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Market Reforms and Public Debt Dynamics in Emerging Market and Developing Economies

Prepared by Zamid Aligishiev, Gabriela Cugat, Romain Duval, Davide Furceri, João Tovar Jalles, Margaux MacDonald, Giovanni Melina, Futoshi Narita, Chris Papageorgiou, and Carlo Pizzinelli

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ABSTRACT: Many emerging market and developing economies face a difficult trade-off between economic support and fiscal sustainability. Market-oriented structural reforms ease this trade-off by promoting economic growth *and* strengthening public finances. The empirical analysis in this note, based on 62 emerging market and developing economies during 1973–2014, shows that reforms are associated with sizable and long-lasting reductions in the debt-to-GDP ratio, mainly through higher fiscal revenues and lower borrowing costs. These effects are larger in countries with greater tax efficiency, lower informality, and higher initial debt. Moreover, a model-based analysis elaborates on how such fiscal gains can be enhanced when revenue windfalls associated with reforms are saved or channeled through higher public investment.

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Contents

Executive Summary	3
I. Growth-Enhancing Reforms as Policy Levers for Fiscal Sustainability	4
II. Were Reforms in Emerging Market and Developing Economies Associated with a Reduction in Public Debt?	9
III. Channels: Further Insights from Model Simulations	15
IV. Conclusion and Policy Considerations	20
Annex I. Empirical Methods	24
I.A. Local Projection Method	24
I.B. Synthetic Control Method	32
Annex II. DIGNAR-19 Model Simulation	34
II.A. Model Structure	34
II.B. Calibration	36
II.C. Simulation	37
References	38
BOXES	
Box 1. Case Study: India (1998–99)—A Historical Account of Successful Reforms but Worsening Fiscal Accounts	21
FIGURES	
Figure 1. Multiple Global Shocks and Limited Fiscal Space in Emerging Market and Developing Economies	5
Figure 2. Selected Countries: Debt/GDP Ratio and Reform Episodes	6
Figure 3. Filling Large Gaps in Structural Policies Can Help Reduce Fiscal Adjustment Needs	7
Figure 4. Empirical Impulse Responses upon Market Reforms	11
Figure 5. Empirical Impulse Responses upon Market Reforms by Fiscal Components	12
Figure 6. Empirical Impulse Responses of Public-Debt-to-GDP Ratio upon Individual Market Reforms	13
Figure 7. Conditional Empirical Impulse Responses of Debt upon Market Reforms	14
Figure 8. Government Debt Reduction under Historical Scenarios	15
Figure 9. Decomposition of the Government Debt Reduction	17
Figure 10. Reforms and Alternative Fiscal Policy Choices (10-year horizon)	18
Figure 11. Government Debt Reduction under Reforms Coupled with a Tax Collection Reform	19
Box Figure 1.1. India: Reform Impacts Estimated by the Synthetic Control Method	23
Annex Figure I.A.1. Combined Market Reforms Indicator in Emerging Market and Developing Economies	29
Annex Figure I.A.2. Empirical Impulse Responses upon Market Reforms	29
Annex Figure I.A.3. Empirical Impulse Responses for Individual Reforms	30
Annex Figure I.A.4. Heterogeneity in Empirical Impulse Response of Debt upon Market	31

Annex Figure I.A.5. Robustness Checks for Empirical Impulse Response of Debt upon Market Reforms	31
Annex Figure I.B.1. India: Reform Impacts Estimated by the Synthetic Control Method	33

TABLES

Table 1. Areas of Market-Oriented Reforms	5
Box Table 1.1. Divestment Receipts	23
Annex Table I.A.1. Summary of Empirical Impulse Responses Estimated by Local Projection Method	26
Annex Table I.A.2. Final Country Sample for the Baseline LPM Specification	28
Annex Table I.A.3. Descriptive Statistics for Selected Variables	28
Annex Table II.B.1. Key Parameters and Initial Values for Model Calibration	36

Executive Summary

Amid multiple global shocks, many emerging market and developing economies face a challenging trade-off between economic support and fiscal sustainability. After the contraction at the onset of the COVID-19 pandemic and the ensuing partial recovery, growth in these economies has declined again. Strong inflation pressures further complicate policymaking when policy space is already limited in many emerging market and developing economies.

Market-oriented structural reforms, by facilitating the functioning of key economic areas (for example, finance, product markets, labor market), could ease this trade-off both by promoting growth and strengthening public finances. Examples of reforms include lowering barriers to firm entry in utilities markets, establishing supervision and regulatory frameworks for the financial sector, and lowering restrictions on foreign exchange transactions and cross-country capital flows. Although full liberalization in these areas is not always desirable, closing gaps in structural policies can in general foster medium-term growth, alleviating the adverse effects of the currently difficult global economic conditions on cross-country income convergence. This Staff Discussion Note examines how market reforms can support debt sustainability not just by fostering growth but also by improving public finances through (1) higher tax revenues, (2) lower borrowing costs from confidence effects on sovereign debt risk premiums, and (3) below-the-line proceeds from privatization. There is therefore a compelling case for implementing market-oriented reforms, particularly at the current juncture.

An empirical analysis based on 62 emerging market and developing economies during 1973–2014 shows market reforms to be associated with reduced public-debt-to-GDP ratios, as well as higher GDP. Major market-oriented reforms (for example, those in Chile, Colombia, Hungary, Morocco, and Uruguay between 1991 and 2001) are associated with a medium-term reduction in public debt to GDP of 3 percentage points. This effect translates into an approximate adjustment similar in magnitude to that corresponding with major historical fiscal consolidation episodes.

Debt reductions materialized mainly through higher government revenues and smaller sovereign bond spreads from confidence effects on sovereign debt risk premiums. In contrast, the analysis finds a relatively small and temporary improvement in the overall fiscal balance, partly due to an increase in public consumption that has also followed reforms. This may reflect the government's choice to use the gained fiscal space to pursue other policy objectives or to address legitimate political considerations, such as ensuring sufficient public support needed to implement reforms by alleviating adverse effects for those negatively affected by the reforms. A case study presented in this note sheds further light on the challenges for reaping the fiscal gains of reforms.

Complementing the empirical analysis, a simulation exercise elaborates on how fiscal gains from reforms can be enhanced. A structural model calibrated to a representative emerging market and developing economy simulates the dynamics of public debt beyond the medium term covered by the empirical analysis, highlighting even larger debt reductions over the long term (cumulatively almost three times the estimated medium-term reduction). Counterfactual scenarios demonstrate gains from containing the increase in public consumption or replacing it with public investment.

While the note highlights important benefits of market-oriented reforms for growth and fiscal accounts, much of their working remains uncertain. Specifically, granular information on the reform measures, complementary fiscal policy packages, existing conditioning factors—such as other accompanying structural reforms—and sector-specific analysis on privatization would be needed to firmly quantify the channels. Nonetheless, the large country and time sample and the robustness of the results to sensitivity analysis give confidence in the general validity of the reform effects reported in this note.

Ensuring that reforms do strengthen debt sustainability calls for several policy considerations. First, countries' initial debt burdens and potential inequality effects are key factors in deciding how much of the fiscal space created by reforms can be directed toward debt reduction, growth-friendly spending, or distributional concerns. Second, improving efficiency in tax collection can enhance the gains of an enlarged tax base. Finally, identifying reforms more likely to produce output gains in the short term can help reduce debt ratios quickly.

I. Growth-Enhancing Reforms as Policy Levers for Fiscal Sustainability

Multiple global shocks currently pose challenges to many emerging market and developing economies. The COVID-19 pandemic was quickly followed by another shock stemming from the spillover effects of Russia's war in Ukraine. In 2022, economic growth in emerging market and developing economies on average declined again—widening the gap from the pre-pandemic trend—accompanied by strong inflation pressures (Figure 1, panel 1). Slowed economic activity and government policy responses kept public-debt-to-GDP ratios elevated, while sovereign spreads have widened, amplifying the increase in borrowing costs (Figure 1, panels 2 and 3).¹

Policymakers face a challenging trade-off between providing immediate economic support and preserving medium-term fiscal sustainability. Amid global shocks, many emerging market and developing economies need to revitalize aggregate economic activity via fiscal stimulus as well as provide targeted support to vulnerable households, which were disproportionately affected by job losses during COVID-19 and struggled the most when facing soaring food and energy prices. However, with already limited fiscal space, ensuring debt sustainability will require fiscal consolidation, and in cases of acute financing distress, it may require debt restructuring together with international support (IMF 2023a). Moreover, in the current context of persistent inflationary pressures, shifting fiscal policy to a less expansionary stance may have the beneficial side effect of supporting monetary policy in its disinflation efforts. Arguably, these fiscal challenges are not equally pressing in all emerging market and developing economies. Some countries, particularly in Asia, weathered the shocks of 2020–22 with relatively contained economic losses and only modest weakening of their fiscal positions. However, the growth slowdown was broad-based, and debt-to-GDP ratios rose particularly in the upper quantiles of the distribution, suggesting increased risk of stress for countries with initially weaker fiscal positions.

Market-oriented structural reforms can serve as potentially powerful policy levers that could promote both economic growth and fiscal sustainability. Market reforms encompass the subset of macrostructural reforms that focus on enhancing the functioning of specific markets where there is scope for private sector action, including trade, finance, the provision of utilities, and the labor market. Reforms in these areas have long been a key policy agenda item, even before the pandemic, amid concerns of weak economic growth under limited policy space.² This note focuses on reforms in five areas: (1) domestic finance, (2) external finance, (3) trade, (4) labor market (employment protection legislation), and (5) product market.³ Table 1 provides a concise definition of each reform area based on the IMF Structural Reform Database. Even though they are not directly focused on fiscal policy, these reforms can also strengthen public finances via their direct fiscal implications as well as indirect effects through promoting economic activity (Banerji and others 2017). Figure 2 shows some examples of countries that enacted major market reforms and reduced their debt ratios. For these examples, domestic finance, trade, and privatization reforms were the main drivers of the rise in the combined index.

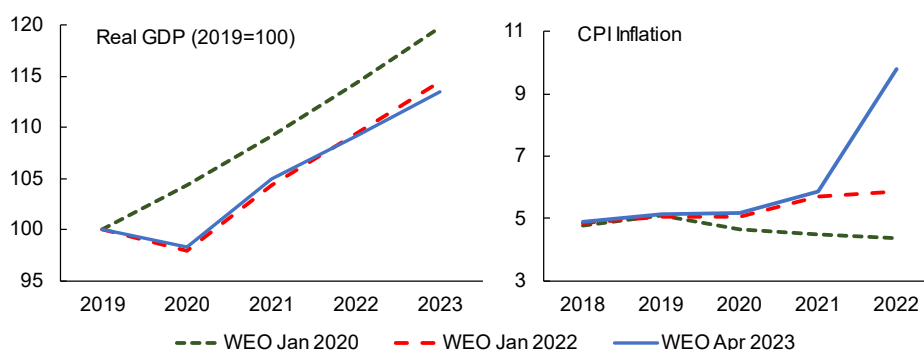
¹ See Chuku and others (2023) for a recent analysis of debt vulnerabilities in low-income countries.

² See IMF (2008, 2015a, b, 2016, 2018, 2019); and Ostry, Prati, and Spilimbergo (2009).

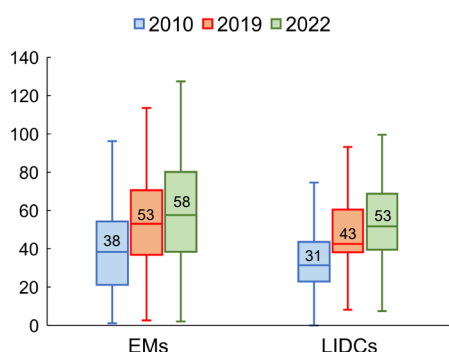
³ There are other equally important areas of structural reform that are not studied in this note, such as education, health, infrastructure, and fiscal reforms (for example, tax systems, public financial management, pension programs), as well as governance and transparency reforms (Gonzalez-Garcia 2022).

Figure 1. Multiple Global Shocks and Limited Fiscal Space in Emerging Market and Developing Economies

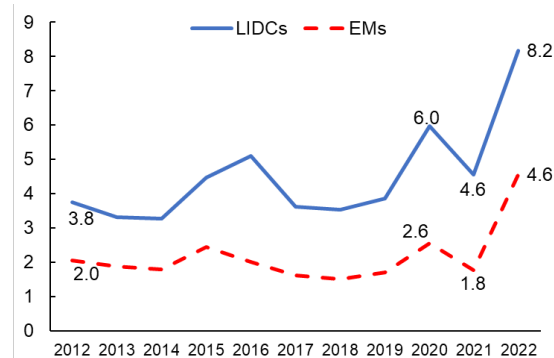
1. Pre- and Post-Pandemic Growth and inflation in EMDEs (Percent)



2. Public Debt in EMDEs (Percent of GDP)



3. Sovereign Spreads in EMs and LIDCs (Percentage points, PPP GDP-weighted average)



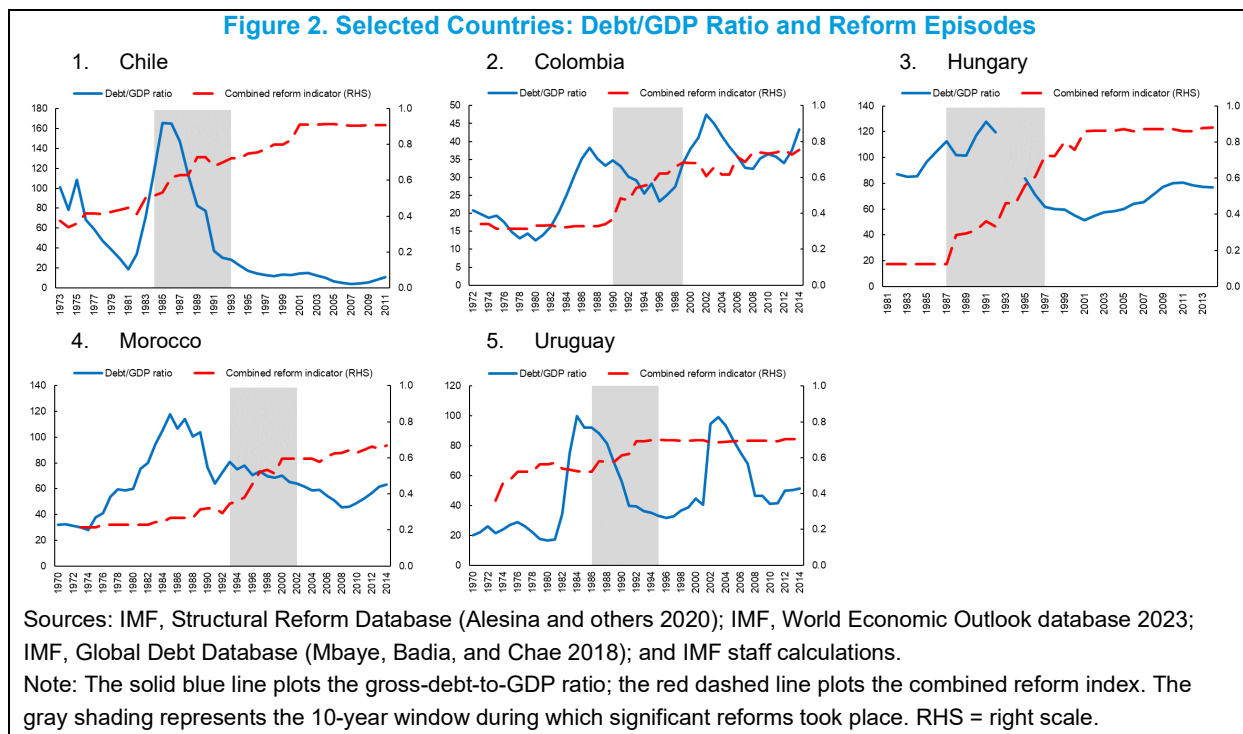
Sources. Bloomberg Back Office; IMF, Sovereign Debt Monitor; and IMF, World Economic Outlook databases January 2020, 2022, 2023 and April 2023.

Note: Panel 3 shows data available for 59 EMs and 16 LIDCs. EMs = emerging market economies; EMDEs = emerging market and developing economies; LIDCs = low-income developing countries; PPP GDP = GDP based on purchasing power parity; WEO = *World Economic Outlook*.

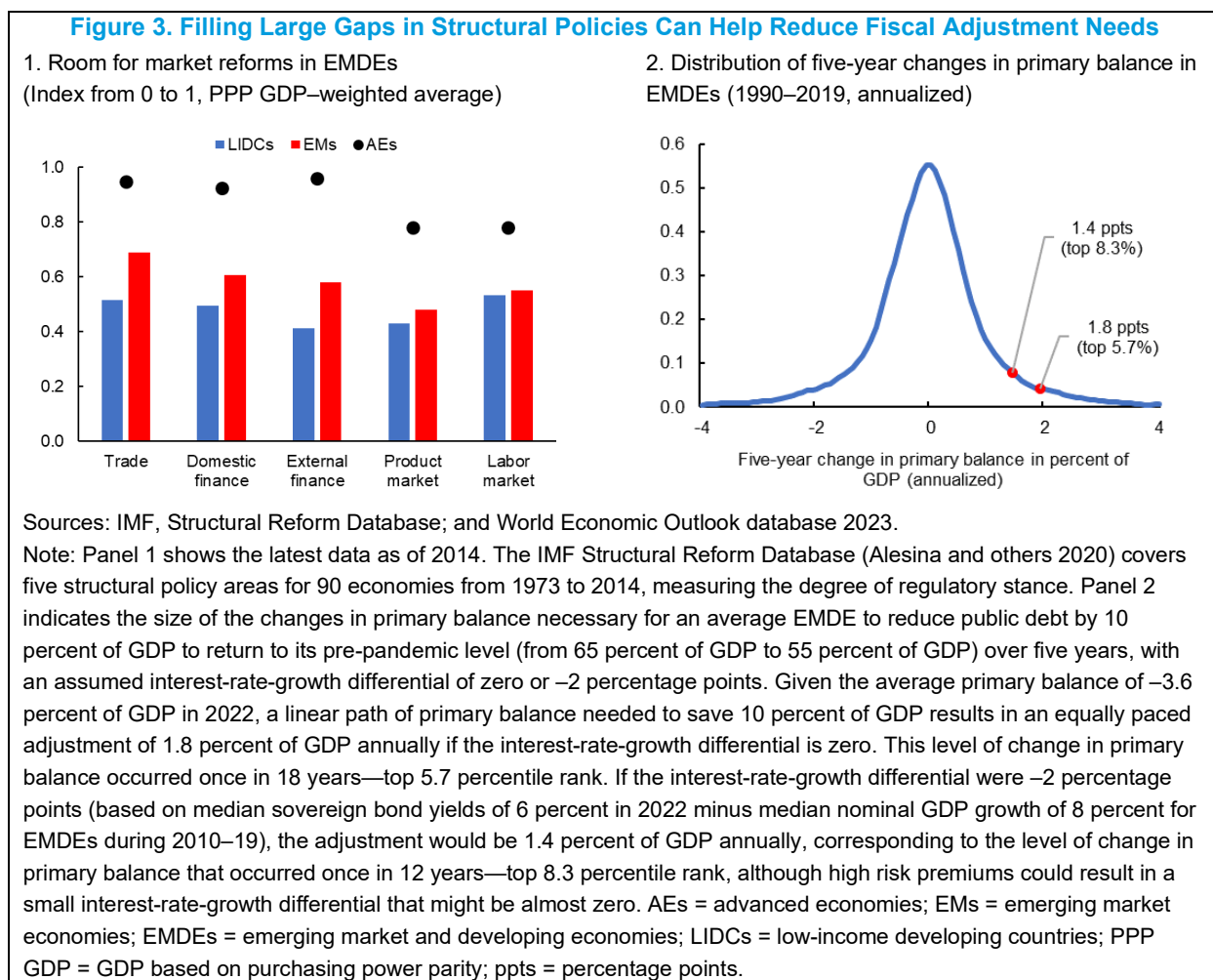
Table 1. Areas of Market-Oriented Reforms

Reform Area	Definition
Domestic Finance	Degree of government restrictions on domestic financial markets and development of a regulatory framework, including credit and interest rate controls for banks, restrictions on entry of new banks, share of private institutions in the credit market, adoption of international standard of banking supervision regulation, and development of a private securities market.
External Finance	Degree of government restrictions on exchange payments for capital inflows and outflows, including foreign direct investment, equities, securities, bank credit, and money market funds.
Product Markets	Degree of government intervention in the markets for electricity and telecommunications, regarding presence of state-owned firms as well as access to services, independence of regulatory body, and other market structures.
Labor Market	Degree of employment protection in five dimensions: valid-grounds dismissals by employers, procedural inconvenience in layoffs, monetary and nonmonetary firing costs, redress measures to contest layoffs, and additional requirements for collective dismissals.
Trade	Presence of tariff and nontariff restrictions on imports and exports of products as well as restrictions on receipts and payments for trade.

Source: IMF, Structural Reform Database.



The case for implementing market-oriented reforms is even more compelling now than prior to the COVID-19 pandemic. First, the case for reforms has been always strong as gaps in structural policies remain large in many emerging market and developing economies (Figure 3, panel 1). Full liberalization may not always be desirable, especially when regulation aims to rectify a well-identified market failure. Hence, even in all five policy areas covered in the IMF Structural Reform Database advanced economies do not appear as fully liberalized. However, emerging markets’ average degree of market orientation substantially lags that of advanced economies in all five areas. The gaps are larger in low-income developing countries. Second, weakening growth prospects in many countries were already a problem even before the pandemic (for example, Duttagupta and Narita 2017). Reforms could deliver sizable output gains in emerging market and developing economies over the medium term (IMF 2019). Revitalizing medium-term growth is essential to counteract factors driving cross-country income divergence and to mitigate scarring from ongoing multiple global shocks. Third, reversing the path of debt accumulation through fiscal consolidation alone would require a sizable—and likely politically impractical—fiscal adjustment. As an illustration, back-of-the-envelope calculations show that, for an average emerging market and developing economy, the adjustment to the primary balance needed to reverse debt to pre-pandemic levels over five years could be unprecedented. If the interest-rate-growth differential is assumed to be -2 percentage points (or zero), it could exceed the 90th percentile (or be close to the 95th percentile) of the historical distribution of primary balance adjustments over five years for emerging market and developing economies during 2010–19 (Figure 3, panel 2).



This note examines how market reforms, besides fostering growth, affect public debt dynamics through channels related to fiscal accounts. Table 2 contains a non-exhaustive list of the main channels, whose magnitude depends on conjunctural (for example, phase of the business cycle) and structural factors (for example, governance and institutional capacity). On the revenue side, market-oriented reforms lead to an expansion of the tax base by spurring firm entry via more developed credit markets and lower entry barriers in product markets and by encouraging the formalization of workers and firms. Some reforms, however, lead to a loss of revenue sources such as trade tariffs or licensing fees. On the expenditure side, pro-market reforms can raise external confidence, reducing sovereign risk premiums and lowering borrowing costs (for example, Ebeke 2017). In contrast, some financial sector reforms, such as removing interest rate controls, could temporarily increase domestic borrowing costs, especially for the public sector, which may have benefited from preferential access to credit, even though it could help public finances in the medium term by deepening the domestic financial market.

The compounding of these direct channels means that the effect of individual market reforms on debt may be a priori ambiguous. For instance, the net impact on debt of some reforms, such as privatizations, will depend on the intertemporal trade-off between up-front below-the-line proceeds from the sale of a of state-owned enterprises and forgoing accrual of a future revenue stream from the sold entity. However, if the state-owned enterprise operated at a loss, with central governments covering the operational deficits, the privatization may entail expenditure savings. The impact of labor market reform, such as lower employment protection—where it is excessive—on expenses for unemployment benefits is also a priori ambiguous. On the one hand, unemployment insurance claims could increase in the short term if firms can lay off workers more easily. On the other hand, once general equilibrium dynamics materialize,

more flexible labor markets are often associated with lower structural rates of unemployment.⁴ Finally, for all reforms, the time period during which the channels evolve, and their duration will affect not just the long-term net effect but also short-term dynamics.

In some cases, reforms have been accompanied by supporting fiscal measures. These could involve new fiscal expenses to gain political support (Ciminelli and others 2019; Alesina and others 2020). In particular, as noted in past studies (for example, Fabrizio and others 2017), structural reforms in low-income developing countries can also increase income inequality despite fostering aggregate growth. Hence, governments may design accompanying fiscal packages to mitigate their adverse distributional effects (Ostry, Berg, and Kothari 2021). There is evidence that, if fiscal space allows, reforms that are paired with fiscal support—especially targeted to low-income households and other vulnerable groups—have a stronger chance of going through and deliver stronger fiscal gains in the medium term (Banerji and others 2017).⁵ Furthermore, instead of using the fiscal space opened up by the reforms to reduce public debt, governments could choose to use the new additional resources (if any) for other policy priorities (e.g., filling infrastructure gaps).

Finally, there are also more indirect channels acting over both short and long horizons. First, the impact of reforms on real GDP growth has not only an automatic effect on the debt-to-GDP ratio but also bolsters tax revenues due to higher aggregate economic activity. While growth in nominal GDP also has an automatic “denominator effect,” the effect of market reforms on prices is not unidirectional.^{6,7} In the end, market reforms can increase potential output in emerging market and developing economies over the long run by lowering economic informality and fostering competition (IMF 2019) and by improving institutional capacity and governance. This may lower debt levels indirectly by increasing the economy’s resilience to exogenous shocks and thus reducing the need for fiscal support to mitigate the adverse impact of downturns (Aiyar and others 2019). On the other hand, a stronger and more resilient economy would translate into inherently higher debt-carrying capacity for the government. This implicit increase in debt sustainability would then allow the government to sustain higher debt without the risk of distress.

This note quantifies the overall effect of reforms on the debt-to-GDP ratio, as well as the channels that link them to public finances in the context of emerging market and developing economies, using empirical and model simulation analyses. Section II empirically studies public debt dynamics upon the implementation of market-oriented reforms using a flexible economic specification on a panel dataset of 62 emerging market and developing economies for 1973–2014. It finds that some reforms were associated with a reduction in public debt, mainly through an increase in revenue and a decline in sovereign spreads. The implementation of market reforms, however, was also associated with an increase in public consumption, which suggests that the reduction in public debt could be larger if the fiscal space generated by the reforms were allocated to reducing debt. Reflecting on these findings, Section III examines in greater detail the channels through which reforms help reduce public debt, using simulations of a calibrated structural model. While the empirical analysis is constrained by the length of available time series and focuses on the medium term, the model also allows for the study of long-term effects of reforms. In addition, its structural nature makes it possible to draw important lessons based on counterfactual scenarios, such as spending the fiscal gains from reforms differently or the effect of greater tax collection efficiency. These counterfactuals highlight the importance of a comprehensive fiscal strategy when implementing reforms. This note concludes with policy considerations.

⁴ For instance, Duval, Furceri, and Jalles (2020) find that employment protection deregulation taking place during weak business cycle conditions leads to a temporary contraction in employment over the first two years.

⁵ Lack of popular support for reforms may even lead to political pressures to reverse the reform in subsequent years.

⁶ A reform could lower prices by strengthening the supply side (for example, more competition, better resource allocation, lower labor costs) and removing trade tariffs. However, privatizations may also entail the removal of subsidies to utilities, increasing costs for households.

⁷ A further automatic effect on the debt-to-GDP ratio originates from exchange rate fluctuations. Considering the presence of foreign-currency-denominated public debt in emerging market and developing economies, if a reform leads to a real exchange rate appreciation, then the debt-to-GDP ratio could decline. However, empirical analysis not reported in this note showed that a change in real effective exchange rate associated with a reform is not statistically significant.

Table 2. Examples of Direct and Indirect Channels for Fiscal Effects of Market-Oriented Reforms

	Increase	Decrease
Revenue	<ul style="list-style-type: none"> • Expansion of tax base • Privatization sales (one-off, below-the-line) • Aggregate economic growth increasing income, profits, and sales 	<ul style="list-style-type: none"> • Loss in trade tariffs, licensing fees, or any related revenue sources • Loss in revenue sources linked to state-owned enterprises
Expenditure	<ul style="list-style-type: none"> • Possible rise in domestic borrowing costs if removal of interest rate controls leads to higher interest rates on public debt • Possible increase in unemployment insurance claims if unemployment increases due to lower employment protection • Compensatory measures (e.g., support for those adversely affected by reforms) • Spending for other policy priorities using the fiscal space generated by reforms 	<ul style="list-style-type: none"> • Decline in external borrowing costs with lowered sovereign risk premiums • Decline in domestic borrowing costs as the domestic financial sector deepens • Possible decline in unemployment insurance claims if the structural rate of unemployment declines as labor markets become more flexible

Source: IMF staff.

Note: Cells colored in green (orange) report channels that improve (worsen) government finances and reduce (increase) debt. The magnitude of individual channels depends on conjunctural factors and countries' structural characteristics.

II. Were Reforms in Emerging Market and Developing Economies Associated with a Reduction in Public Debt?

The extent to which public debt declines when market-oriented reforms are implemented in emerging market and developing economies remains an open empirical question. The magnitude of the channels through which reforms affect fiscal outcomes, directly or indirectly and in either direction, as discussed in the previous section, may vary with countries' structural characteristics and cyclical conditions.⁸ Moreover, the budgetary effects of market reforms may materialize over different horizons, requiring an analysis of their impact over time.

The empirical analysis in this section indicates that, on average, market reforms in emerging market and developing economies have historically been associated with a reduction in the public-debt-to-GDP ratio over the medium term (Figure 4).⁹ An aggregate indicator of reforms is constructed as the change in the simple average of

⁸ The existing literature examining the budgetary effects of structural reforms includes works by Hughes-Hallett, Jensen, and Richter (2005); IMF (2016); Banerji and others (2017); and Furceri and Jalles (2020). All of these focus on advanced economies and, therefore, give rise to closer inspection of the fiscal implications of such reforms in emerging market and developing economies, which remain greatly understudied. The sign and magnitude of the budgetary effects can ultimately depend on reforms' credibility and design (Heinemann 2005; Tavares 2004; Deroose and Turrini 2005) as well as on the political economy aspects of structural reforms (Eichengreen and Wyplosz 1998; Saint-Paul 1996; Blanchard and Giavazzi 2003; Boeri 2005; Ciminelli and others 2019; Alesina and others 2020).

⁹ Annex Table I.A.2 provides details on the sample of countries and years used for the analysis for each country, based on data availability. Annex Table I.A.3 presents descriptive statistics of key variables.

the indicators in the IMF Structural Reform Database (Alesina and others 2020)¹⁰ in the following areas: domestic finance, external finance, trade (tariffs and current account restrictions), labor market, and privatization in two network sectors (that is, telecommunications and electricity sectors).¹¹ The local projection method proposed by Jordà (2005) is used to estimate impulse response functions.¹² On average, reforms are followed by a decrease in debt as a percentage of GDP over the medium term, an improvement in output, and a temporary improvement in the overall balance, as shown in Figure 4. The results imply that the reduction in the debt-to-GDP ratio originates from both higher real GDP and an improved budgetary position.

Following a major reform, the debt-to-GDP ratio improves over the medium term by about 3 percentage points, while the overall fiscal balance in percent of GDP improves by approximately 0.26 percentage point in the short term. The estimated impacts shown in Figure 4 are scaled by the size of two standard deviations of the changes in the aggregate indicator of reforms to illustrate what could be associated with a major reform. A major reform, defined as such, is associated with an approximately 3 percentage point reduction in the public-debt-to-GDP ratio over the medium term (that is, after four to five years), while output increases by about 1.2 percent over the medium term.¹³ The overall fiscal balance as a percentage of GDP improves by about 0.26 percentage points in the first two years, with the effect diminishing over time. The relatively small and only temporary increase in the overall fiscal balance suggests that there may be other factors partially offsetting the fiscal gains from pro-market reforms, as discussed below. The estimated debt reduction over five years is approximately equivalent to an adjustment to the primary balance of 1.4 (or 1.0) percent of GDP a year if the interest-growth differential is zero (or –2 percentage points), which is higher than the 90th percentile (or at the 87th percentile) of the historical distribution (Figure 3, panel 2). The estimated magnitude of the medium-term debt reduction from a reform episode is comparable to that of major fiscal consolidations (IMF 2023a,b), and it represents 50 and 30 percent of the increase in debt experienced by the average emerging market and low-income country, respectively, from 2019 to 2022.

Historically fiscal gains from reforms materialized mainly through higher government revenue and smaller sovereign bond spreads (Figure 5, panels 1 and 2, respectively). The empirical analysis shows that during the first two years after a major reform, government revenue increased by 0.4 percent of GDP, likely reflecting an expanded tax base as economic activity improved due to reforms and despite a potential loss of revenue as a consequence of some of the reforms (such as trade tariff reductions). The impact on revenue diminishes over time, even turning slightly negative but statistically insignificant by the fifth year. This reversal could reflect subsequent tax cuts or the introduction of tax exemptions, engendered by the newly created fiscal space. A reduction in sovereign spreads upon a major reform is as

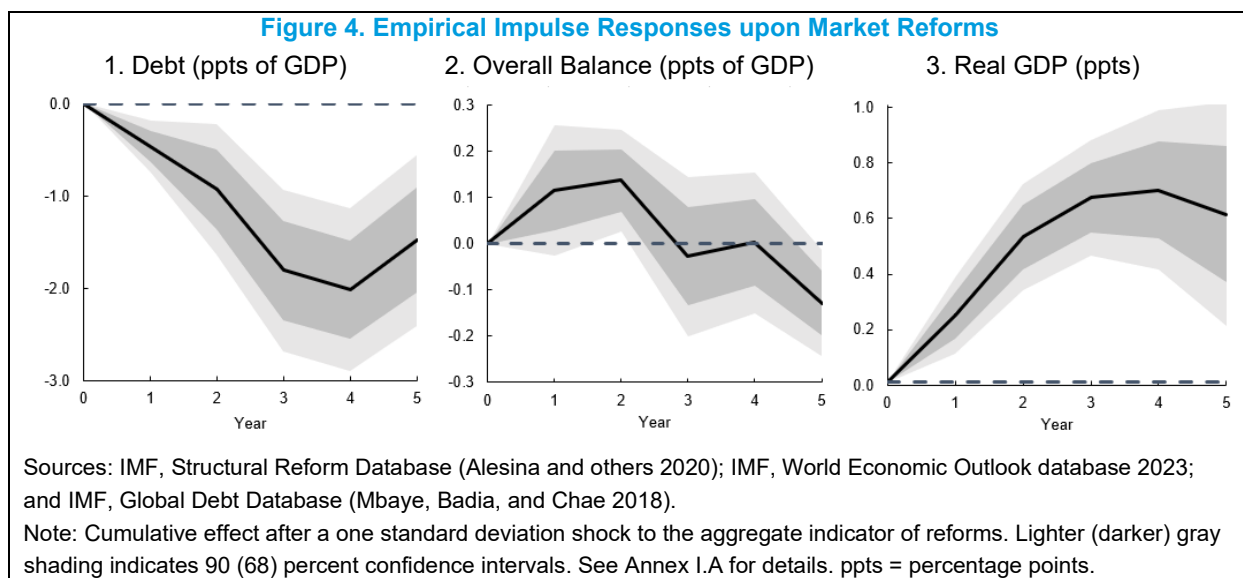
¹⁰ The dataset measures the degree of regulatory stance in 90 countries (68 emerging market and developing economies). IMF (2019) provides a description of the indicators and criteria used to build the reform indices. As explained in IMF (2019), by the nature of the indicators, direct comparison of a country's regulatory stance across different areas is not possible. All comparisons must be made relative to other countries. Therefore, increases in the indices for the different areas point to steps taken toward liberalization, but it is not possible to claim, for example, that trade is more liberalized than labor markets simply by directly comparing the levels of these indicators. Annex Figure I.A.1 shows the time series of the combined reforms indicator for emerging market and developing economies.

¹¹ The analysis uses privatization in the two sectors covered by the IMF Structural Reform Database, as previously done in IMF (2019), to compute the aggregate indicator of reforms. The privatization subindicators used may capture reform efforts in product markets beyond the two sectors mentioned. This is because privatization is likely to take place when a more pro-market government comes to power with a stronger liberalization policy agenda, which includes the privatization of many publicly owned enterprises. As supporting evidence, the correlation between product market reforms and privatization of these two sectors is high, at 50.4 percent (OECD 2023).

¹² The estimates may be biased due to possible endogeneity issues, as discussed below.

¹³ These results are in line with the findings by Furceri and Jalles (2020), who use an older version of the same set of reform indicators ending in 2003.

large as 188 basis points after four years, leading to lower government borrowing costs.¹⁴ The overall effective interest rate (that is, interest payments over the stock of government gross debt in the previous period) also declines by about 0.1 percentage point, although the effect is not statistically significant (Annex Figure I.A.2).¹⁵



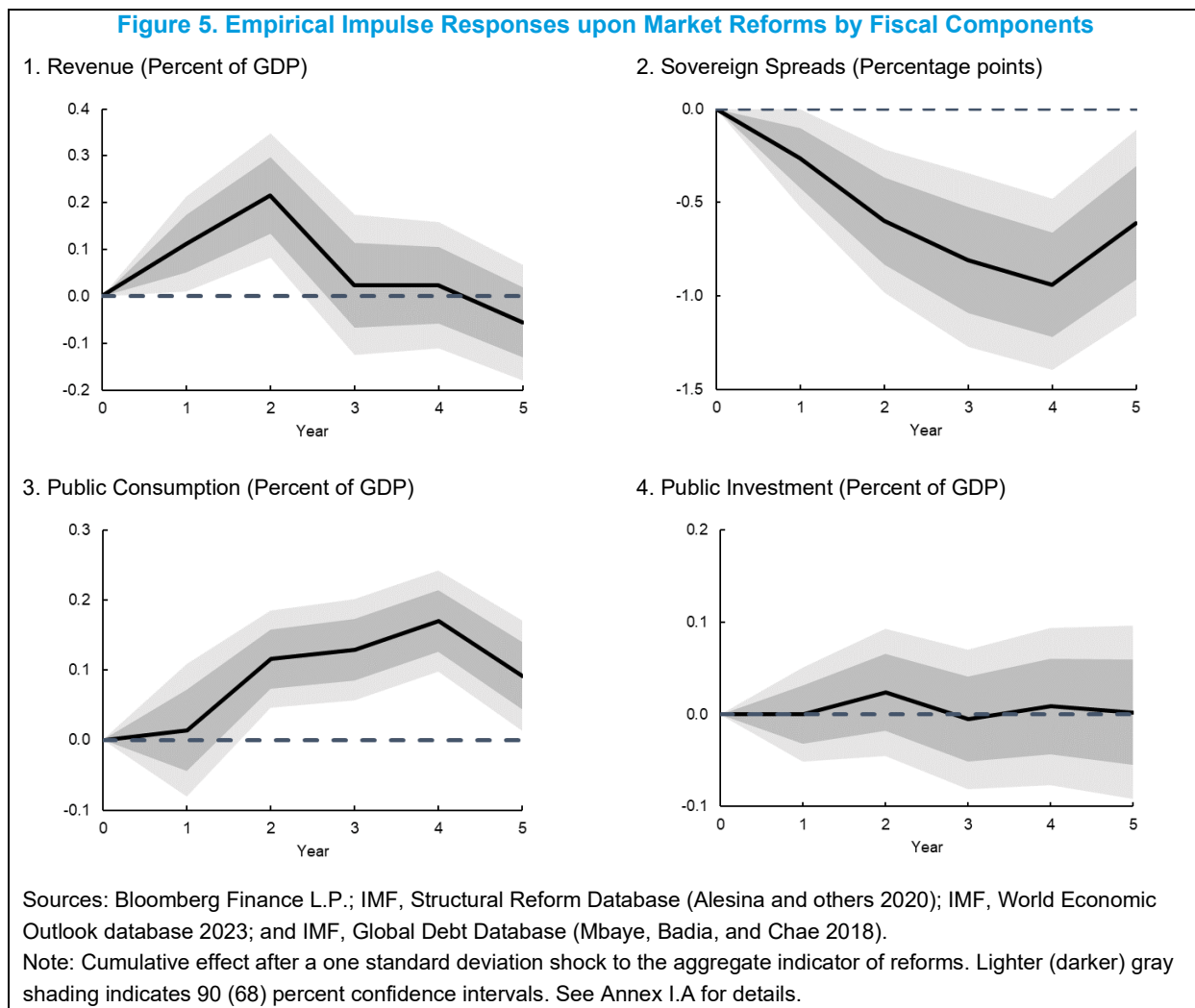
An offsetting factor is an increase in public consumption following reforms, while there is almost no change in public investment (Figure 5, panels 3 and 4). The analysis indicates that, over the medium term, the increase in public consumption reaches 0.15 percent of GDP, nearly offsetting the estimated increase in revenue. The increased government spending may reflect governments' choice to use the gained fiscal space to pursue other policy objectives, such as investing more in education, enhancing health systems, and strengthening public service provisions, or to provide mitigative support for those adversely affected by the reforms (Ciminelli and others 2019; Alesina and others 2020; Banerji and others 2017) and thus ensure inclusivity.¹⁶ Overall, such increases in public consumption could reflect governments' efforts to navigate a trade-off between the long-term growth and fiscal gains of the reforms and the short-term costs. As reforms often also entail a political decision-making process, obtaining public support is key for both approval and successful implementation. Increasing public consumption in the aftermath of reforms may also reflect any

¹⁴ Ebeke (2017, Table 1) also finds an estimated reduction in long-term government bond yields by 140 basis points four years after labor market reforms for 25 Organisation for Economic Co-operation and Development (OECD) countries using the OECD database. The decline in bond spreads is likely driven by strengthened investor confidence in the country's economic prospects following the reforms and an improvement in the government's fiscal outlook. Plausibly, the strength and quantitative importance of this channel rise with a country's degree of access to international capital markets. In countries with greater market access, the link between GDP growth outlook and sovereign yields is likely to be tighter, and the share of foreign-held sovereign debt is likely to be higher.

¹⁵ Other variables related to debt that would be interesting to examine to flesh out the impact of reforms, such as maturity, currency denomination, and domestic/foreign holding of debt, unfortunately are not available with long time series to be included in the panel data analysis.

¹⁶ Fabrizio and others (2017) find that a broad set of structural reforms have historically increased inequality in low-income countries. Market reforms may have adverse effects on subgroups of the population, potentially increasing inequality, through several channels. For instance, an easing of employment protection legislation may increase layoffs in the short term, liberalization of trade tariff and nontariff barriers may expose some sectors to foreign competition and lead to profit losses and layoffs, privatization of state-owned enterprises may lead to employment losses if companies are downsized, and revenues from licensing fees may have been earmarked for specific expenditure items that especially benefited some industries or demographic groups.

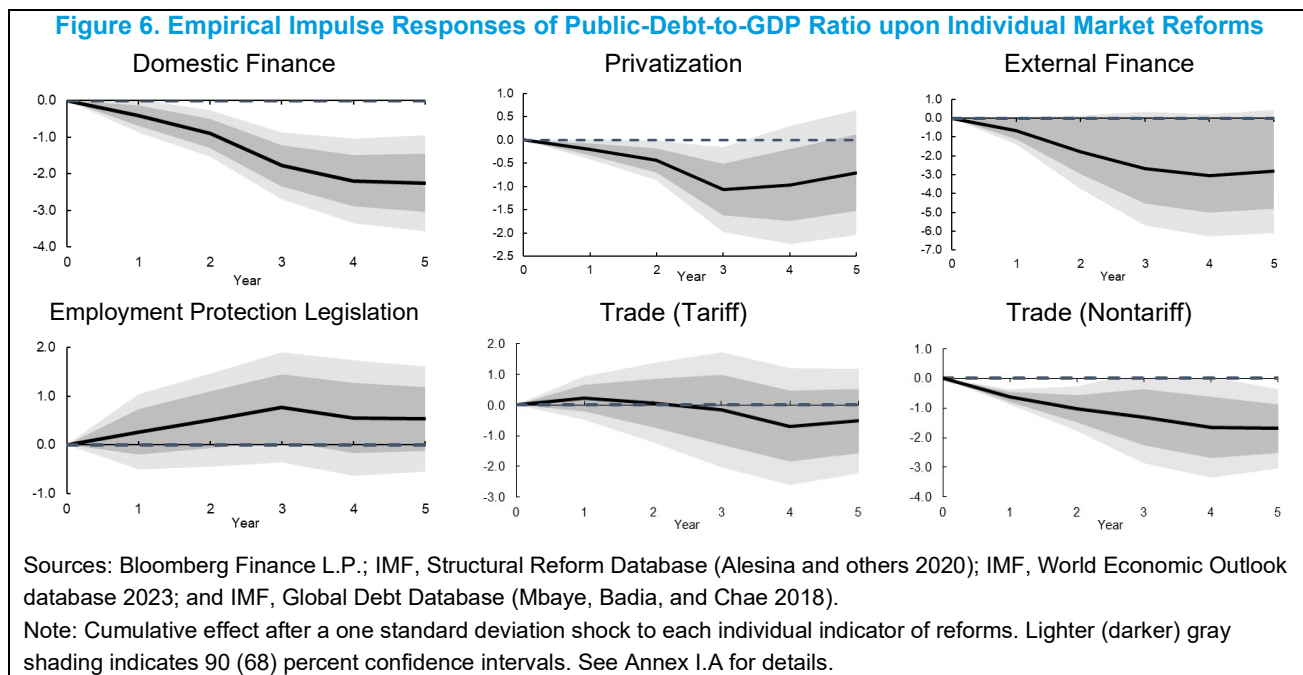
use of windfall revenues for (potentially) opportunistic (for example, electoral) purposes.¹⁷ By contrast, public investment shows no statistically significant historical association with the implementation of reforms.



A case study of India in 1998–99 also illustrates this offsetting expenditure factor and the importance of the broader context for converting the gains of reforms into debt reductions (Box 1). India went through major reforms over this period, in the areas of trade, domestic finance, and product markets, leading to an increase in reform indicators exceeding two standard deviations over the emerging market and developing economy sample. The reforms took place in the context of political instability, decelerating growth, increasing pressure in the external sector and in inflation, and deteriorating fiscal accounts. A counterfactual analysis using the synthetic control method (see Annex I) shows statistically significant impacts from the major reforms implemented, which were a success in terms of increasing output but were followed by a worsening of the overall fiscal balance. The deteriorated overall fiscal balance was driven by increased expenditure that offset lagged improvements in revenue. The observed increase in debt to GDP was not statistically different from a random effect. The results suggest that fiscal gains were not large enough to reverse the course of fiscal sustainability concerns and highlight the importance of other factors, such as implementation context, to support market reforms. Historically and at the current juncture, emerging market and developing economies may

¹⁷ Adopting a political economy perspective, Raveh and Tsur (2020) confirm that natural resource windfalls increase public debt in democracies. In particular, reelection considerations shorten political time horizons and give rise to political myopia, which turns the effect of resource windfalls positive on debt (which would be a priori ambiguous).

face similar implementation challenges to those highlighted by this case study, which could dampen the debt reduction impact of reforms.

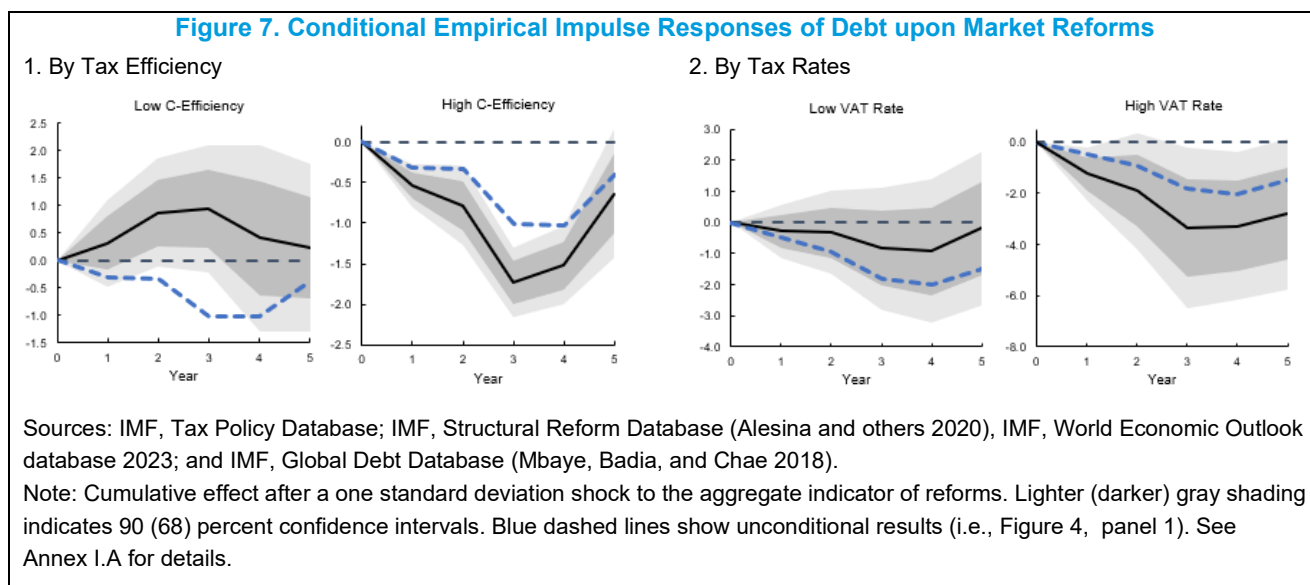


Estimates for individual reform types show varied implications for debt dynamics. Figure 6 reports the average dynamics of debt in response to episodes of individual reform types. Annex Figure I.A.3 displays the responses of the other key macroeconomic variables, while Annex Table I.A.1 summarizes the results for ease of comparison. Reforms focused on domestic finance, privatizations, and nontariff trade barriers (sourced from Estefania-Flores and others 2022) are associated with public debt reductions, together with increases in real GDP over the medium term with statistical significance at 10 percent. Lower tariffs and more liberalized capital accounts are also associated with debt reductions over the medium term (but not statistical significance at the 10 percent level), together with a medium-term increase in real GDP. Finally, reforms in employment protection legislation, for which the indicator shows the least variation, are associated with a statistically insignificant increase in debt, likely because of their time-varying effect over the business cycle, which is noted in several studies (IMF 2016; Banerji and others 2017). Importantly, the time horizon over which reforms affect public finances varies, with debt reductions materializing already by the first year for nontariff trade reform but taking longer for domestic finance and privatization reforms. These results, however, should be interpreted with caution as individual reform indicators have less variation than the aggregate indicator, leading to less statistical precision and robustness in the estimates.

Tax collection capacity of the government is found to be a key factor that affects the size of debt reduction as a result of market reforms. Following the methodology proposed by Auerbach and Gorodnichenko (2013), several country characteristics are examined, including the level and degree of efficiency of various categories of taxes, the level of informality, the initial position in the business cycle, and initial indebtedness.¹⁸ A key finding among these various nonlinear exercises is that higher efficiency in the collection of value-added taxes (VAT)—known as “C-efficiency”—is

¹⁸ Business cycle positioning at the time of reform implementation matters, but the patterns vary across reform types, as also found by Banerji and others (2017) for labor and product market reforms in advanced economies. Debt reductions seem to be larger for cases with higher initial indebtedness levels, but the result is not statistically significant, and it is dependent on the reform type. Conditional results on governance levels (based on the indicators produced by Kaufmann and Kraay 2022) do not show clear differential patterns.

associated with larger public debt reduction (with statistical significance) (Figure 7, panel 1).¹⁹ Moreover, higher statutory VAT rates are statistically significantly associated with larger debt reductions in the aftermath of a structural reform (Figure 7, panel 2). This result supports the conjecture that reforms entail fiscal gains through expanded tax bases so that high tax efficiency would lead to higher revenue gains. As tax efficiency is a pillar of revenue mobilization capacity, these results are reflective of the importance of quality of governance, market development, and other structural and institutional features for the success of reforms.²⁰ Analysis on the level of informality supports this finding by showing larger debt reductions with statistical significance for countries with low levels of informality (Annex Figure I.A.4, panel 1).^{21,22}



Conjunctural factors contribute to heterogeneity in the ultimate effect of reforms on debt. For instance, reforms during times of economic expansion (that is, “good times” of the business cycle) may result in greater growth dividends, as the economy is more resilient to potential short-term costs of the reforms, and imply less need for governments to complement reforms with supporting fiscal spending (Annex Figure I.A.4, panel 2). Furthermore, the country’s initial debt level may condition the effect of the reform through several channels. First, the impact of the reform on growth itself may differ if fiscal sustainability is already a concern in the country. For instance, the investor confidence effect of growth-friendly reforms may be greater when debt levels are already high, leading to a larger reduction in bond spreads. Meanwhile, low-debt countries may be more likely to use the fiscal space created by the reforms, as debt sustainability is a less pressing concern than alleviating some of the short-term costs of reforms or pursuing other policy objectives.

¹⁹ C-efficiency is defined as VAT revenues / (VAT rate X aggregate consumption). This metric reflects the size of VAT revenues relative to potential revenues calculated by applying the statutory VAT rate to aggregate private consumption. A lower value, implying lower efficiency, may reflect limited efficiency in revenue collection, the size of the informal economy, and fiscal policy factors such as VAT exemptions, preferential rates, and zero rates. See, for example, Keen (2013) for more details on C-efficiency.

²⁰ Another factor underpinning fiscal governance is the presence of a fiscal rule. Expenditure-based fiscal rules, for instance, would also limit the growth in public spending allowed in the aftermath of reforms, thus contributing to the improvement of the overall balance.

²¹ IMF (2019) shows that reforms tend to have larger growth effects on high-informality countries. Taken together with the result presented in this note that debt reduction is larger in countries with low informality, the evidence suggests that the decline in the debt-to-GDP ratio in low-informality countries is driven by the way public finances evolve in the aftermath of reforms rather than by the denominator effect.

²² Analysis by Prati, Onorato, and Papageorgiou (2013), focusing on GDP growth but not on debt, shows that political institutions and distance from the technological frontier also drive a significant degree of heterogeneity in the effect of market reforms.

Suggestive evidence for this channel is presented in Annex Figure I.A.4, panel 3, showing that reforms are associated with falling debt in countries with an initially high debt level but followed by rising debt in countries with low debt.

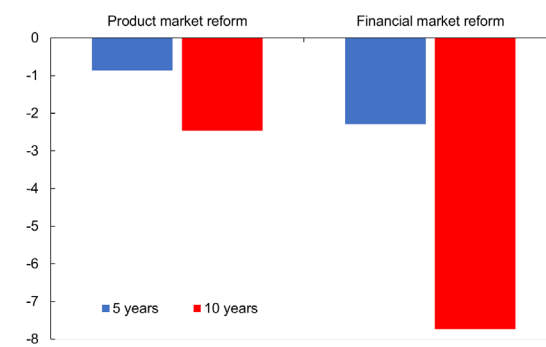
The estimation results are relatively robust, but possible endogeneity concerns remain. To mitigate omitted-variable bias, the baseline specification includes controls, such as lagged fiscal variables, to capture consolidation efforts. Changing these controls (for example, from fiscal expenditure to revenue or adding a dummy for IMF-supported programs as in Annex Figure I.A.5) as well as changing the lag structure leads to broadly similar results. The estimated effects of individual reforms also remain broadly the same when other simultaneous reforms are controlled for. However, endogeneity issues may still arise from reverse causality. On the one hand, if reforms were motivated by the need to tackle a difficult fiscal situation, already existing difficulties may lead to underestimation of the reform impacts—a common issue for estimating policy effects. On the other hand, a comprehensive policy action that includes not only reforms but also fiscal consolidation efforts and other policy actions may lead to overestimation, attributing the impacts of these other policy effects to reforms. More generally, the impact of a reform implemented shortly before a cyclical upswing is difficult to distinguish from the recovery itself. These factors may partially offset each other, but since lagged fiscal variables are controlled, the overall direction of reverse causality is more likely to be an underestimation. Nonetheless, additional robustness checks generally support the baseline results.²³

III. Channels: Further Insights from Model Simulations

An analysis based on a structural economic model complements the empirical analysis, as it allows gauging the effects of reforms over a longer time horizon and drawing lessons from counterfactual scenarios. A calibrated model is used to simulate the dynamics of macroeconomic variables and shed light on how reforms affect fiscal revenues, eventually leading to changes in public debt over different time horizons, under specific assumptions on fiscal expenditures. While the empirical analysis is constrained by the length of available time series and focuses on the medium term, the model also allows for the consideration of a longer time horizon. Its general equilibrium nature ensures that the simulated dynamics entail macroeconomic feedback loops capturing both the direct and indirect effect of reforms on the fiscal sector. Unlike reduced-form empirical approaches, this structural model is not prone to potential endogeneity biases and allows decision-makers to draw lessons from counterfactual scenarios.

For this purpose, the DIGNAR-19 model is extended to account for the effect of reforms.²⁴ The DIGNAR-19 model (Aligishiev and others 2021) is a dynamic general equilibrium model featuring the investment-growth-debt nexus and a detailed

Figure 8. Government Debt Reduction under Historical Scenarios
(Percent of GDP)



Sources: DIGNAR-19 model simulation; and IMF staff calculations.

²³ Controlling for the occurrence of financial crises or expected future growth, debt, or deficit leads to similar results as in the baseline estimation (Annex Figure I.A.5). In particular, these robustness exercises examine the possibility that reforms occur at the same time as large fiscal consolidations. See Annex I.A for details. The baseline results are also broadly supported when using an instrumental variable—with an instrument based on market reforms implemented in neighbor countries—which makes it possible to better isolate the impact of reforms from other contemporaneous policy changes, including fiscal consolidations.

²⁴ DIGNAR-19 stands for Debt, Investment, Growth, Natural Resources, and COVID-19. It is an extension of the DIGNAR model by Melina, Yang, and Zanna (2016), which itself is an extension of the DIG model by Buffie and others (2012) and Gurara,

(continued)

fiscal sector, besides other structural channels.²⁵ For this note, the model is calibrated to a country broadly representative of the average emerging market and developing economy in the empirical analysis and extended to account for reforms along four dimensions: (1) time-varying markup rates to reflect the degree of competition in product markets; (2) time-varying wedges on the marginal products of capital to capture the efficiency of resource allocation; (3) tax collection inefficiency to appropriately scale the fiscal gains from reforms to the level consistent with empirical findings; and (4) licensing fees that depend on the level of markup rates and revenues from privatization to capture a direct impact on revenue sources due to product market reforms (see Annex II.A for details).²⁶

The model is used to simulate two types of reforms: domestic finance reforms and privatization in product markets.²⁷ The model captures macro-financial implications of domestic finance reforms, which reduce the wedge on the marginal product of capital and facilitate more efficient resource allocation. Privatization is modeled as up-front one-off revenue for the government, while the increased competition through privatization is captured by a reduction in markup rates, which in turn reduces fiscal revenue from licensing fees.²⁸ As such, the model implies that reforms are successful at reducing the markup or improving resource allocation. In practice, designing and implementing reforms to achieve such goals might be difficult, especially in countries with low institutional capacity. To bridge the model analysis with empirics, time-varying parameters related to reforms are set such that, over a five-year horizon, the resulting response of real GDP approximately matches the point estimate from the local projection method analysis. The level of tax collection efficiency is also set to simulate a similar level of medium-term debt reduction after implementing reforms as in the empirical analysis. The fiscal rule in the model is calibrated to simulate increased public consumption in line with what is found in the empirical analysis.

Model simulations show larger debt reductions associated with market reforms over the long term than those estimated by the empirical analysis over the medium term (Figure 8). By construction, simulated impulse responses of both real GDP and public debt are very close to the corresponding empirical impulse responses estimated by the local projection method over the first five years after the implementation of reforms (see Annex II.C for details). Assuming reforms are not reversed after five years, fiscal gains increase further as effects compound over time. In the time interval between five and ten years after the reform implementation, the model predicts an additional debt reduction of 1.6 percent of GDP for product market reforms and 5.4 percent of GDP for financial market reforms.

Melina, and Zanna (2019), accommodating the effects of COVID-19-related shocks. While, for this note, the model has been calibrated to an average emerging market and developing economy, the DIGNAR model has been widely applied to individual country cases across all income groups (see Gurara, Melina, and Zanna 2019 for a comprehensive list).

²⁵ The investment-growth-debt nexus refers to the impact that public investment has on growth and, in turn, to the impact of these variables on debt dynamics, given assumptions on the other components of the fiscal sector.

²⁶ See Annex II.B for details on the calibration. Although there is empirical evidence demonstrating the dependence of certain reform outcomes on the state of the business cycle (for example, IMF 2019), this model's simulations focus on unconditional effects, given that it has not been engineered to accommodate such nonlinearities.

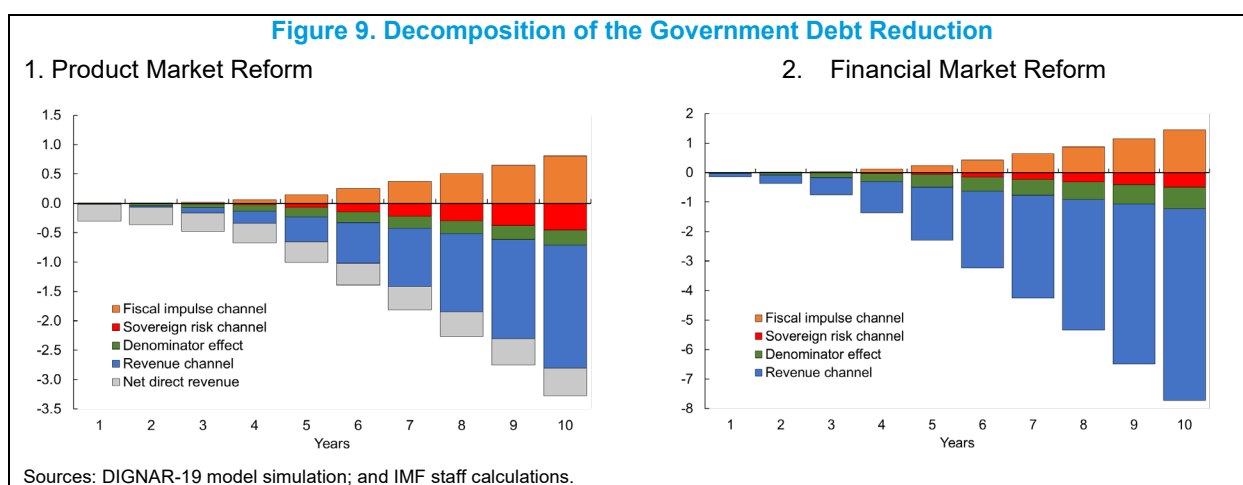
²⁷ The simulations focus on the individual reforms with a statistically significant reduction in debt, as required by the calibration strategy. For reforms on nontariff trade barriers, which were found to be associated with a debt reduction after five years, it is difficult to capture the associated dynamics in the DIGNAR-19 model, which does not explicitly model export and import decisions by firms.

²⁸ The one-off revenue increase captures the returns from the sale of state-owned enterprises (SOEs). While this is technically a below-the-line operation in which one asset is exchanged for cash, the exercise models it as one-time revenue to allow for the sale to contribute directly to debt reduction. Meanwhile, the loss of a revenue stream from the SOEs is modeled through lower licensing fees for simplicity. While these values are calibrated on data, as discussed in Annex II, individual instances of privatization may vary significantly. There are historical episodes of SOEs sold far below market price. On the other hand, as SOEs are in several cases not profitable, privatization may entail a reduction in the government's expenditure to cover the losses rather than in forgone revenue.

Quantifying the different channels through which reforms affect public debt highlights the role of the expansion of government revenue and the offsetting effect of ensuing fiscal expansions (Figure 9). The change in the public-debt-to-GDP ratio following reforms is decomposed into five factors:

1. **Revenue channel:** For both reforms, the largest effect comes from revenue growth, which occurs thanks to the increase in labor and capital productivity delivered by reforms, which magnify factor incomes. With constant tax rates, the resulting increase in government revenues leads to an improvement in the primary balance. This effect is of the order of 2 to 6.5 percent of GDP in the long term, depending on the reform.
2. **Fiscal impulse channel:** The fiscal impulse channel refers to the fact that governments may use some of the new tax revenues for additional spending. This mechanism mutes the long-term government debt reduction by 0.8–1.5 percent of GDP, depending on the reform.
3. **Denominator effect:** Higher output growth stemming from reforms affects debt sustainability through a direct denominator effect (0.3–0.7 percent of GDP, depending on the reform); that is, through the increase in GDP by which the existing stock of debt is divided. Higher real GDP growth brought about by structural reforms affects both the stock and the flow of public debt. The denominator effect captures the direct impact of the change in g (in the $r-g$ term) on the existing stock of debt; that is, the decrease in the debt-to-GDP ratio due to a higher denominator. The revenue channel captures the reduction in debt as a result of higher primary balances—that is, the effect on the flow of new debt accumulation.
4. **Sovereign risk channel:** Another effect triggered by reforms is the reduction in risk premiums associated with sovereign debt, reflecting confidence effects and especially applicable to countries with access to international debt markets. The debt reduction associated with this channel is 0.4–0.5 percent of GDP, depending on the reform.
5. **Net direct revenue** (for product market reform only):²⁹ Last, in the case of product market reforms involving privatizations, the revenue gains from the sale of government-owned assets outweigh the losses in licensing fee receipts on average in emerging market and developing economies, contributing to a larger reduction in the public-debt-to-GDP ratio. This result is based on the calibration for an average emerging market and developing economy, whereby revenue gains turn out to be higher than revenue losses, leading to positive net direct revenue for the government (see Annex II for details). This channel accounts for 0.5 percent of GDP in debt reduction 10 years after the product market reform is implemented.

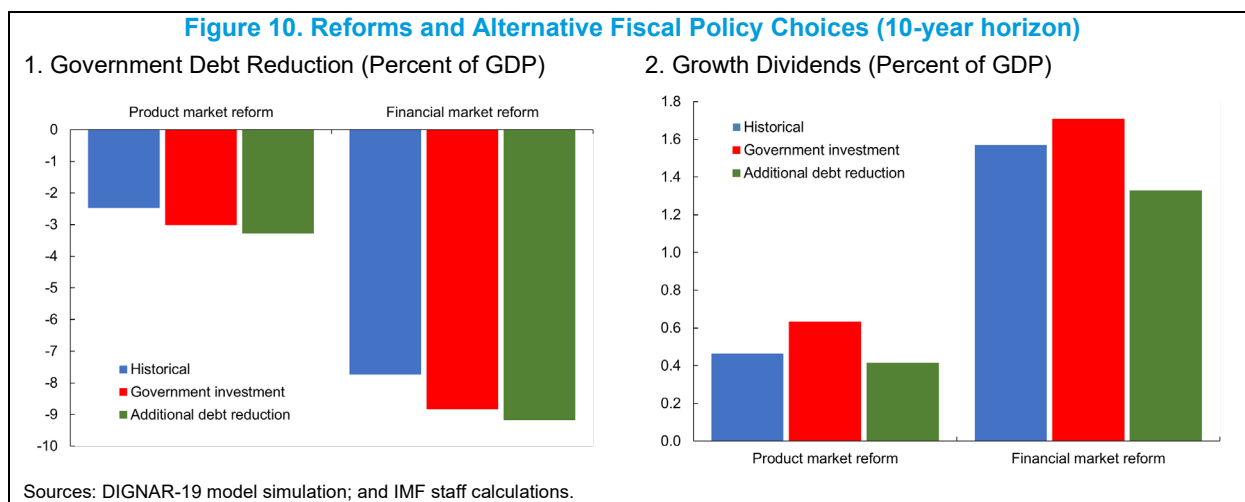
Figure 9. Decomposition of the Government Debt Reduction



²⁹ The net direct revenue from product market reforms is defined as the difference between the revenue gain from privatization episodes (associated with the sale of government assets) and the revenue loss from lower licensing fee receipts (associated with liberalizations). In practice, revenue gains and losses (and their net effect) may vary a lot across countries, depending on the scope for privatization and the pervasiveness and magnitude of licensing fees (for example, there can be other types of barriers to entry that may not involve licensing fees but instead are subject to red tape or even outright prohibition, which do not generate revenue for the government).

Counterfactual scenarios demonstrate the gains from containing the increase in public consumption or replacing it with higher public investment (Figure 10). Baseline model simulations embed an increase in government spending following reforms, in line with the empirical findings. Some spending increase may indeed be associated with reforms due to political economy considerations or as a support measure toward those adversely affected. However, some of the extra spending funded by the gains from reforms may be purely discretionary. If not well spent, it could mute the reduction in government debt without significantly increasing growth. Given long-standing evidence that capital expenditure has a higher fiscal multiplier than other types of fiscal spending (Ilzetzki, Mendoza, and Végh 2013; IMF 2014), an alternative policy choice could be to replace (potentially unproductive) public consumption with more productive public investment, which would lead to a somewhat intermediate reduction in public debt and higher growth dividends.³⁰ As an illustration, replacing public consumption with investment would lead to an additional reduction in debt of 0.5–1.1 percent of GDP, depending on the reform type, relative to the historical scenario, and to an additional average growth dividend of almost 0.2 percentage point a year over the first 10 years after the reform. Finally, utilizing all the additional fiscal revenues to reduce public debt—a choice more likely to occur in countries where the debt burden is high to start with—would reduce the growth dividend but allow for an even greater reduction in the debt-to-GDP ratio—a decrease of approximately 0.8–1.5 percent of GDP relative to the historical scenario.

Another counterfactual exercise quantifies the long-term additional gains from greater tax collection efficiency. The empirical analysis highlights the benefits of higher tax collection efficiency comparing countries with different levels of tax administration capacity. Model simulations quantify the long-term effect of improving tax collection efficiency by considering tax reforms implemented at the same time as market reforms (Figure 11). Higher tax collection efficiencies, corresponding approximately to an efficiency improvement of 5 and 10 percentage points (consistent with moving from the mean of the tax collection efficiency parameter in the IMF’s Fiscal Affairs Department database to the 68th and 76th percentile of the distribution, respectively) are associated with an additional long-term (10-year) debt reduction of 1.7–4.4 percent of GDP depending on the type of reform.

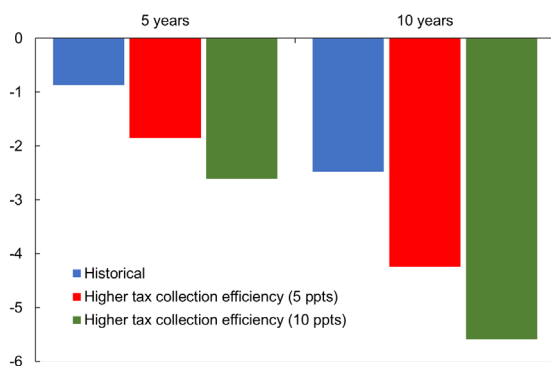


³⁰ Several areas of public consumption spending, especially those related to human capital development, may in fact increase the economy’s potential output and hence contribute to growth. However, these effects are likely to materialize over even longer-term horizons and are outside the scope of the analysis.

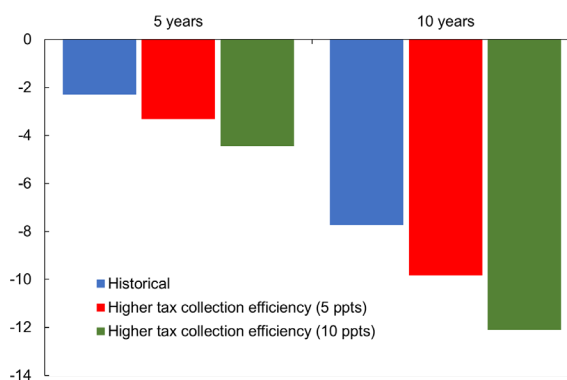
All in all, under a plausible parameterization, the model analysis shows that market reforms, if accompanied by appropriate fiscal policy choices, can foster sizable debt reductions also at a longer horizon. For reform efforts comparable to those captured by the empirical analysis, the model predicts long-term debt reductions of 2.5 and 7.7 percent of GDP for product and financial market reforms, respectively. While these effects are dominated by increased revenues, net revenues from privatizations (in the case of product market reforms) and lower risk premiums (in the case of market access countries) also play a significant role. Debt reductions can be magnified significantly if reforms are accompanied by fiscal reforms increasing the tax collection efficiency and if the fiscal space resulting from the wider tax base is used for productive spending.

Figure 11. Government Debt Reduction under Reforms Coupled with a Tax Collection Reform

1. Product Market Reform (Percent of GDP)



2. Financial Market Reform (Percent of GDP)



Sources: DIGNAR-19 model simulation; and IMF staff calculations.

Note: ppts = percentage points.

IV. Conclusion and Policy Considerations

Market-oriented reforms have the potential to ease the trade-off between supporting economic activity and preserving fiscal sustainability. In the current economic environment, marked by high interest rates, tightening financial conditions, high debt levels, and low growth, such reforms would help revitalize economic activity, counteracting some of the factors that are driving cross-country income divergence (IMF 2019). Empirical evidence in this note suggests that reforms can also generate fiscal space over the medium term by expanding the tax base and reducing sovereign spreads. Tax collection capacity is found to enhance the impact on revenues of the expanded tax base, thereby amplifying the debt reduction associated with reforms. Model simulations demonstrate that long-term fiscal gains can be even larger, as the effects of improved fiscal balances on the debt-to-GDP ratio compound over time, especially when tax collection efficiency is high.

The analysis also indicates that fiscal gains may be reduced if governments decide to use revenue windfalls. Empirical analysis based on past experience suggests that public consumption tends to increase following reform episodes, dampening debt reductions. A case study of India presents a historical account of how the broader context in which major reforms take place may lead to expenditures rising more than revenues. Indeed, in some cases fiscal expenses are deemed necessary to gather public support for the reforms, as well as to alleviate adverse short-term effects for those adversely affected by the reforms. Model simulations show that debt reductions can be magnified significantly if the reform-driven increase in fiscal space is used for productive spending rather than for redistribution.

The analysis suggests the following policy considerations for emerging market and developing economies:

- Countries' initial debt levels are an important factor to determine how best to utilize the fiscal space created by market reforms. If cyclical (for example, output gap, inflation) and structural (for example, institutional capacity) conditions allow it, emerging market and developing economies with lower debt burdens have greater latitude to use some of the fiscal gains to enhance public investment and further improve growth prospects. However, higher debt burdens call for greater prioritization of debt reductions.
- Since some fiscal costs may need to be incurred to address distributional consequences and ensure political support, avoiding overoptimism and planning fiscal spending accordingly are key aspects of successful reform implementation.
- Strengthening tax efficiency is key to amplifying the fiscal gains of, and therefore is an important complement to, market reforms.
- Given that some reforms—such as banking reforms, privatization, and lowering nontariff barriers—have historically produced sizable output and fiscal gains in the short term, careful prioritization of reform areas can help maximize debt reduction over a short time horizon.

Box 1. Case Study: India (1998–99)—A Historical Account of Successful Reforms but Worsening Fiscal Accounts

This box describes the major market reforms implemented in India in the late 1990s. While the reforms were successful at boosting real GDP, they fell short in terms of improving fiscal accounts and reducing the debt ratio. The narrative presented complements the results obtained in the main text, highlighting the role of the implementation context (such as political stability and fiscal sustainability concerns) to reap the gains of market reforms.

The process of market reforms in India began in the mid-1980s and accelerated following the balance of payments crisis in 1991. While the pace and scope of reforms in the latter half of the 1990s were adversely affected by political instability, several important measures were implemented toward the end of the decade. Significant reforms are identified during this period for trade (1997–98), domestic finance (1999), and product markets (1998–2001), based on the IMF Structural Reform Database.³¹

During the 1990s, the overall balance of the general government showed a large deficit of 7.9 percent of GDP on average. Fiscal sustainability was a salient concern throughout the period due to this large and sustained deficit. Interest payments and the states' deficit remained stable before the reforms, with the overall balance driven by the central government's primary deficit and the deficit of central public enterprises. The ratio of tax revenues to GDP showed a declining trend during the 1990s, and while expenditure to GDP also declined in the first half of the 1990s, it was not enough to reduce the deficit. The debt-to-GDP ratio increased from about 40 percent of GDP in the mid-1980s to close to 80 percent in 1992. After the 1991–92 IMF-supported program, the debt ratio improved until the mid-1990s, but started increasing in 1996.

The reforms at the end of the 1990s took place in a context of political instability, decelerating growth, and increasing inflation and external sector pressures. There were three general elections and six changes of government between early 1996 and late 1999, hindering the continuity of the reform agenda. After three years of solid growth performance, real GDP stagnated starting in 1997 due to a decline in agricultural output and weak industrial production, driven by weaker investment demand. The continued weaknesses in the financial sector were considered to have contributed to the slowdown in economic activity through restrained credit. Reforms strengthening the financial sector and improving efficiency and private sector participation in product markets were prioritized.³²

Fiscal sustainability was a concern, but there was limited progress on reforms that directly affected fiscal outcomes. Some factors that contributed to the deterioration of fiscal accounts after the reforms were the 1997/98 sharp wage expenditure increase to reflect the recommendations from the Fifth Pay Commission, with lingering effects in the next two fiscal periods; military expenditures; increases in food subsidies; increased domestic interest rates; and a decrease in concessional external debt. The fiscal deterioration and lack of deep fiscal reforms in a turbulent international environment weakened investor sentiment and led Moody's to downgrade India's credit rating in 1998 to below investment grade.

Trade Reforms

Customs duties were lowered on capital goods and on a range of intermediate inputs. While import duties and surcharges were adjusted up and down during 1997–2000, the effective trade-weighted tariff remained stable at about 25 percent. Reforms in 1997–98 focused heavily on removing nontariff barriers and quantitative restrictions on imports. The import policy for gold and silver was also further liberalized in October 1997. The Indian government signed the World Trade Organization agreement on trade in financial

services, increasing the number of branches foreign banks could open each year. The Foreign Exchange Management Bill was also passed in 1999, facilitating external trade and payments.

Domestic Financial Market Reforms

The core of the financial sector reform involved liberalization of deposit and lending rates, recapitalization of public sector banks, and implementation of the Basel Core Principles for Effective Bank Supervision. The authorities also tightened the regulatory and supervisory framework for nonbank finance companies. The 1999 Insurance Regulatory and Development Authority Bill was enacted, effectively opening the Indian insurance sector to private and foreign competition and established a regulatory entity. In 1999 the Securities Contracts (Regulations) Amendment bill was passed, providing a framework for the introduction of trading in derivatives and collective investment programs. In October 1999, banks were given the freedom to set different prime lending rates for different loan maturities. The Securities and Exchange Board of India also announced measures in 1999 to liberalize norms governing the capital market and bring them on par with international standards. In April 1999, the Reserve Bank of India took a series of steps to facilitate the development of the government securities market.

Product Market Reforms

The government focused on improving efficiency and encouraging a greater role for the private sector. Major reforms were implemented in the power and telecom sectors, and the government designed and executed a strategy for divestment from nonstrategic sectors. In the power sector, regulatory bodies at the central level (Central Electricity Regulatory Commission) and at the state level were set up to deal with tariffs. Legislation in 1998 privatized or corporatized power generation, transmission, and distribution. A new telecom policy was announced in 1999, allowing for multiple fixed service operators and opening domestic long-distance services to private operators. The Telecom Regulatory Authority of India was reconstituted in January 2000. There were also a few reforms in the oil sector, which was dominated by large public enterprises with monopoly positions for exploration, import, and distribution. The reforms included increasing administered prices to clear accumulated arrears by the Oil Coordination Committee, phasing out the administered price mechanism, and lowering oil-related import tariffs. The divestment strategy aimed to reduce government holdings in nonstrategic enterprises to 26 percent. During 1999–2001, three strategic sales of state-owned enterprises were completed, 31 were approved for divestment in FY 2001/02, three loss-making state-owned enterprises were closed during 2000/01, and 10 more were waiting for approval for closure by 2001.

Direct Fiscal Implications from the Reforms

Some reforms had direct fiscal implications through lost tariff revenue, divestment receipts, and compensation benefits to facilitate closure of unproductive public enterprises. The trade reforms had direct fiscal revenue losses estimated at 0.2 percent of GDP for 1997/98, but this was not sustained over time as the import duty changes were reversed in 1998/99. The divestment strategy generated a stream of domestic financing from FY 1998 to FY 2002 of 0.1–0.3 percent of GDP a year (Box Table 1.1). Compared with the budget plans, some of the sales were delayed, postponing the divestment revenues to FY 2003/04. To increase the scope for closure of unproductive public enterprises, the government introduced a more attractive (but time-bound) compensation package for workers opting for voluntary retirement. Benefits were paid from a restructuring fund partly replenished from the sale of the closed companies' remaining assets.

³¹ These indicators show large changes exceeding two standard deviations over the emerging market and developing economy sample.

³² See the following documents for India: IMF Staff Reports (1996–2002), IMF Recent Economic Developments (1997–2001), IMF Selected Issues (1997–2002).

Box Table 1.1. Divestment Receipts

	1997/98	1998/99	1999/2000	2000/01	2001/02
Billions of Rupees	9.1	58.7	17.2	21	36
Percent of GDP	0.1	0.3	0.1	0.1	0.2

Source: IMF staff calculations based on data provided by the Indian authorities.

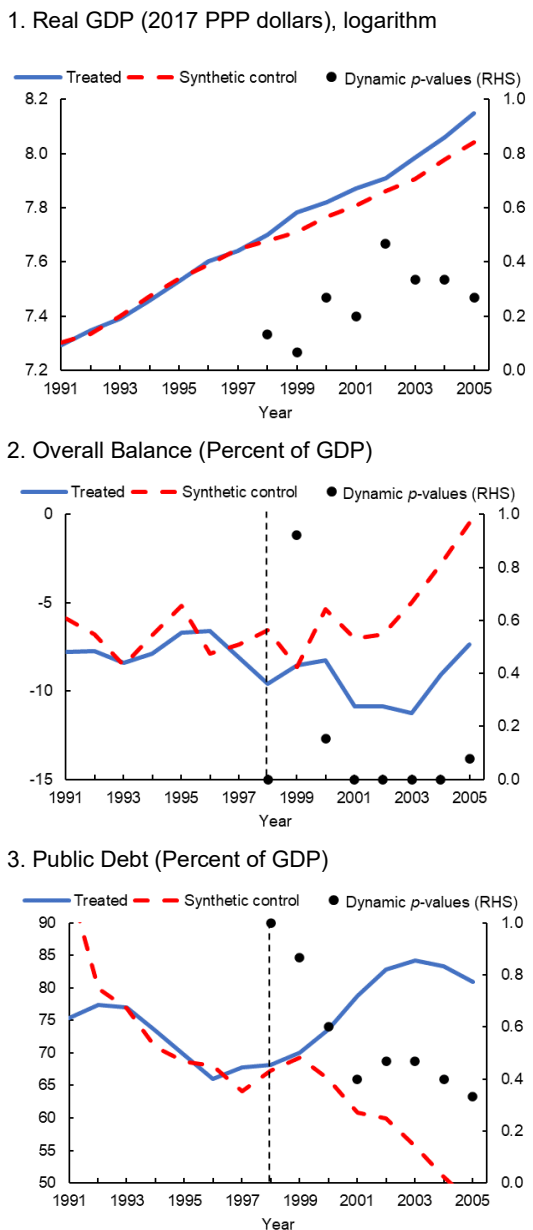
Impact of the Reforms

The reforms are estimated to have led to an increase in output but a weakening of the overall fiscal balance (Box Figure 1.1). The synthetic control method is used to estimate counterfactual paths (see Annex I.B for details). While real GDP increased after the reforms, output growth continued its declining path from 6.2 percent in 1995–97 to 6 percent in 1998–2000. However, the overall balance further deteriorated after the reforms. The worse overall-balance-to-GDP ratio is statistically significantly lower than the estimated counterfactual path. Public debt increased in the three years after the reforms, from an average of 67.9 percent of GDP to an average of 70.6 percent, although the increase was not statistically significantly different from the estimated counterfactual path and cannot be attributed to the reforms.

The worsened overall fiscal balance was driven by increased expenditure that offset lagged improvements in revenue. Revenue initially declined and improved only a couple of years after the reforms when compared with an estimated counterfactual path. However, the effect is not statistically significant. The estimated impact on expenditure is close to zero and statistically insignificant shortly after the reforms, but expenditure was higher than an estimated counterfactual path from 2000 onward.

These results suggest that fiscal gains were not large enough to reverse the course of fiscal sustainability concerns, despite the favorable effect on output. The implemented reforms had limited direct fiscal gains, and the indirect gains that materialized later were more than offset by increased expenditure. Political instability at the time of reform implementation may have posed challenges to containing expenditure and enacting reforms targeted to fiscal outcomes.

Box Figure 1.1. India: Reform Impacts Estimated by the Synthetic Control Method



Sources: IMF, Structural Reform Database; and IMF, World Economic Outlook database 2023. Note. See Annex I.B for details. The dashed vertical line indicates the year of the reform. PPP = purchasing power parity; RHS = right scale.

Annex I. Empirical Methods

I.A. Local Projection Method

To estimate the dynamic response of fiscal variables to reforms, the local projection method (LPM) proposed by Jordà (2005) is followed. This approach has been advocated by Auerbach and Gorodnichenko (2013) and Romer and Romer (2017) as a flexible alternative to vector autoregression, better suited to estimating nonlinear effects—such as, in this context, those associated with the interactions between market reforms and countries' initial characteristics. The baseline specification is

$$y_{t+k,i} - y_{t-1,i} = \alpha_i + \tau_t + \beta_k SR_{i,t} + \theta X_{i,t} + \varepsilon_{i,t} \quad , \quad (1)$$

in which $y_{t,i}$ is the dependent fiscal variable of interest (see below); k is the forecast horizon, up to five years, after the which effect of reform shocks can take time to materialize; β_k denotes the (cumulative) response of the variable of interest in each year after the structural reform shock; α_i and τ_t are country and time fixed effects, respectively, included to take account of cross-country heterogeneity and global shocks (such as global financial cycle and the commodities cycle); $SR_{i,t}$ denotes a structural reform shock, measured as the first difference of the corresponding structural policy indicator then normalized to represent one standard deviation of the respective reform category. $X_{i,t}$ is a set of control variables including two lags of structural reform shocks, real GDP growth, the level of the overall balance (expressed in percent of GDP), government expenditures (expressed in percent of GDP), inflation, and the relevant dependent (fiscal) variable.³³ In some specifications, we further control for two lags of the change in the cyclically adjusted primary balance given that some structural reform episodes may follow or be concomitant with fiscal adjustment programs.

Equation (1) is estimated using ordinary least squares with spatial correlation consistent standard errors as proposed by Driscoll and Kraay (1998).³⁴ Impulse response functions (IRFs) are then obtained by plotting the estimated β_k for $k = 0, 1, \dots, 5$ with 90 (68) percent confidence bands computed using the standard errors associated with the estimated coefficients β_k .

This equation is estimated for the following set of dependent fiscal variables: government gross debt, government overall balance, government primary balance, total government expenditures, total government revenues (all expressed in percent of GDP), and the effective interest rate on government debt (defined as interest payments over the stock of government gross debt in the previous period). The estimation is conducted on a common set of fiscal observations for arithmetic consistency (as the time and cross-sectional dimension of the different dependent variables is not identical ex ante) across the different IRFs on an unbalanced panel of 62 emerging market and developing economies between 1970 and 2014. All variables used in the empirical analysis are retrieved from IMF World Economic Outlook database 2023, supplemented by the IMF Global Debt Database (Mbaye, Badia, and Chae 2018).

The impact of reforms on the sovereign interest spread of the country considered, which could reflect confidence or credibility effects of reforms, is also analyzed.³⁵ To this end, the 10-year foreign-currency-denominated government bond spread vis-à-vis the United States, drawn from Bloomberg, is used.³⁶

³³ Alternatively, replacing government expenditures with revenues does not alter the main thrust of our results.

³⁴ This is a nonparametric technique assuming the error structure to be heteroscedastic, autocorrelated up to some lag, and possibly correlated across countries.

³⁵ For a recent study on the credibility of public finances, see IMF (2021).

³⁶ As an alternative measure, sovereign bond spreads on external US dollar-denominated debt using data from J.P. Morgan Emerging Market Bond Index Global (EMBIG) are used, which enables broadening the coverage of emerging market and

(continued)

The debt-to-GDP ratio data are cleaned of potential outliers. Debt-to-GDP ratios can be subject to very large sudden shifts resulting, for example, from data revisions, debt restructuring, or hyperinflation—all of which could affect the regression estimates insofar as they correlate even mildly with structural reform episodes. To remove such anomalies from the data, the following simple algorithm is applied. First, the first difference of the debt-to-GDP ratio is computed, followed by marking the years with changes in excess of one standard deviation of the sample's distribution of annual changes in debt-to-GDP ratios for each country. Second, those years that show two consecutive odd movements—a spike followed by a dip, or a dip followed by a spike—are also marked. A unanimous rule is then applied to identify and remove outliers, thereby avoiding any ad hoc adjustments. Details for specificities around pairs of countries and years removed from the empirical analysis are available upon request.

Six types of reforms, $SR_{i,t}$, are considered, plus an aggregate structural reform indicator that combines all of them using a simple arithmetic average, in the following areas: domestic finance, external finance, international trade (tariffs and nontariff barriers, separately); labor market (employment protection legislation); and privatization in product markets (that is, telecommunications and electricity sectors). All these indicators of reforms are drawn from the IMF Structural Reforms Database (Alesina and others 2020), as used in IMF (2019) on the macroeconomic effects of reforms in emerging market and developing economies. The only exception is the nontariff barriers indicator, which is sourced from Estefania-Flores and others (2022). The estimated signs of the impulse responses are summarized in Annex Table I.A.1.³⁷

The estimated increases in real GDP upon reforms are broadly in line with those in IMF (2019) despite several differences as follows. First, the estimation specification in this note includes more control variables than those used in the empirical analysis of IMF (2019). Second, the estimation sample in this note is smaller due to the imposition of a common sample across fiscal variables for comparison purposes and the debt outlier exclusion algorithm employed, as explained above. Third, the size of the shock used for impulse response functions is one standard deviation in this note, while two standard deviations are used in the empirical analysis of IMF (2019) instead. If the same controls and the same scaling of initial shocks are used, results show very similar dynamics and order of magnitude regarding the impacts for real GDP, that is, between 0.5 and 1 percent at the peak, four years after the shock.

developing economies (Bloomberg covers 29 of these; J.P Morgan EMBIG covers 43). Results using this alternative measure convey a similar picture and are available upon request.

³⁷ All reform-area indicators are computed by adding up multiple subarea indicators and subsequently standardized between 0 and 1. The combined reform indicator is the average of the individual reform-level indicators and is thus also bounded between 0 and 1.

Annex Table I.A.1. Summary of Empirical Impulse Responses Estimated by Local Projection Method¹

	Aggregated Indicator ²	Domestic Finance	External Finance	Labor Market	Privatization ³	Trade ⁴	Nontariff Trade Barriers ⁵
Public Debt	Down* (ST-MT)	Down* (ST-MT)	Down (ST-MT)	None	None	None	Down* (ST-MT)
Overall Balance	Up* (ST)	Up* (ST)	None	Down* (ST-MT)	None	None	Up* (ST)
Primary Balance	Down* (MT)	Up* (ST)	None	Down* (ST-MT)	None	None	None
Revenue	Up* (ST)	Up* (ST)	None	Down* (ST-MT)	None	Up* (ST)	Up* (ST)
Expenditure	Up (ST-MT)	None	None	None	None	Up* (MT)	None
Public Consumption	Up* (MT)	None	Up* (MT)	Up* (ST)	Up* (MT)	None	Up* (ST-MT)
Public Investment	None	Up* (ST)	None	Down* (ST-MT)	Down* (ST)	Down* (ST)	Down* (ST-MT)
Effective Interest Rate	Down (ST)	Down* (MT)	Down* (ST)	Down* (ST)	None	None	Down* (ST)
Real GDP	Up* (ST-MT)	Up* (ST-MT)	Up* (ST-MT)	None	Up* (MT)	Up	Up* (ST-MT)

Sources: Estefania-Flores and others (2022); IMF, Structural Reform Database (Alesina and others 2020); IMF, World Economic Outlook database 2023); and IMF, Global Debt Database (Mbaye, Badia, and Chae 2018).

¹ “Up,” “Down,” or “None” indicates whether the estimated effect is positive, negative, or not clear; star (*) denotes statistical significance at the 10 percent level or greater (i.e., *p*-value less than 10 percent); ST and MT denote whether the effect is over the short or medium term, respectively, if statistically significant. All dependent variables are expressed in percent of GDP, except for real GDP (natural logarithm).

² A simple average of the indicators in the IMF Structural Reform Database in the following areas: trade, domestic finance, external finance, labor market, privatization. The indicator of nontariff trade barriers is not included as it is differently sourced from Estefania-Flores and others (2022).

³ The simple average of subindicators on public ownership in the two sectors (telecommunications and electricity).

⁴ The simple average of subindicators on trade tariffs and current account restrictions.

⁵ An index sourced from Estefania-Flores and others (2022).

Dependence of the impact of reforms on fiscal outcomes on individual country characteristics is also explored. For example, the analysis explores variation in the fiscal response with respect to the level and efficiency of various taxes—as would be expected insofar as reforms raise output and, depending on the marginal income tax rate and the degree of efficiency of the tax considered, tax revenues.^{38,39} Specifically, the dynamic fiscal response is allowed to vary with different initial characteristics. The local projection estimation of nonlinear effects is equivalent to Granger and Terasvirta’s (1993) smooth transition autoregressive (STAR) model.⁴⁰ The augmented specification takes the following form:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \tau_i + \beta_k^L F(z_{i,t}) SR_{i,t} + \beta_k^H [1 - F(z_{i,t})] SR_{i,t} + \theta X_{i,t} + \varepsilon_{i,t} \quad (2)$$

with

$$F(z_{it}) = \frac{\exp(-\gamma z_{it})}{1 + \exp(-\gamma z_{it})}, \quad \gamma > 0,$$

³⁸ Value-added tax (VAT) rates are based on a panel dataset, retrieved from the IMF Fiscal Affairs Department Tax Policy database—it refers to the combined standard rate. Efficiency of tax collection refers to a cross-sectional dataset VAT c-efficiency.

³⁹ Auerbach and Gorodnichenko (2012, 2013) discuss the advantages of using the local projection approach to estimate nonlinear effects.

⁴⁰ Using such a STAR function in the context of fiscal policy is not new. Auerbach and Gorodnichenko (2012, 2013) and Abiad and others (2016) employed a similar approach.

in which z_{it} is a (time-invariant) indicator of tax efficiency or a (time-varying) level of a given tax rate, normalized to have zero mean and unit variance.⁴¹ The coefficients β_L^k and β_H^k capture the fiscal impact of reforms at each horizon k in cases in which the efficiency and/or level of the tax rate is low ($F(z_{it}) \approx 1$ when z_{it} goes to minus infinity) and in which it is high ($1 - F(z_{it}) \approx 1$ when z_{it} goes to plus infinity), respectively.⁴²

The level of informality is based on the deterministic dynamic general equilibrium model approach used in Colombo and others (2022). This measure was proposed by Elgin and Oztunali (2012) and recently updated by Elgin and others (2021). A value below the cross-country median is used to define informality as “low.”

Additional analyses for robustness generally confirm the findings under the baseline estimation. Including a dummy for IMF-supported programs leads to similar results or almost identical results (still different, though) when using the same sample over the period 1993–2014 based on data availability of the [Monitoring of Fund Arrangements](#) (MONA) database (Annex Figure I.A.5). If reforms are implemented in the downturn, then the impacts from the reforms may not be separately identified from the recovery effects. Some additional regressions are conducted considering this issue (Annex Figure I.A.5). The dummy variable for a financial crisis is included in the regression, leading to broadly similar results. Also, to address the issue that reforms could be implemented to try to boost future output, expectation made in a prior period regarding future growth is included in the regression, resulting in similar estimates too. Similarly, to address the issue that reforms could be implemented to try to reduce future debt and improve debt sustainability, expectation made in a prior period regarding future deficit or debt (both in percent of GDP) is included in the regression, and results do not change either. Furthermore, a variable to capture reforms implemented in neighboring countries is used as an instrumental variable, leading to larger point estimates in general and supporting the baseline estimation results, too.⁴³

⁴¹ The weights assigned to each regime vary between 0 and 1 according to the weighting function $F(\cdot)$, so that $F(z_i)$ can be interpreted as the probability of being in a given state, high or low tax/efficiency.

⁴² We choose $\gamma = 3$. Results barely change when using alternative values of the parameter γ , between 1 and 4.

⁴³ The instrument variable is the distance-weighted average of the reform indicators in other countries, following Alesina and others (2020), to capture an exogenous momentum for reforms motivated by peer countries. This instrument variable may suffer from upward bias due to regional spillovers through factors other than reforms (for example, growth, trade, capital flows) as well as through cross-country synergies.

Annex Table I.A.2. Final Country Sample for the Baseline LPM Specification

	First Year	Last Year		First Year	Last Year
Albania	1997	2014	Kyrgyz Republic	1995	2014
Algeria	1995	2014	Latvia	1997	2014
Argentina	1984	2014	Lithuania	1995	2014
Azerbaijan	2002	2014	Madagascar	1995	2014
Bangladesh	1984	2014	Malaysia	1989	2014
Belarus	2000	2010	Mexico	1973	2014
Bolivia	1974	2014	Morocco	1992	2014
Brazil	1978	2014	Mozambique	1999	2014
Bulgaria	1997	2014	Nepal	2000	2014
Burkina Faso	1984	2014	Nicaragua	1991	2014
Cameroon	1999	2014	Nigeria	1990	2014
Chile	1976	2014	Pakistan	1973	2014
China	1987	2014	Paraguay	1974	2014
Colombia	1975	2014	Peru	1974	2014
Costa Rica	1985	2014	Philippines	1974	2014
Côte d'Ivoire	1996	2014	Poland	1994	2014
Dominican Republic	1996	2014	Romania	1990	2014
Ecuador	1994	2014	Russia	1999	2014
Egypt	1998	2014	Senegal	1998	2014
El Salvador	1989	2014	South Africa	1985	2014
Estonia	1995	2014	Sri Lanka	1990	2014
Ethiopia	1995	2014	Tanzania	1991	2014
Georgia	1999	2014	Thailand	1973	2014
Ghana	1973	2014	Tunisia	1990	2014
Guatemala	1994	2014	Türkiye	1986	2014
Hungary	1995	2014	Uganda	1996	2014
India	1985	2014	Ukraine	1995	2014
Indonesia	1976	2014	Uruguay	1973	2014
Jamaica	1996	2014	Uzbekistan	2001	2014
Jordan	1996	2014	Venezuela	1977	2014
Kazakhstan	2001	2014	Vietnam	1997	2014
Kenya	1994	2014	Zimbabwe	2005	2014

Source: IMF staff calculations.

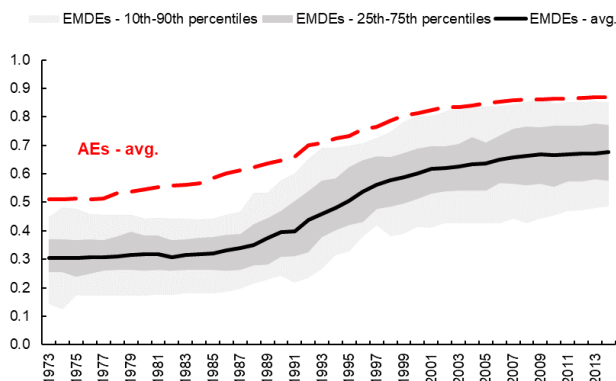
Note: LPM = local projection method.

Annex Table I.A.3. Descriptive Statistics for Selected Variables

	Mean	Median	25th Percentile	75th Percentile
Debt/GDP	52.4	43.7	27.6	67.4
Overall Balance/GDP	-0.1	-0.2	-2.0	1.8
Expenditure/GDP	29.6	27.7	18.5	39.6
Revenue/GDP	27.1	24.7	16.2	37.1
Effective Interest Rate	5.7	5.0	3.4	7.2
Public Consumption/GDP	16.4	15.7	11.5	19.5
Public Investment/GDP	6.2	4.7	3.2	7.5
Real GDP Growth Rate	3.4	3.8	1.6	5.9

Sources: Bloomberg Finance L.P.; IMF, Structural Reform Database (Alesina and others 2020); IMF, World Economic Outlook database 2023; IMF, Global Debt Database (Mbaye, Badia, and Chae 2018); and IMF staff calculations.

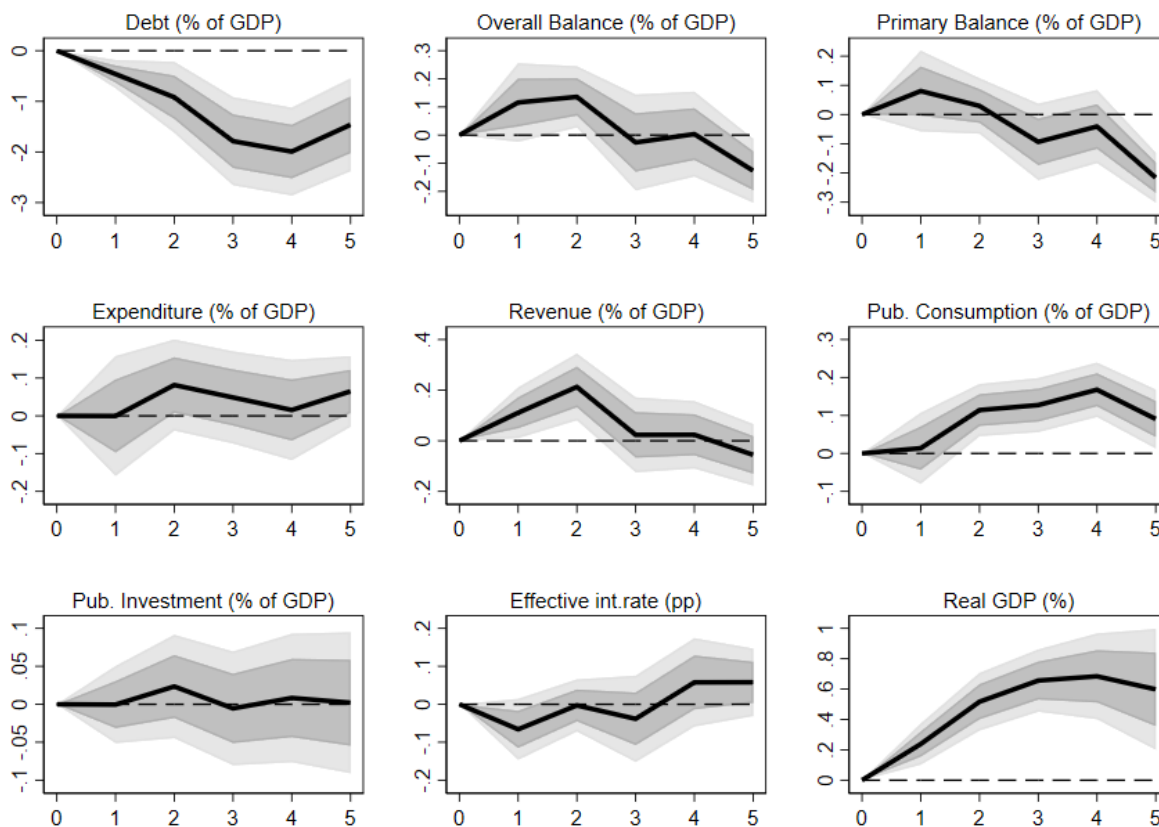
Annex Figure I.A.1. Combined Market Reforms Indicator in Emerging Market and Developing Economies



Sources: IMF, Structural Reform Database (Alesina and others, 2020); and IMF staff calculations.

Note: AEs = advanced economies; EMDEs = emerging market and developing economies.

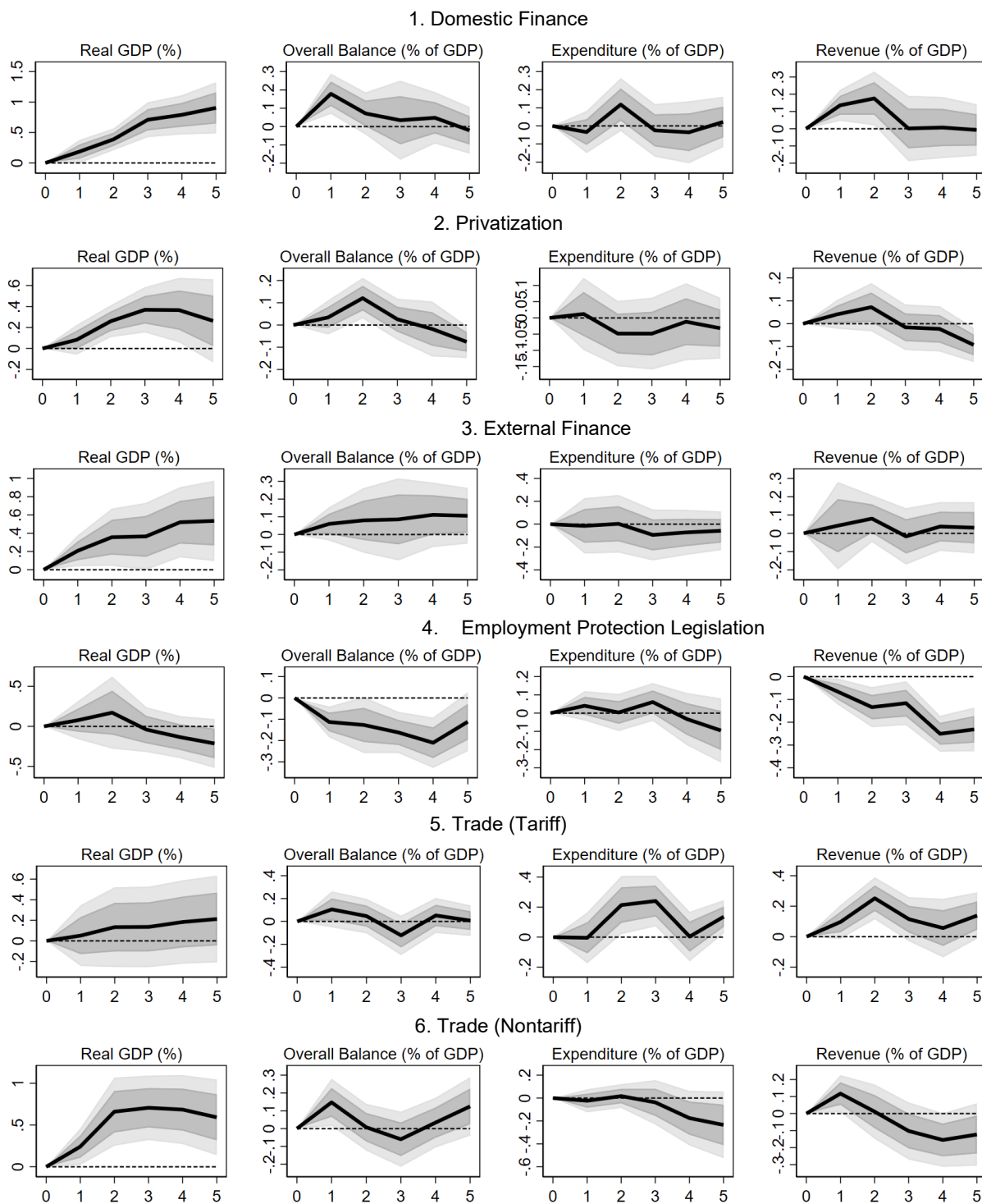
Annex Figure I.A.2. Empirical Impulse Responses upon Market Reforms



Sources: Bloomberg Finance L.P.; IMF, Structural Reform Database (Alesina and others 2020); IMF, World Economic Outlook database 2023; IMF, Global Debt Database (Mbaye, Badia, and Chae 2018); and IMF staff calculations.

Note: Cumulative effect after a one standard deviation shock to the aggregate indicator of reforms. Darker (lighter) gray shading indicates 90 (68) percent confidence intervals. See Annex I.A for details.

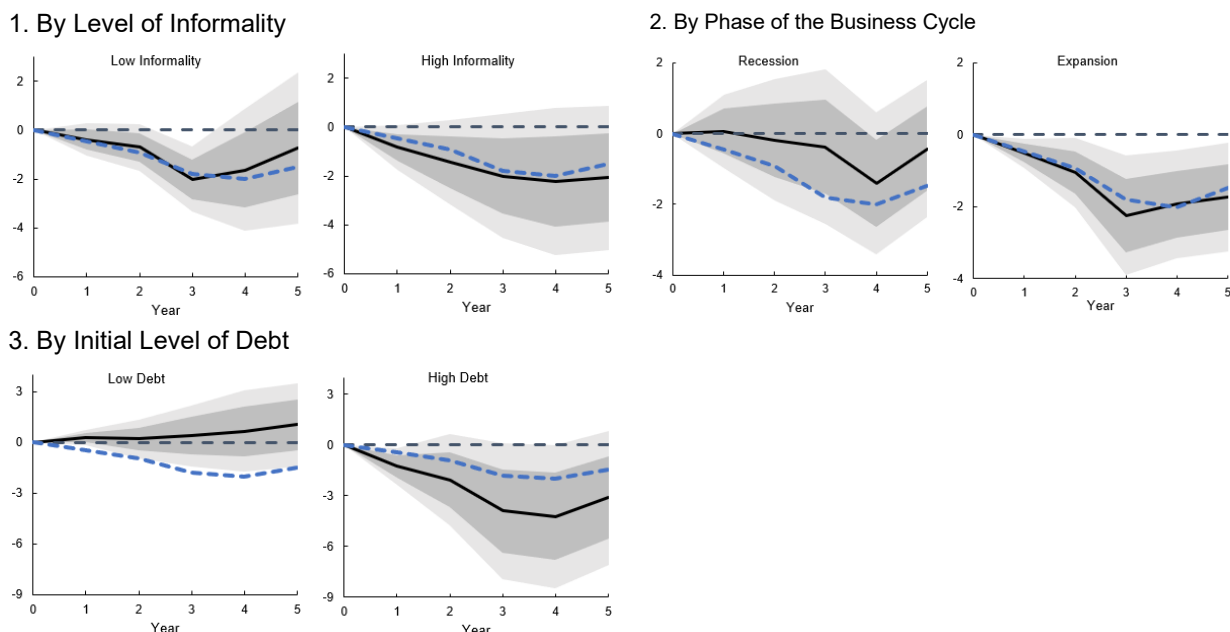
Annex Figure I.A.3. Empirical Impulse Responses for Individual Reforms



Sources: Bloomberg Finance L.P.; IMF, Structural Reform Database (Alesina and others 2020); IMF, World Economic Outlook database 2023; and IMF, Global Debt Database (Mbaye, Badia, and Chae and others 2018).

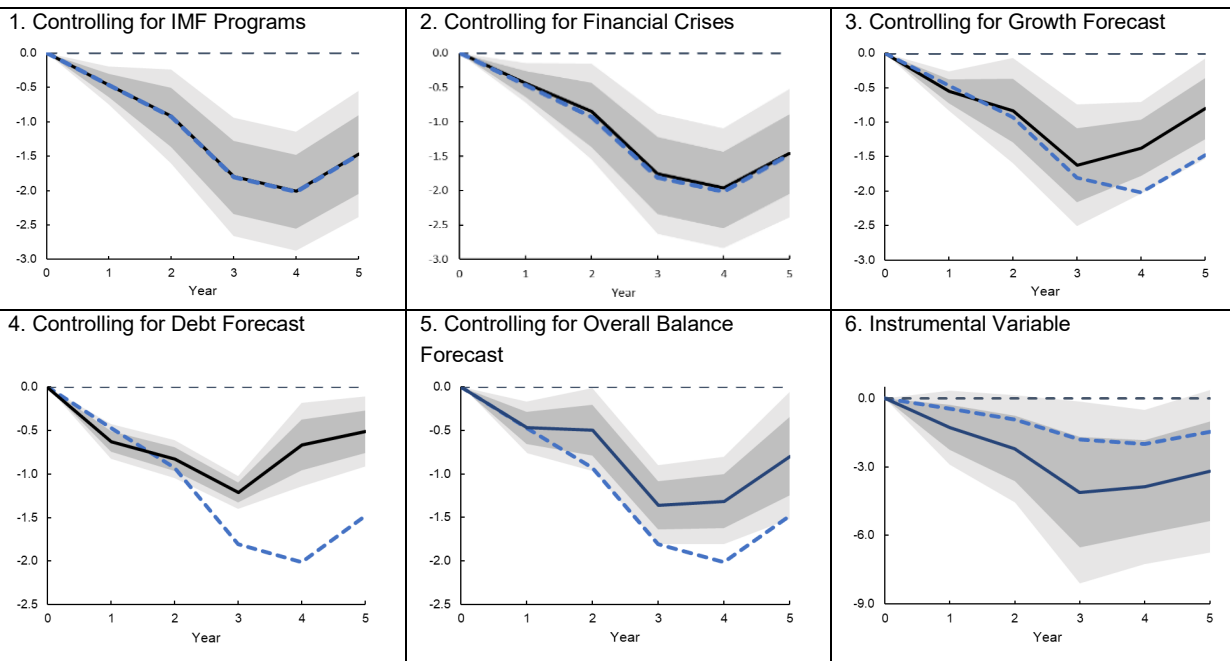
Note: Cumulative effect after a one standard deviation shock to the employment protection indicator of reforms. Lighter (darker) gray shading indicates 90 (68) percent confidence intervals. See Annex I.A for details.

Annex Figure I.A.4. Heterogeneity in Empirical Impulse Response of Debt upon Market



Sources: Bloomberg Finance L.P.; Colombo and others (2022); IMF, Structural Reform Database (Alesina and others 2020); IMF, World Economic Outlook database 2023; IMF, Global Debt Database (Mbaye, Badia, and Chae 2018); and IMF staff calculations. Note: Cumulative effect after a one standard deviation shock to the trade (nontariff) indicator of reforms. Lighter (darker) gray shading indicates 90 (68) percent confidence intervals. The blue dashed line shows the baseline results. See Annex I.A for details.

Annex Figure I.A.5. Robustness Checks for Empirical Impulse Response of Debt upon Market Reforms



Sources: Bloomberg Finance L.P.; IMF, Structural Reform Database (Alesina and others 2020); IMF, World Economic Outlook database 2023; IMF, Monitoring of Fund Arrangements (MONA); and IMF, Global Debt Database (Mbaye, Badia, and Chae 2018). Note: Cumulative effect after a one standard deviation shock to the aggregate indicator of reforms. Lighter (darker) gray shading indicates 90 (60) percent confidence intervals. The blue dashed line shows the baseline results. See Annex I.A for details.

I.B. Synthetic Control Method

The synthetic control method (SCM) is used to estimate the effect of major market reforms. The SCM is a quantitative case study technique that builds a synthetic control using data from comparators before the reforms episode that can replicate the treated country before the reforms. Using the synthetic control, a counterfactual path is built for how the outcome variable of interest would have looked in the absence of the reforms.⁴⁴ The effects on real GDP, gross-debt-to-GDP ratio, overall fiscal balance, government expenditure to GDP, government revenues to GDP, and the effective interest rate are examined. The sample period is restricted to seven years pretreatment to calibrate the synthetic unit and seven years posttreatment to evaluate the impact. The pretreatment outcomes are matched using a model with covariates that includes the pretreatment average value of the overall reforms index, the pretreatment average value of real GDP growth, and the remaining most recent T-2 pretreatment observations.⁴⁵ Two measures of quality of fit are presented. The first one is the fit index, as in Abadie, Diamond, and Hainmueller (2010) and Adhikari and others (2018), which compares the quality of fit against a zero-fit model for the treated country, the closer to 0 the better the fit. The second one is the relative fit index, indicating the proportion of placebos that have a pretreatment root mean square prediction error (RMSPE) at least as large as the treated unit, the closer to 1 the better the fit.

The comparator country group (so-called donor pool) is restricted in several ways. First, countries that also had a major reform within five years before and after the treatment year are removed from the pool. Second, isolated outliers (as defined in the Local Projection Method section) are replaced with the before and after average; in any other case with more missing values the country is dropped. Third, the countries in East Asia that experienced the 1997 East Asian financial crisis through direct channels are excluded. Finally, the donor pool is restricted to countries that belonged to the same income group as the treated country; countries belong to one of three income groups: advanced economies, emerging market economies, and low-income developing countries.

In line with the cross-sectional results from Section II, the estimated counterfactual using the SCM for real GDP indicates a positive effect of the implemented reforms on output, likely related to limiting contagion from the 1997 Asian financial crisis. The estimated p -values indicate a significant effect of reforms on output in the first half of the postreform period.⁴⁶ In terms of the gross-debt-to-GDP ratio, its realized value was close to the estimated counterfactual path shortly after the reforms, but it remained above the counterfactual in the remaining portion of the posttreatment period. The estimated p -values suggest the estimated reform impact is insignificant and the gross-debt-to-GDP ratio is driven by idiosyncratic factors not captured by the SCM.

The results related to the overall balance show a worse overall-balance-to-GDP ratio compared with the counterfactual path. The estimated p -values indicate the effect found is statistically significant. The lower quality of fit than for other variables is an indicator of the strong idiosyncratic factors at play in India's fiscal position that make it difficult to match in the pretreatment period and weaken the credibility of the counterfactual impact estimated. Revenue and expenditures are also analyzed separately. In terms of revenues, real revenues are found to have improved after the reforms, but the

⁴⁴ See Abadie (2021) for a comprehensive survey on the SCM.

⁴⁵ Following Kaul and others (2021), when covariates are included, pretreatment outcome variables are not included as matching targets. The pretreatment rules of thumb of Ferman, Pinto, and Possebom (2020) are followed, and results for a model with no covariates are available upon request. The main difference between models is how the weights are allocated to different countries to achieve the best covariate balance possible in the pretreatment period. While a model with no covariates achieves the best pretreatment fit, including covariates can improve the quality of the counterfactual created through the synthetic control by improving the posttreatment simulation.

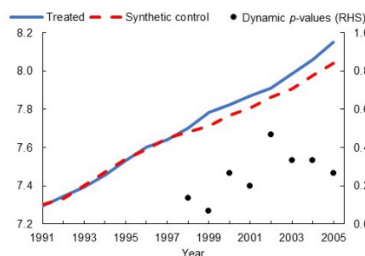
⁴⁶ One-sided p -values are calculated based on placebo experiments for the donor pool, see Abadie, Diamond, and Hainmueller (2010) and Galiani and Quistorff (2017). The adjusted p -value indicates the likelihood of obtaining an estimate at least as large as the one obtained for the treated unit at each postreform period analyzed. The effect is standardized by the pretreatment match quality as measured by the pretreatment RMSPE, and placebos with a pretreatment RMSPE 5 times larger (worse) than the treated country are dropped.

counterfactual impact estimated is insignificant. For expenditures, a close to zero and insignificant effect is found shortly after the reforms, while actual expenditures were higher than the control in the second half of the posttreatment period. These results point to the worsening of the overall fiscal balance being driven by the improvement in output with a worsening of revenues in the first half, while in the second half the worsening is driven by the increase in expenditures.

The results for the effective interest rate are in line with the domestic finance reforms increasing domestic interest rates due to previous financial repression (most of the Indian government debt is domestic). However, the estimated *p*-values suggest the estimated reform impact cannot be distinguished from a random effect. Given the small donor pool and low quality of fit, it is not possible to separate whether the effect is due to the reforms (confidence effects from the reforms that limited the increase in the effective interest rate in the first half and a higher risk from the weak fiscal position in the second half) or idiosyncrasies from the donor pool.

Annex Figure I.B.1. India: Reform Impacts Estimated by the Synthetic Control Method

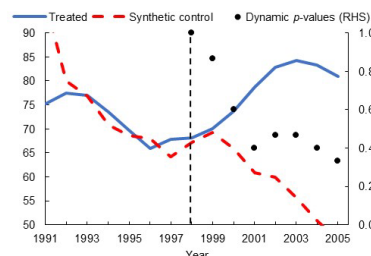
1. Real GDP (2017 PPP dollars), logarithm



RMSPE: 0.0109 Fit index: 0.0014
Relative fit index: 0.9333

Synthetic India is made up of 59% Brazil, 38% China and 3% Georgia.

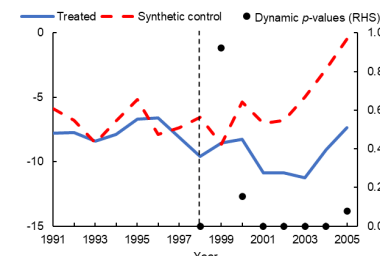
2. Gross-Debt-to-GDP Ratio (Percent of GDP)



RMSPE: 8.1920 Fit index: 0.1086
Relative fit index: 0.2667

Synthetic India is made up of 31% Jordan, 26% China, 19% Ecuador, 9% Brazil, 8% Algeria, and 7% South Africa.

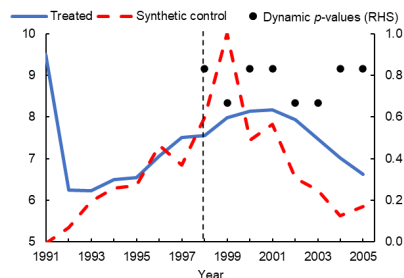
3. Overall-Balance-to-GDP Ratio (Percent of GDP)



RMSPE: 1.2000 Fit index: 0.1377
Relative fit index: 0.6154

Synthetic India is made up of 55% Türkiye, 43% South Africa, and 2% China.

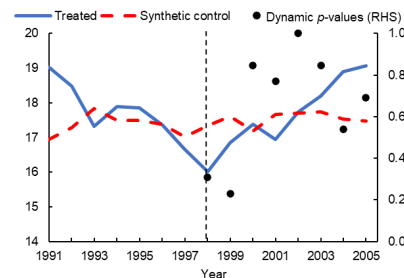
4. Effective Interest Rate (Percent)



RMSPE: 1.7747 Fit index: 0.2392
Relative fit index: 0.3333

Synthetic India is made up of 60% Jordan, 26% Chile, 8% Costa Rica, and 6% Türkiye.

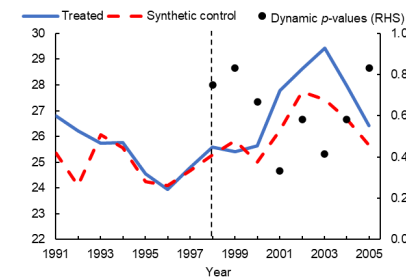
5. Revenues-to-GDP Ratio (Percent)



RMSPE: 0.9625 Fit index: 0.0543
Relative fit index: 0.8462

Synthetic India is made up of 55% Costa Rica, 42% Tunisia, 2% Bolivia, and 1% Jordan.

6. Expenditures-to-GDP Ratio (Percent)



RMSPE: 0.9934 Fit index: 0.0245
Relative fit index: 0.8333

Synthetic India is made up of 33% Algeria, 24% China, 17% Uruguay, 17% Jordan, 8% Costa Rica, and 1% Paraguay.

Source: IMF staff estimates.

Note: Dashed line indicates the year of the reform. PPP = purchasing power parity; RHS = right scale.

Annex II. DIGNAR-19 Model Simulation

II.A. Model Structure

The Debt, Investment, Growth, Natural Resources, and COVID-19 (DIGNAR-19) model is extended to account for the effect of market reforms.⁴⁷ DIGNAR is a real, dynamic, open economy model. Its general equilibrium nature makes it possible to analyze the impact of reforms simultaneously on output, private investment, consumption, and government debt, besides other variables. Firms optimally choose their demand for private capital and labor inputs. The government levies distortionary taxes to finance public expenditures. Policymakers are assumed to respond to changes in the debt/GDP ratio with a lag, to return the ratio gradually to its steady-state level: increases (decreases) in the debt ratio are followed by tax rate hikes (cuts). The model is extended to account for four implications of reforms, as follows.

First, product market reforms are modeled to increase competition. Deregulation leads to an inflow of businesses causing profit margins to shrink and to an increase in production and employment. For simplicity, the increase in competition is captured by a decrease in the average markup. It is modeled as a permanent shock to the intratemporal elasticity of substitution between goods that delivers a target decrease in the average markup:

$$P_t = (1 + \lambda_t)MC_t,$$

in which P_t is the aggregate price level and MC_t is the average marginal cost. The average mar-up charged by businesses, λ_t , is given by:

$$\lambda_t = \frac{1}{\zeta_t - 1},$$

in which ζ_t is the intratemporal elasticity of substitution across goods.

Second, financial market reforms increase the efficiency of resource allocation. Financial repression constrains private credit and results in slower capital accumulation. Financial liberalization facilitates financial deepening, which in turn supports higher capital stock. The model captures this relationship through an implicit cost of renting capital. As a result, firms are discouraged from investing.

From an algebraic point of view, this mechanism is captured as follows. Let the firm's production function be

$$Y_t = f(K_t, L_t, K_t^G),$$

in which Y_t is output, K_t is the stock of private capital, L_t is labor, K_t^G is the stock of public capital, and $f(\cdot)$ is an increasing and concave function of the public capital and private factors of production. The firm's profit, Π_t , is given by

$$\Pi_t = Y_t - w_t L_t - (1 + \kappa_t^K) r_t^K K_t,$$

in which w_t is the real wage, $\kappa_t^K \in [0,1]$ is the cost of financial repression as a share of the firm's capital expenditure, and r_t^K is the rental rate of private capital. Standard profit maximization implies that the rental rate of capital is equalized to the marginal product of capital:

⁴⁷ The DIGNAR19 model (Aligishiev and others 2021) itself is an extension of the DIG/DIGNAR models (Buffie and others 2012; Melina, Yang, and Zanna 2016) to accommodate the effects of the COVID-19 pandemic. See Gurara, Melina, and Zanna (2019) for a stocktaking of many applications of these models by IMF country teams.

$$r_t^K = \frac{1}{(1 + \kappa_t^K)} \frac{\partial f(\cdot)}{\partial K_t}.$$

Additional costs associated with a less liberalized domestic financial system create a wedge $(1 + \kappa_t^K)^{-1} < 1$ between the rental rate of capital and the marginal product of capital. For a given level of capital productivity, reforms causing a decrease in this wedge require the demand for capital inputs to increase and the rental rate of capital to rise in equilibrium. This will translate into higher output, employment, and private investment.

Third, the trajectory of public debt is sensitive to the tax collection efficiency, the reaction of the sovereign risk premium, and any government revenue deriving from market distortions. At a first approximation, reforms produce growth dividends that benefit the country's debt-to-GDP ratio. However, the size of these potential gains depends, among other things, on the soundness of the tax administration system. For example, due to inefficiencies in the tax collection system, a fraction of taxes due may fail to reach the government's revenue authority, compromising the improvement in the debt-to-GDP ratio. To reflect this point, the law of motion of total government debt (in real terms) may be expressed as follows:

$$D_{t+1} = R_t D_t + G_t - (1 - \theta)(T_t + \Lambda_t),$$

in which D_t is government debt, R_t is the real gross interest rate paid on debt, G_t is government spending, T_t is the de jure tax revenue net of licensing fees, $\theta \in [0,1)$ is the share of tax revenue lost owing to the tax collection inefficiency, and Λ_t represents government revenues deriving from the product market distortion (that is, licensing fees). For a given level of tax revenue, a higher θ would result in a higher level of debt.

Fourth, the extent to which product market reforms affect public debt depends on the size of the implied net direct revenue to the government. On the one hand, market inefficiencies that arise due to excessive regulation may entail government revenues in some countries, that is, they are not purely wasteful distortions. For example, licensing creates market barriers that hinder competition and economic growth but also supplements the government budget with licensing fees. In such countries, market liberalizations may in principle lead to worse fiscal outcomes as additional revenues from regulatory activities are forgone. On the other hand, product market reforms that involve privatizations can produce one-off revenue gains as assets are sold to the private sector.

To reflect these opposing effects in the analysis of a representative emerging market and developing economy, the net direct revenue to the government is calculated as a partial permanent loss of its licensing fee receipts when the reform is adopted—where the size of the loss depends on the strength of the reform proxied via the expected reduction in the aggregate markup—that is counteracted by the one-off revenue gain from the sale of government assets:

$$\Lambda_t = -LF + PR_t \quad \text{for } t = 0, 1, \dots, H$$

$$LF = \gamma \sum_{s=0}^H \Delta \lambda_s$$

$$PR_t = \begin{cases} > 0, & \text{for } t = 1 \\ = 0, & \text{for } t \neq 1 \end{cases}$$

and Λ_t is a net direct gain/loss in government revenue at time t ; LF is a permanent loss in the licensing fee revenue; PR_t is the revenue gain from the sale of government assets, assumed to be zero in every period but $t = 1$; $\gamma \in [0,1]$ is the elasticity of government licensing revenues to the decrease in the average markup; H is the horizon of simulation for reforms. When γ is set to zero, product market reforms' effect on government revenues boils down to one-off revenue gains from privatization. Setting $\gamma \in (0,1]$ implies that product market reforms are associated with fiscal costs in the short term.

II.B. Calibration

The model is calibrated at an annual frequency to a representative emerging market and developing economy. Annex Table II.B.2 reports the key parameters and initial values necessary to pin down the steady state. Initial values are obtained in two steps. First, historical averages are computed for individual countries in our sample. Second, the means/medians of the associated distributions are set as the resulting initial values. Most of the deep structural parameters are taken from Melina, Yang, and Zanna (2016).

The initial level of market distortions is taken from the literature or fitted to the data. Following Adrian, Gaspar, and Vitek (2022), the level of price markup is set at 25 percent, a value that corresponds approximately to the middle of the distribution of markups in emerging market and developing economies estimated in Diez, Leigh, and Tambunlertchai (2018). Labor market distortions are calibrated in a similar fashion by assuming that the presence of a distortion results in a 14 percent markup over a competitive wage (Costa 2016).⁴⁸ Financial market distortion is set to match the average private-investment-to-GDP ratio in our sample.

Annex Table II.B.1. Key Parameters and Initial Values for Model Calibration

Definition	Value	Definition	Value
Initial Values			
Exports to GDP	0.43	Consumption Inequality (Gini) Index	35.76
Imports to GDP	0.43	Grants to GDP	0
Government Consumption to GDP	0.18	Domestic Real Interest Rate	0.04
Government Investment to GDP	0.08	Real Interest Rate on External Commercial Debt	0.06
Private Investment to GDP	0.21	Real Risk-Free Rate	0.04
Natural Resources to GDP	0.12	Foreign Real Interest Rate on Savings	0.027
Government Domestic Debt	0.16	Real Interest Rate on Concessional Debt	0
Private Foreign Debt to GDP	0.15	Labor Income Tax Rate	0.05
Government External Commercial Debt	0.15	Consumption Tax Rate	0.1
Concessional Debt	0.20	Tax Rate on the Return on Capital	0.2
Price Markup	0.25	Privatization Receipts to GDP	0.0028
Wage Markup	0.14		
Parameters			
Labor Income Share in Nontraded Sector	0.45	Measure of Optimizers in the Economy	0.2
Labor Income Share in Traded Sector	0.60	User Fees of Public Infrastructure	0.50
Private Capital Depreciation Rate	0.10	Home Bias of Government Purchases	0.6
Investment Adjustment Cost	25	Output Elasticity to Public Capital	0.2
Inverse of Frisch Labor Elasticity	10	Depreciation Rate of Public Capital	0.07
Inverse of Intertemporal Elasticity of Substitution	2.94	Steady-State Efficiency of Public Investment	0.50
Intratemporal Substitution Elasticity of Labor	1	Severity of Absorptive Capacity Constraint	25
Elasticity of Substitution between Traded and Nontraded Goods	0.44	Adjustment Share by Consumption Tax	1
Elasticity of Portfolio Adjustment Costs	0.5	Adjustment Share by External Commercial Debt	1
Elasticity of Licensing Revenues to Changes in Markups	0.04	Steady-State Tax Collection Efficiency	0.31

Source: Authors' assumptions

Market reform shocks are identified by matching the cumulative growth dividends estimated in Section II. For example, in the case of the product market reform, the reform is calibrated by computing the decrease in the average markup (λ_t) that delivers the target increase in real GDP after five years, where the target is given by the empirical results obtained using

⁴⁸ Facing the lack of data on wage markups for emerging market and developing economies, we leverage a value obtained through a Bayesian estimation of a dynamic stochastic general equilibrium (DSGE) model on Brazil's data. Results presented in this analysis are not sensitive to a range of alternative estimates for the size of the wage markup.

a local projection method and reported in Section II and Annex I.A. The exercise assumes that the decrease in the average markup achieved by the fifth year is permanent. The calibration of the domestic finance reform shocks follows the same logic. The net direct revenue channel relies on the average revenue from privatizations as well as the elasticity of licensing revenues to changes in markups (γ). This parameter is set to 0.04, a number obtained by combining the elasticity of entry costs to changes in aggregate markup (Ebell and Haefke 2009) with the typical share of licensing fees in entry costs (Djankov and others 2002). The size of privatization receipts is set at 0.28 percent of GDP based on the average of variable “fees” for “divestiture” for subsector “telecom” and “electricity” in the Private Participation in Infrastructure Database (World Bank 2022).

Empirical results are also leveraged to calibrate the steady-state tax collection efficiency. The five-year cumulative reduction in debt in each of the reforms considered provides a range of θ values consistent with such reforms. A single efficiency parameter is picked from this range, set at $\theta = 0.31$, which is in the observed range for emerging market and developing economies. The chosen value implies an average tax collection inefficiency of 69 percent across three types of taxes included in the model.

II.C. Simulation

The counterfactual exercise of alternative fiscal choices is conducted as follows. In the *historical scenario*, part of the additional fiscal space acquired through reforms is used to finance additional public consumption expenditure, as estimated in Section II. The *government investment scenario* assumes that instead of increasing unproductive public consumption, a sovereign leverages additional fiscal space to finance productive public investment. In this exercise the increase in public investment as a percentage of GDP is matched to the increase in public consumption under the historical scenario. The last counterfactual exercise assumes that the improvement in the overall fiscal balance is not leveraged to increase public spending but is used to reduce the debt burden further by paying off part of the public debt. This scenario is denoted *additional debt reduction* in Figure 10.

Another counterfactual exercise focuses on the role of the tax collection efficiency. By reducing market distortions and facilitating competition, reforms boost production and deliver a wider potential tax base that can be used to pay off debt. The extent to which an increase in the potential tax base is transformed into actual higher tax receipts depends on the quality of the domestic revenue mobilization system. Higher tax collection efficiency implies fewer leakages and, hence, greater reduction in the debt-to-GDP ratio following the adoption of reforms. Figure 11 presents the reduction in public debt under a combination of market reforms and reforms targeted at improving the quality of the domestic revenue mobilization. *Higher tax collection efficiency* scenarios correspond to gradual improvements in tax collection efficiency of 5 and 10 percentage points that take three years to materialize.

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