in the model, will have different macro implications.

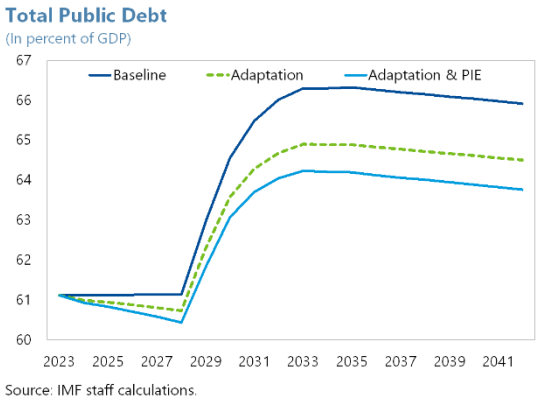
11. Simulation 1a: Grant financed investment in adaptation and debt financed recovery. This scenario considers a scaling-up of public resilient infrastructure spending during a five-year period financed by grants. Therefore, initial public debt stays stable until the natural disaster hits the economy. Result illustrated in Figure 3 shows that adaptation capital also crowds in private investment and therefore total output in adaptation scenarios is higher than compared to the baseline. In this simulation the reconstruction after the natural disaster is financed solely by domestic and external debt. Without international donor support, a debt-financed recovery could drive total debt to 66.3 percent of GDP in the baseline shock scenario and to 64.2 percent in scenario 3, when mitigating effect of adaptation investment and PFM reform is considered. Results show how benefits from the resilient infrastructure could be amplified if accompanied by the

meaningful PFM reforms, which can also lessen the growth-debt trade-off, illustrated in Figure 3. The higher efficiency of investment also allows for more rapid recovery from the disaster.

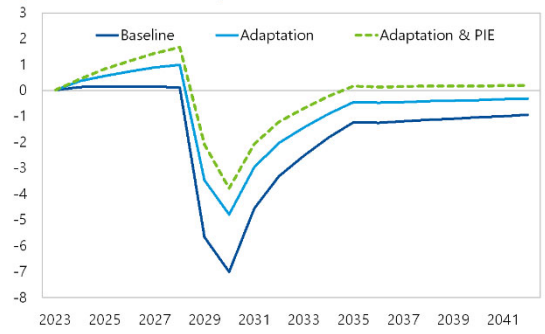
Figure 3. Philippines: Simulation 1a: Grant Financed Adaptation Infrastructure and Recovery



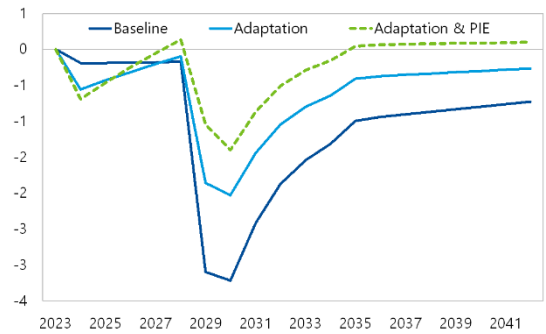
Source: IMF staff calculations.



Source: IMF staff calculations.



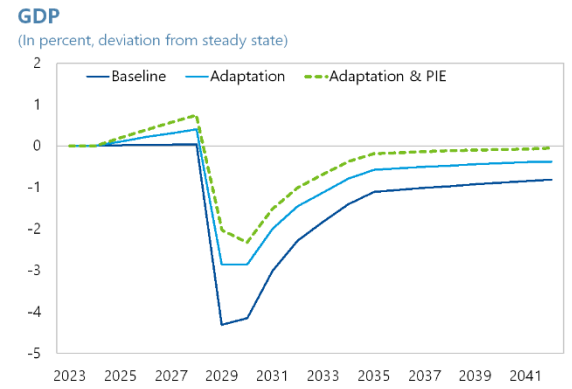
Source: IMF staff calculations.



Source: IMF staff calculations.

12. Simulation 1b: Debt financed adaptation infrastructure and recovery. This simulation considers a scaling-up of public resilient infrastructure financed by the domestic and external debt. The impact is seen on debt, private investment, and consumption. An increase in public capital investments initially requires domestic financing and, therefore, crowds out private investment in scenario two and three. The increased cost of adaptation translates into higher fiscal deficit, which in turn leads to a larger accumulation of debt before the disaster. Therefore, the importance of securing concessional financing for resilient infrastructure and adaptation plans is paramount. The authorities should tap concessional and grant-based financing sources in partnership with other development partners to help improve resilience to disasters. Clearly outlining a medium-term expenditure and finance roadmap for adaptation in the budget is also crucial. Although investment in adaptation infrastructure is costlier than investment in standard infrastructure, the reduction in the short-run GDP and the long-run scarring effects are substantially lower in presence of resilient capital compared to the baseline scenario.

Figure 4. Philippines: Simulation 1b: Debt Financed Adaptation Infrastructure and Recovery



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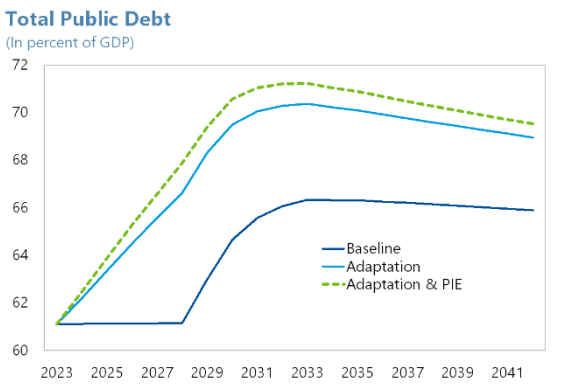
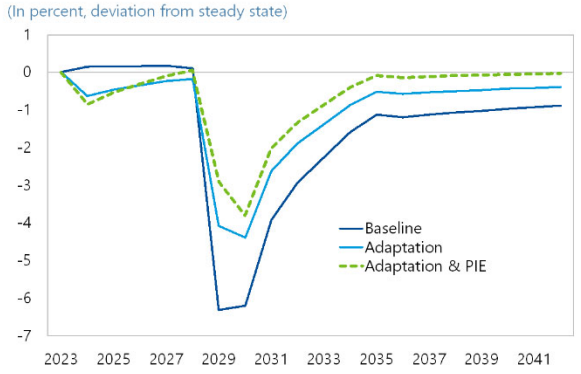


Source: IMF staff calculations.



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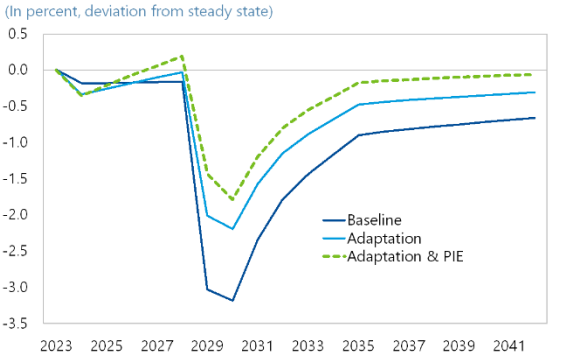


Source: IMF staff calculations.

13. Simulation 1c: Presence of counter-cyclical remittances have implications for public debt, private investment, and welfare of households. The previous simulations do not include the impact of counter-cyclical remittances during adverse shocks. Based on the existing evidence in the literature, showing remittances can be countercyclical, we include the following remittances equation from Chami et al. (2008):

$$Remit_t = \overline{Remit}\left(\frac{\bar{Y}}{Y_t}\right)^{r1} \qquad (1)$$

where $\bar{Y}$ and $\overline{Remit}$ are the steady-state level of output and remittances respectively. *r1* is a positive constant determining the responsiveness of remittances to the business cycle.[7] The DIGNAD simulation results with the counter-cyclical remittances illustrated in Figure 5 shows that remittances smooth the impact of the natural disaster. This impact is particularly important for household consumption. The percent deviation of household consumption from its steady state level in this

[7] We calibrated *r1* so that that remittances respond to a fall in output and increase to offset some of the loss in private consumption due to the disaster.

simulation is less than in Simulation 1a. An impact on the private investment is also sizable, the fall is almost by 25 percent less than in previous simulations. Moreover, debt-financed recovery drives total debt to 65.7 percent of GDP in the baseline shock scenario and to 64 percent in scenario 3, when mitigating effect of adaptation investment and PFM reform is considered.

14. Reforms that could be pursued together with the investment into resilient infrastructure. One of such reform is considered in the third scenario, reform related to PFM which raises the efficiency of public investment. Public investment efficiency can be affected by many factors, including incompetence, corruption, or imperfect information. A lower efficiency is a measure of the degree of deviation from the optimal process that a government may choose worse projects. A complementary way to think about efficiency is simply that a fraction of spending is simply wasted (Buffie et al., 2012). Reforms improving infrastructure governance, promoting transparency, greater stakeholder participation, and the prevention of conflict of interest could strengthen public financial management and investment management capacity, thereby helping to reduce public investment inefficiencies as well as waste in public investment expenditures.

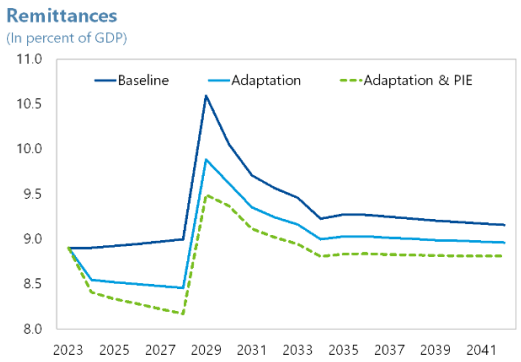
15. Room for revenue mobilization: improving C-efficiency of VAT. While the Philippines has improved its tax-to-GDP ratio over the past decade, its tax revenue collection remains modest compared to its level of development. The Philippines' revenue collection from VAT remains significantly below the averages for emerging market economies and lower middle-income countries. The Philippines also has one of the lowest C-efficiency rates in the region, where the C-efficiency denotes, the extent to which final consumption is taxed. In 2020, the Philippines' C-efficiency was 0.35 (compared to 0.66 in Cambodia and 0.71 in Thailand), implying that the VAT captures only a third of its potential tax base (IMF Philippines Selected Issues, 2022). Bringing its C-efficiency to the worldwide average for upper middle-income countries (of around 0.6) would nearly double VAT collections (over 7 percent of GDP).

16. Simulation 2a: Recovery through revenue mobilization with low efficiency of tax collection. In this simulation the recovery from the natural disaster is financed by the revenue mobilization, mainly by value added tax. The C-efficiency for this simulation was considered to be 0.35. As an alternative to the baseline scenario, we consider a scenario with resilient infrastructure investment which is accompanied by reforms related to improvement of the PFM raising the efficiency of public investment by 20 percentage points. Results show that with PFM reforms private investment impacted less by the natural disaster. Meaningful PFM reforms that increase the efficiency of public investment and strength public financial and investment management can increase the benefits gained from investing in adaptation capital. Additionally, presence of remittances mitigates the impact of the natural disaster shock to the households' consumption.

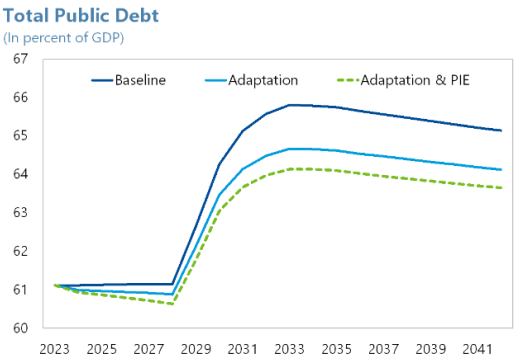
17. Simulation 2b: Recovery through revenue mobilization in presence of reforms improving the efficiency of tax collection. As in the previous simulation 2a we consider an alternative scenario to the baseline the resilient infrastructure investment accompanied by reforms related to improvement of the PFM raising the efficiency of public investment by 20 percentage points. However, in both scenarios we bring C-efficiency of VAT collection to the worldwide average for upper-middle income countries of around 60 percent. We also consider the impact of

remittances. Figure 7 illustrates how such reforms can help alleviate the growth-debt trade-off. Results show that with improved tax efficiency the VAT rate increase needed to finance reconstruction is 2.1 percent less than the one required without reforms (both tax collection and public investment efficiency reforms) and resilient infrastructure (5.6 percent). Reforms together with investment in resilient capital returns the household consumption quickly even over its steady state value in just about five years after the natural disaster hit the economy. Moreover, in presence of resilient infrastructure and abovementioned reforms private investment rebounds quickly from the shock. The visual comparison of results of the simulation 2a and 2b presented in Figure 8. The effect on the path of output not included in Figures 6 to 8, given the reconstruction follows the same path in these simulations.

Figure 5. Philippines: Simulation 1c: Presence of Counter-Cyclical Remittances Have Implications for Public Debt, Private Investment, And Welfare of Households



Source: IMF staff calculations.



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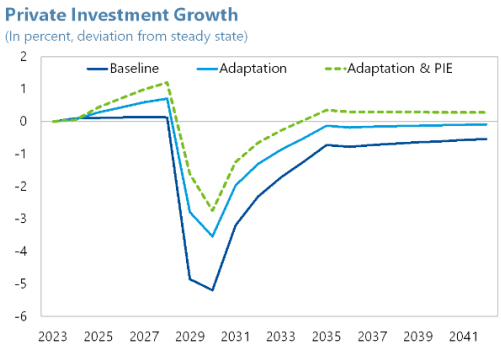

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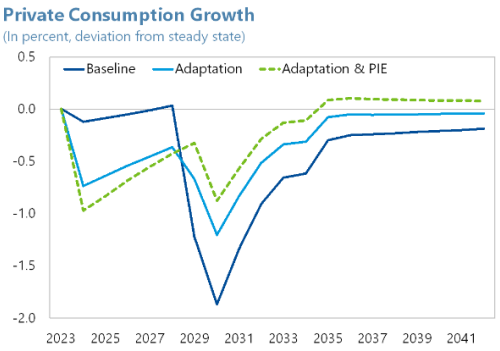
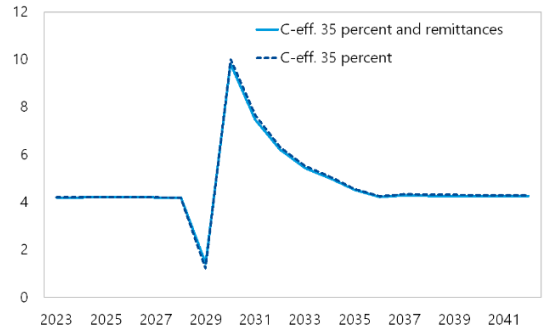


Source: IMF staff calculations.

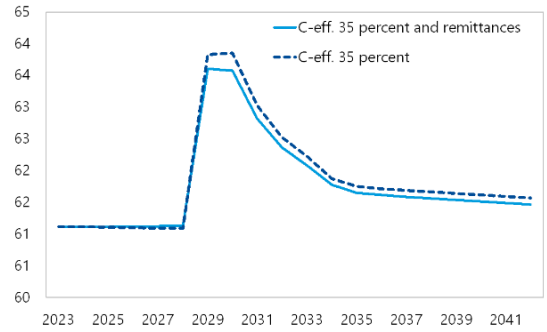
Figure 6. Philippines: Simulation 2a: Recovery Through Revenue Mobilization With Low Tax Collection Efficiency (C-Efficiency Of 0.35)

Effective VAT Rate
(In percent)



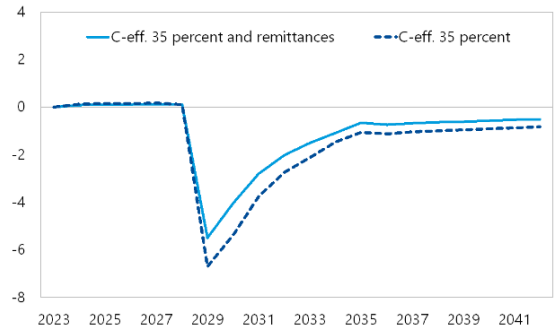
Source: IMF staff calculations.

Total Public Debt
(In percent of GDP)



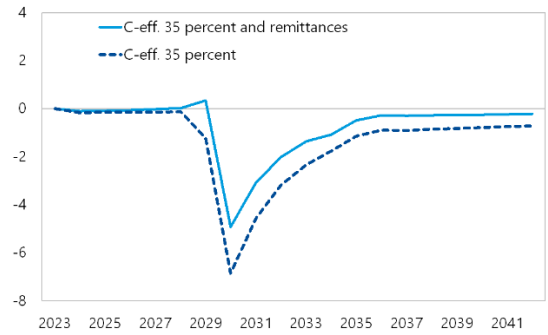
Source: IMF staff calculations.

Private Investment Growth
(In percent, deviation from steady state)



Source: IMF staff calculations.

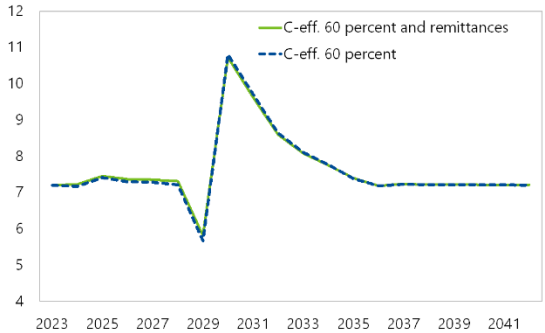
Private Consumption Growth
(In percent, deviation from steady state)



Source: IMF staff calculations.

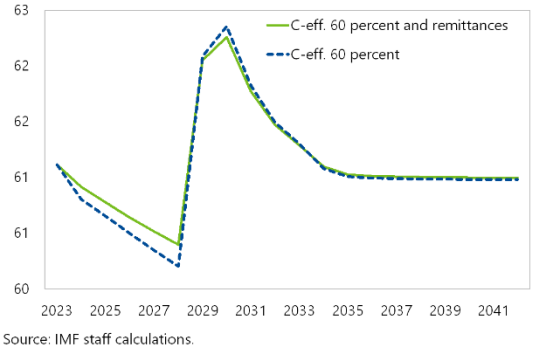
Figure 7. Philippines: Simulation 2b: Recovery Through Revenue Mobilization with Moderate Tax Collection Efficiency (C-Efficiency Of 0.6)

Effective VAT Rate
(In percent)



Source: IMF staff calculations.

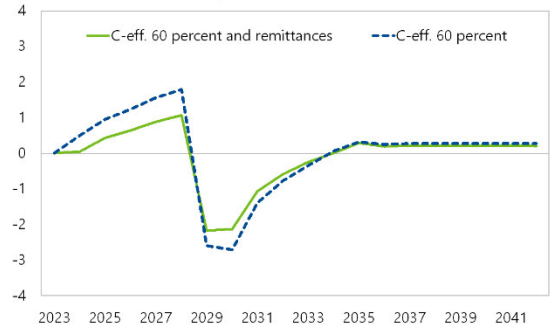
Total Public Debt
(In percent of GDP)



Source: IMF staff calculations.

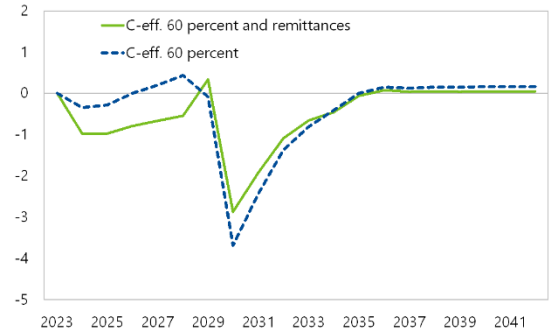
Figure 7. Philippines: Simulation 2b: Recovery Through Revenue Mobilization with Moderate Tax Collection Efficiency (C-Efficiency Of 0.6) (Concluded)

Private Investment Growth
(In percent, deviation from steady state)



Source: IMF staff calculations.

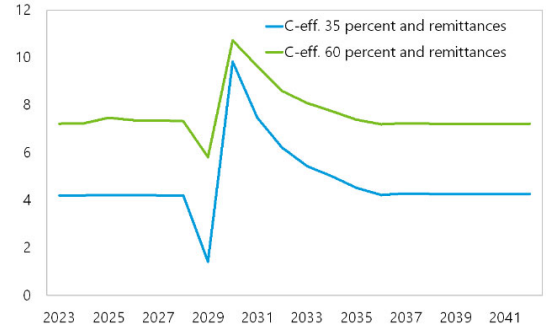
Private Consumption Growth
(In percent, deviation from steady state)



Source: IMF staff calculations.

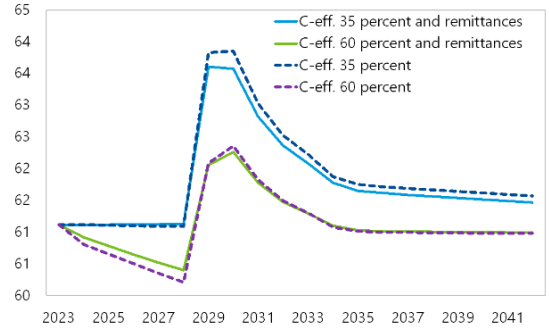
Figure 8. Philippines: Comparing Recovery Through Revenue Mobilization in with And Without Reforms Improving the Efficiency of Tax Collection (Simulation 2a Vs 2b)

Effective VAT Rate
(In percent)



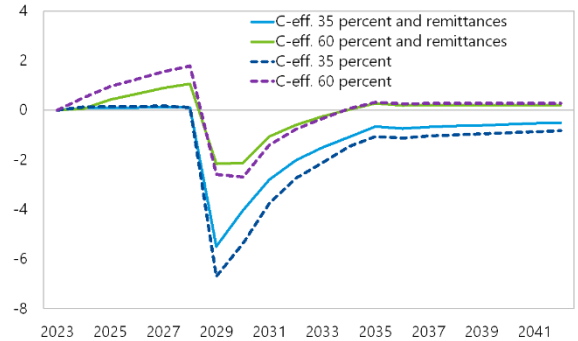
Source: IMF staff calculations.

Total Public Debt
(In percent of GDP)



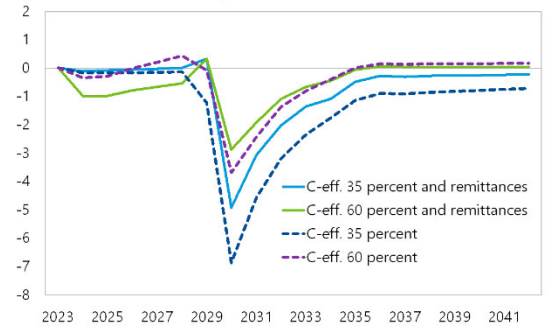
Source: IMF staff calculations.

Private Investment Growth
(In percent, deviation from steady state)



Source: IMF staff calculations.

Private Consumption Growth
(In percent, deviation from steady state)



Source: IMF staff calculations.

D. Concluding Remarks

19. Resilient investment mitigates the impact of natural disasters. Extreme naturel events cannot be prevented, but their negative impact can be reduced by building resilient infrastructure and implementing reforms. Those who build resilient infrastructure, install, and use early warning systems, and invest in climate and environmental protection are better prepared to deal with disasters. As also highlighted in the World Bank's CCDR (2022), ***up to two thirds of the climate impacts could potentially be offset through climate adaptation measures*** but these measures will likely require substantial public and private financing. Therefore, it is important to secure concessional financing for resilient infrastructure and adaptation plans.

20. Although it is not easy to select the most relevant infrastructure projects considering the uncertainty of shocks the authorities should prioritize public spending towards resilient infrastructure. Whether it be earthquakes, storms or floods, the risk of a natural event turning into a disaster only partly depends on the force of the natural event itself. Equally important are the infrastructure and the existing structures for rapid response and assistance in the event of an emergency. The more fragile the infrastructure network and the poorer the access to public services, the more susceptible a society is to natural events. It is widely recognized that climate change has a significant impact on disaster management efforts and poses a major threat to efforts to meet the growing needs of the most vulnerable part of the population. The Philippines' high exposure to natural hazards, dependence on climate-sensitive natural resources, and vast coastlines where all of its major cities and the majority of the population reside creates further pressure in selecting and prioritizing the most relevant resilient infrastructure projects and challenges the government to mobilize domestic and international resources for adaptation as a priority action to combat consequences of climate change.

21. Reforms contribute to long-term fiscal sustainability and welfare of the population, particularly in presence of resilient infrastructure. Model simulations show that investments in resilient infrastructure potentially helps to mitigate the impact of disasters on economy and households. The response of remittances (counter-cyclicality) to a natural disaster shock improves private consumption, acting as an automatic stabilizer. Another important and intuitive result is while recovery through revenue mobilization will stabilize debt in the long term, it may nonetheless affect household consumption, especially the most vulnerable ones. Model simulations also show that reforms improving an efficiency of public investment and tax collection are also paramount and will help tap the full potential of investing in resilient infrastructure. High public investment efficiency implies a larger stock of public capital for a given investment rate and hence higher output. Reforms contribute to long-term fiscal sustainability and welfare of the population, particularly in presence of resilient infrastructure.

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