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Macroeconomic Research in Low-Income Countries

Advances Made in Five Key Areas Through a DFID-IMF Collaboration

Prepared by Hites Ahir, Mattia Coppo, Hendre Garbers, Giovanni Melina, Futoshi Narita (lead), D. Filiz Unsal (all RES), Vivian Malta, Xin Tang (both SPR), Daniel Gurara (AFR), Luis-Felipe Zanna (ICD), and Linda G. Venable (IMF Library) under the guidance of Kangni Kpodar (SPR) and Chris Papageorgiou (RES)

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Contents

Overview, Impact, and Looking Forward 1

Hites Ahir (RES), Futoshi Narita (RES), and Linda G. Venable (IMF Library)

Macroeconomic Research Needs in Low-Income Countries 1

Impact Through Citation, Download, and Social Media 4

Looking Forward: COVID-19 and Beyond 5

1. Debt-Investment-Growth Nexus 7

Daniel Gurara (AFR), Giovanni Melina (RES), and Luis-Felipe Zanna (ICD)

The DIG and DIGNAR Models 7

Model Extensions 13

COVID-19 and Beyond 14

2. Monetary Policy in Low-Income Countries 17

Hendre Garbers (RES) and D. Filiz Unsal (RES)

Monetary Policy Practices in LICs 17

Gauging the Effectiveness and Effects of Monetary Policy in LICs 18

Developing Modern Macroeconomic Models to Look into Monetary Policy Issues in LICs 20

Advancing Model-Based Monetary Policy Analysis and Formulation in LICs 21

Effecting Change Through Country Applications and Uptake 22

Transforming the Engagement of the IMF with LICs 24

An Ongoing Agenda on Monetary Policy in LICs 25

3. Gender Issues 29

Vivian Malta (SPR)

Women and the Macroeconomy 29

Gender Budgeting 33

4. Income Inequality in Low-Income Countries 37

Xin Tang (SPR)

Persistent Income Inequality in LICs 37

Fiscal Reforms 40

Financial Sector Reforms 46

Globalization 47

Key Messages Going Forward 50

5. Diversification 53

Mattia Coppo (RES) and Giovanni Melina (RES)

Diversification and Macroeconomic Performance 53

Diversification Is at the Forefront of the Policy Debate 54

Successful Country Experiences 56

Analytical Work on Diversification at the IMF 56

References 59

Boxes

Box 1. Gender Gaps and Informality 32

Box 2. The Quantitative Macroeconomic Approach 42

Box 3. Revenue Mobilization and Inequality in Senegal 45

Box 4. Financial Reforms in Ethiopia and Myanmar 48

Tables

Table 1. Selected Pilot Studies of Fiscal Policy Reforms 44

Figures

Figure 1. Gap in Economic Policy Analysis 2

Figure 2. Growing Scholarly Citations 4

Figure 3. Country Applications of the DIG and DIGNAR Models in the Stock-Taking Analysis 9

Figure 4. Gender Gaps in Education and Income Level 30

Figure 5. Macroeconomic and Distributional Impacts of Domestic Revenue Mobilization: Case Studies 43

Figure 6. The Effect of Capital Account Liberalization on the Gini Coefficient 51

Figure 7. The Role of Financial Inclusion 51

Box Figure 3.1. Fiscal Reforms in Senegal 46

Box Figure 4.1. The Interaction between Financial Reforms and Fiscal Reforms 48

Overview, Impact, and Looking Forward

Hites Ahir (RES), Futoshi Narita (RES), and Linda G. Venable (IMF Library)

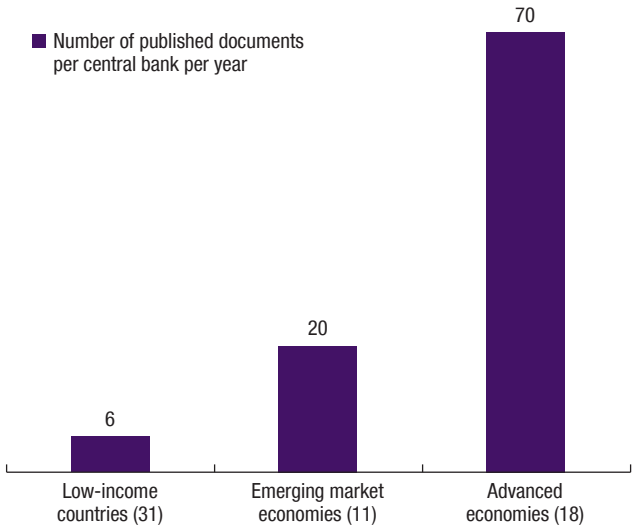
Macroeconomic Research Needs in Low-Income Countries

Despite strong economic growth since 2000, many low-income countries (LICs) still face numerous macroeconomic challenges, even prior to the COVID-19 pandemic. Despite the deceleration in real GDP growth during the 2008 global financial crisis, LICs on average saw 4.5 percent of real GDP growth during 2000 to 2014, making progress in economic convergence toward higher-income countries. However, the commodity price collapse in 2014–15 hit many commodity-exporting LICs and highlighted their vulnerabilities due to the limited extent of economic diversification. Furthermore, LICs are currently facing a crisis like no other—COVID-19, which requires careful policymaking to save lives and livelihoods in LICs, informed by policy debate and thoughtful research tailored to the COVID-19 situation. There are also other challenges beyond COVID-19, such as climate change, high levels of public debt burdens, and persistent structural issues.

The amount of macroeconomic research in LICs has not been commensurate to the extent of the challenges that LICs face. Both emerging and structural issues facing LICs require a deeper understanding based on dedicated research work. Nonetheless, capacity and resource constraints at governments and central banks in LICs have led to an insufficient scale of research activities by not only themselves but also academia, because policy research by nature needs to be promoted by policymakers as in the case of advanced and frontier emerging market economies. For example, the number of documents published by central banks in LICs per year is much less than those in higher-income countries on average, indicating a large gap in the amount of policy analyses in LICs (Figure 1). Also, the list of author affiliations at the

Figure 1. Gap in Economic Policy Analysis

Published documents by central banks in LICs are much fewer than those in higher-income countries.



Sources: Overton.io; and IMF staff calculations.
Note: The sample period is 2015–19. The number of published documents is only indicative, because it may include any documents other than policy analyses. "Low-income countries" are defined by Table 1 in the Annual Report of the DFID-IMF research partnership. "Advanced economies" are defined by the *World Economic Outlook* (IMF 2020a). "Emerging market economies" are defined as the rest of the countries. The number of central banks in the sample is shown in the parentheses. The sample includes regional central banks.

Research Papers in Economics (RePEc) includes only two central banks of LICs, compared to 30 for advanced economies. More generally, a recent perspective paper in the field of research metrics (Acharya and Pathak 2019) points out the persistent issue of limited resources for research activities in LICs and calls for international collaborations that can yield significant benefits to LICs.

In this context, the IMF and the UK Department for International Development—DFID (now known as the Foreign, Commonwealth and Development Office—FCDO) formed a partnership since 2012 to promote research to study macroeconomic policy issues in LICs.[1] The persistent shortage of research work on macroeconomic policymaking in LICs has necessitated support from the international community. The DFID-IMF joint project Macroeconomic Research in Low-Income Countries (MRLIC) has successfully contributed to narrow the gap in research on policymaking in LICs. Many toolkits and models developed under the MRLIC have supported capacity development in many LICs, being adopted in policy operations. Since its inception in 2012, the MRLIC's output has been consecutively assessed as exceeding expectations (A+ or A++) under the DFID Annual Reviews. The MRLIC has now established its compelling reputation, being well acknowledged by both researchers and policymakers.

[1]This research partnership was funded by the former UK DFID, which merged with the Foreign and Commonwealth Office (FCO) on September 2, 2020, to become the Foreign, Commonwealth and Development Office (FCDO). The collaboration over the past eight years had three phases: phase 1 from March 2012 to March 2015, phase 2 from April 2015 to March 2017, and phase 3 from April 2017 to March 2020. Phase 4 started in April 2020 and will continue until March 2023.

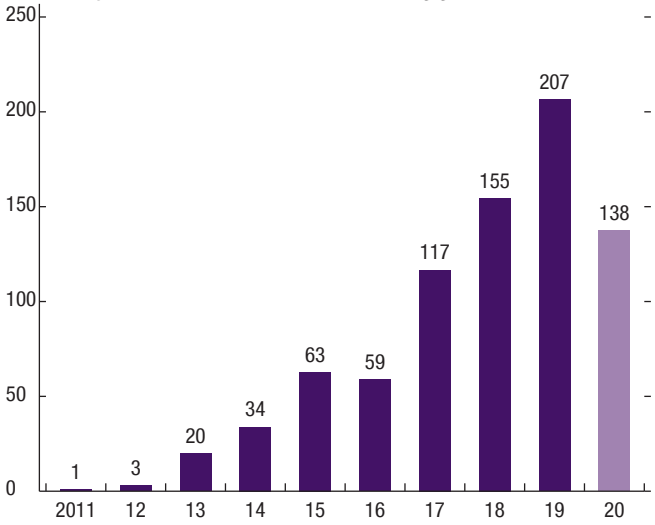
The first and very successful contribution of the DFID-IMF research collaboration is to effectively advance the research agenda on fiscal and monetary policy issues in LICs. The work done in the areas of fiscal and monetary policies has been extensively adopted by policymakers and IMF country teams, illustrating the usefulness of this work for policymaking. On the fiscal policy front, a highlight is the development of the Debt, Investment and Growth (DIG) model plus an extension of the latter to include natural resources—DIGNAR. The DIG/DIGNAR model has become an established workhorse model for the analysis of LICs, providing key insights to how best public investment can be scaled up in LICs without jeopardizing debt sustainability (Chapter 1). The work on monetary policy is another cornerstone of the DFID-IMF collaboration, documenting the key features of monetary policy in LICs and promoting model-based policy design, which has led to significant improvements in the analysis, formulation, and communication of monetary policy (Chapter 2).

The second and important contribution is promoting research on inclusion. The United Nations Sustainable Development Goals (SDGs) encompass gender equality (SDG5) and reduced inequalities in general (SDG10) as key goals. Both have been important components of the DFID-IMF collaboration. The work on gender has focused on the barriers preventing women from fulfilling their economic potential and the role of gender budgeting, that is, how the ministry of finance can take the lead to promote gender equality (Chapter 3). On income inequality more generally, one of the highlights is the development of a heterogeneous agent model and its toolkit to carefully analyze the trade-off between growth and distributional impacts from fiscal reforms (Chapter 4). There are also many other studies conducted under the DFID-IMF collaboration such as examining the distributional impacts of globalization, financial inclusion, and macroeconomic policy actions. The DFID-IMF collaboration has contributed to placing gender and income inequality more squarely in the forefront of IMF policy-oriented research.

The third contribution is in the area of promoting structural change and enhancing resilience. A focus in this area of research was economic diversification. Lack of economic diversification in LICs has been a recurrent issue, and the recent commodity price fluctuation amid the COVID-19 crisis is another strong reminder of the benefit of economic diversification. The work under the DFID-IMF collaboration has analyzed the role of diversification in improving growth in LICs, finding a key role played by structural characteristics as well as significant room for policy interventions (Chapter 5). The work in this area has also expanded to cover the issues of climate change and natural disasters, examining how best to enhance resilience in LICs.

Figure 2. Growing Scholarly Citations
(Number of citations)

Citations by external researchers exhibit a strong growth trend.



Sources: Lens.org; and IMF staff calculations.
Note: Data were collected on September 21, 2020. Self-citations by the IMF or the DFID (currently FCDO) are excluded to focus on external impact. All versions of each title (when published first as a working paper and later in a journal) were located and included in the analysis.

The rest of the paper is structured as follows. The remainder of this introductory section first provides insights to the impact of research outcomes and then lays out the plan going forward under the DFID-IMF partnership. The following five chapters respectively present a brief summary of advances made in each of five key areas of research under this collaboration over the past eight years. While this paper focuses on the research conducted under this collaboration, many papers and articles cited in this document are not necessarily conducted under this collaboration. See the project website for the list of the outputs under this collaboration.

Impact Through Citation, Download, and Social Media

Research papers produced by the DFID-IMF collaboration were received with interest by scholarly research. According to Lens.org, total scholarly citations show a strong growth arc, rising to 797 cumulatively as of September 21, 2020, excluding 929 self-citations by IMF or DFID (FCDO) authors (Figure 2). While 45 percent of all papers have been cited at least once, 24 percent were cited more than the average of papers published in similar years in the fields of "applied economics" and "econometrics" based on Field Citation Ratio (FCR) calculations by Dimensions.ai. Thirteen papers achieved FCR rankings 10 times the average. Research published in social science typically takes approximately eight years to reach maximum citations, and only 20 percent of the publications in this body of research have reached the age of six years.[2] Therefore, additional citations are expected to accumulate over the next few years. According to Overton.io, the research under this

[2]Sugimoto and Larivière (2018) find that, using a 100-year citation window, the mean age of cited documents is about five to six years in the medical sciences, about seven years in the natural sciences and engineering, and about eight years in the social sciences.

collaboration was also cited in 358 publications (mostly working papers) by policy institutions such as central banks (including those in five LICs), multilateral development banks, other international organizations, and think tanks.

The number of downloads of IMF working papers also indicates a growing public interest on the research produced under this collaboration. The 122 IMF working papers produced under this collaboration since the year 2012 until March 2020 were downloaded more than 110,000 times cumulatively, exceeding 900 downloads per paper, at an accelerated pace with a strong growth by 50 percent only during the recent 16 months from January 2019 to April 2020. Examples of popularly downloaded IMF working papers are a paper on inequality and globalization (Lang and Tavares 2018) and two papers on data sets on world trade in services (Loungani and others 2017) and commodity terms of trade (Gruss and Kebhaj 2019).

Social media attention on 41 papers increased public visibility of the research under this collaboration across 47 countries including six LICs. The 549 social media mentions tracked by Altmetric Explorer were primarily from Twitter, with the notable exception of a reference in Wikipedia's entry on "Balance of Trade" to a paper on macroeconomic consequences of tariffs (Furceri and others 2019). A paper on inequality and financial globalization (Furceri, Loungani, and Ostry 2019) earned high attention, with 153 mentions across 14 countries, after the first tweet in late 2019 by Dani Rodrik, an economist from Harvard Kennedy School with about 160,000 followers, which was later retweeted by Zitto Kabwe, a Tanzanian politician with more than 1 million followers. Another example of high attention, with 117 mentions across 21 countries, is a publication at the *Journal of Economic Literature* on cross-country convergence (Johnson and Papageorgiou 2020), which was originally tweeted in September 2018 by Robert Dur, an economist at Erasmus University in the Netherlands, which was retweeted 39 times, including by Nonso Obikili, an economist from Nigeria with more than 10,000 followers.

Looking Forward: COVID-19 and Beyond

The COVID-19 pandemic additionally poses macroeconomic challenges in LICs. The crisis has led to multiple shocks to LICs simultaneously through huge health concerns, reversals of external financing flows, and volatile commodity prices. LICs have been proactive in responding to the crisis, but their structural issues, accumulated vulnerabilities before the crisis, and limited policy space altogether pose serious challenges. Given the nature of these challenges under the COVID-19 crisis, the research and its pol-

icy implications distilled under the DFID-IMF collaboration are even more relevant now.

At the onset of the pandemic, the focus of the DFID-IMF research collaboration has swiftly shifted to the ongoing challenges that LICs face in this crisis. Three IMF blog articles have been published to feature the analyses conducted under this collaboration on COVID-19 developments in LICs, remittances, and income inequality. Ongoing work will look at how COVID-19 has affected gender inequality. A high-level virtual conference, "COVID-19 Pandemic in Developing Countries" was held in December 2020. More analyses are ongoing to examine the impacts of COVID-19 situations on debt and growth. The work to strengthen real-time economic assessment in LICs to better inform pandemic policy responses is also underway.

Going forward, the DFID-IMF collaboration, or the FCDO-IMF collaboration, will continue advancing the frontier of research to support sustainable and inclusive growth in LICs beyond the COVID-19 pandemic. Many structural issues predating the pandemic will need to be addressed with adjustments to post-COVID situations. How to manage higher debt burdens due to the COVID-19 crisis will likely be one of these issues. Also, work will continue in the areas that this collaboration has made strong progress, such as building resilience to climate change, modernizing monetary policy framework, managing natural resource wealth, expanding links to the global financial system, promoting financial inclusion, and encouraging diversification and structural transformation. The DFID-IMF collaboration has provided a unique platform of collaboration for researchers and policymakers in LICs and will continue expanding global knowledge in development macroeconomics that will be helpful for LICs to achieve sustained and inclusive growth in the post-COVID era.

CHAPTER

1 Debt-Investment-Growth Nexus

Daniel Gurara (AFR), Giovanni Melina (RES), and Luis-Felipe Zanna (ICD)

Over the past eight years, the Debt, Investment, and Growth (DIG) model and its extension to account for NAtural Resources (DIGNAR) have complemented the IMF and World Bank debt sustainability framework analysis, with more than 65 country applications. They have provided useful insights in the context of program and surveillance work, based on quantitative analysis. By taking stock of the model applications and extensions, five common policy lessons can be extracted from the universe of country cases. First, improving public investment efficiency and/or raising the rate of return of public projects raises growth and lowers the risks associated with debt sustainability. Second, prudent and gradual investment scaling-ups are preferable to aggressive front-loaded ones, in terms of private sector crowding-out effects, absorptive capacity constraints, and debt sustainability risks. Third, domestic revenue mobilization helps create fiscal space for investment scaling-ups, by effectively containing public debt surges and their later-on repayments. Fourth, aid smoothens fiscal adjustments associated with public investment increases and may lower the risks of unsustainable debt. Fifth, external savings mitigate Dutch disease macroeconomic effects and serve as fiscal buffers. Several model extensions were employed to study specific policy-relevant questions.

The DIG and DIGNAR Models

To analyze the effects of public investment plans on growth and debt sustainability in developing countries, two structural model-based frameworks are developed under the IMF-UK Department for International Development (DFID-IMF) research collaboration. The first is the Debt, Investment, and Growth (DIG) model, which is described in Buffie and others (2012); the second is an important extension of that first model to natural resource (NAR)-abundant countries, and is described in Melina, Yang, and Zanna

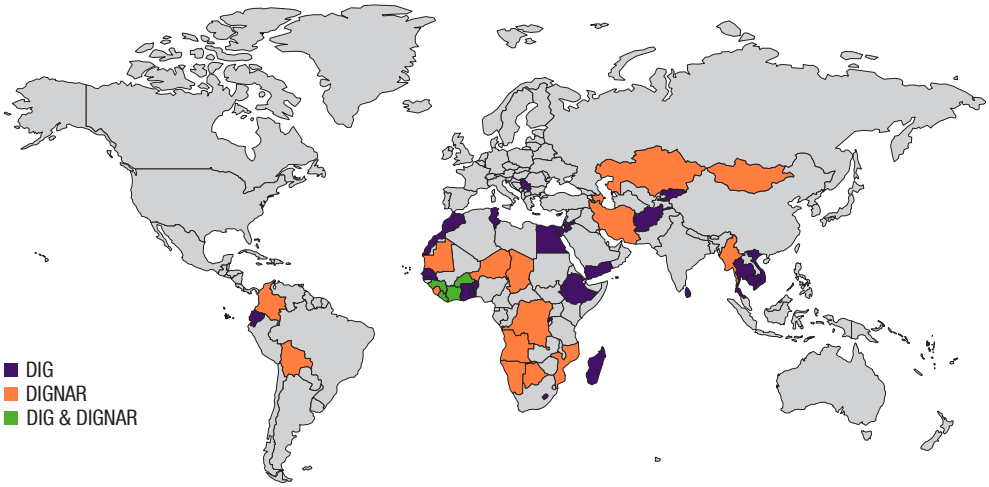
(2014). The DIG and DIGNAR models have a dynamic-stochastic-genera l-equilibrium (DSGE) structure, which facilitates the construction of internally consistent policy scenarios that can be used for debt sustainability analysis. In these scenarios, the linkages between public investment, growth, and debt, as well as the private sector response and fiscal policy reaction functions, are at the heart of the analysis. Over the years, DIG and DIGNAR have complemented the debt sustainability analysis conducted at the IMF, by allowing staff to quantify, the macroeconomic effects of public investment increases, including on growth and debt accumulation. The model helps make explicit the assumptions and linkages between macro variables. It also allows to capture consistently the feedback effects from policy decisions to private sector responses, and vice-versa, in a general equilibrium setup.

The DIG and DIGNAR models combine several crucial pieces that help capture the main mechanisms and policy issues of interest for debt sustainability analysis in low-income countries (LICs). The models particularly feature those associated with the linkages between public investment, growth, and debt. These crucial pieces comprise (1) the investment-growth nexus, (2) the fiscal adjustment, and (3) the private sector response.

The public investment-growth nexus is the relationship between infrastructure spending scaling-ups, which raise the stock of public capital and GDP growth. The models account for high rates of return on public capital as well as significant inefficiencies in public investment and absorptive capacity constraints, which are pervasive in LICs.

As regards the fiscal adjustment, the models consider several government financing options and state explicitly the fiscal policy reactions for different tax (and transfer) instruments that attempt to ensure debt sustainability. As in other dynamic models that ensure consistency between stock and flows, the budget constraint of the government plays a central role because it links revenues, expenditures, and debt issuance/borrowing. The government has access to various fiscal instruments from the revenue and expenditure sides. On the revenue side, it incorporates taxes on consumption, labor, and capital; while on the expenditure side, it allows for government consumption, public investment, and transfers to households. Other sources of revenues include those related to donor's grants, oil royalties, and user fees on infrastructure services. The government also pays interest on debt. There are three types of government debt: domestic, external commercial, and external concessional debt. Depending on the borrowing choice, domestic and external commercial debt accumulates endogenously in the model, while the path of external concessional debt is determined exogenously by international donors. Having also domestic debt in the model is important in the light of its rapid increase in LICs, which has been associated with high domestic interest rates, and

Figure 3. Country Applications of the DIG and DIGNAR Models in the Stock-Taking Analysis



Source: IMF staff.
Note: DIG = Debt, Investment, and Growth model; DIGNAR = Debt, Investment, and Growth Natural Resources model.

large debt service payments often resulting in liquidity pressures. In DIGNAR, withdrawals from a resource fund can be also considered as a financing source. This fund plays the role of a fiscal buffer: positive differences between revenue inflows (including natural resource revenue) and spending outflows (including investment expenditures) are saved, while negative differences imply that the fund is drawn down, subject to a minimum level of savings.

Finally, the models also incorporate the private sector response to policy actions. In both models, there is some heterogeneity regarding private consumption behavior. There are consumers who can smooth consumption because they have access to assets such as bonds and capital. There are also hand-to-mouth consumers who are forced to consume their income in every period. This feature captures pervasive financial constraints in a simple manner.

The analysis of more than 65 DIG and DIGNAR applications (Figure 3) suggests that there are common policy lessons across country cases, deriving from the results of the model applications.

Takeaway 1: Improving public investment efficiency and/or raising the rate of return of public project boosts growth and lowers the risks associated with debt sustainability.

Raising efficiency is one of the most important challenges that policymakers face in LICs. The common view is that complementary efforts to improve the appraisal, selection, implementation, and evaluation of projects could

increase efficiency and translate public investment into more public capital and higher growth. But if this is the case, by how much would growth increase due to improvements in efficiency? Or in the opposite case, by how much would growth be affected if efficiency deteriorates? And would there be any debt sustainability risks associated with such deterioration? The DIG and DIGNAR models help provide quantitative answers to these questions. For example, simulations conducted LICs (IMF 2014b) showed that a 10-year scaling-up of 4.5 percentage points of public investment to GDP, coupled with improving efficiency from 0.5 to 0.75, could deliver a gain of 1.4 percentage points in per capita GDP growth over a decade (relative to a scenario with no improvement in efficiency and no investment scaling-up). By contrast, with a decline of efficiency from 0.5 to 0.25, the same scaling-up plan would generate much smaller growth dividends and public debt could become explosive (if these plans were to be financed with non-concessional borrowing).

Country applications also investigated the role of the rate of return on public capital. The analysis of these applications acknowledged that one pervasive problem in developing countries (in addition to cost overruns, corruption, and other factors affecting the efficiency of public investment) was the lack of institutions that facilitate the careful appraisal of projects. This suggested that improvements in the selection of investment projects could increase the average real return on the public capital stock. A DIGNAR application to Botswana demonstrated the benefits from improving not only the investment efficiency, but also the return of public projects (IMF 2016a).

Takeaway 2: Prudent and gradual public investment scaling-ups are preferable to aggressive front-loaded ones, in terms of private sector crowding-out effects, absorptive capacity constraints, and debt sustainability risks.

This lesson follows from three empirical observations that are captured and quantified by the models. First, covering the costs of public investment scaling-ups through fiscal adjustment—higher taxes or cuts of transfers—has clear implications for private demand. In this case, resources are shifted away from the private sector to the public sector, crowding out private consumption and investment. Second, the ability of governments to effectively carry out public investment is largely a function of their capabilities to implement this investment. The absence of such capabilities is often referred to as absorptive capacity constraints, which manifest as declines in the efficiency of government investment or as pervasive costs and schedule overruns. Third, government borrowing to finance public investment scaling-ups can lead to substantial buildups of public debt. External commercial borrowing may help smooth this negative adjustment of the private sector, as resources come from abroad. But both types of borrowing—domestic and external commercial—may cause substantial increases in public debt-to-GDP ratios, to levels associ-

ated with high risks of debt distress. While this lesson applies to total public investment, it must be recognized that projects are lumpy in nature and may require significant upfront expenditures. In addition, the assessment focuses on the impact of public investment on growth and the public debt trajectory, and abstracts from welfare metrics.

Specific applications illustrated these points more practically. For instance, the application of DIGNAR to Kazakhstan—where using its oil wealth to speed up development is a key long-term goal for authorities—showcased the presence and magnitude of private sector crowding-out effects (IMF 2013a). Non-oil growth, for instance, could be higher in an aggressive investment scenario by more than 0.2 percentage points, on average, in the next decade. However, the aggressive scenario could also lead to a stronger crowding-out effect on private consumption and on investment in the tradable sector. In the next decade, consumption could fall by up to 5 percent in the aggressive scenario, which starkly contrasted with the persistent increase featured by the prudent scenario. Next, the Botswana application investigated the role of absorptive capacity constraints on the macroeconomic effects of a public investment scaling-up. Here, an aggressive public investment scaling-up would deliver only a slightly larger build-up of public capital and non-mineral output, relative to a more gradual investment plan. This is explained by the fact that, given absorptive capacity constraints, the aggressive approach would lead to a decrease in public investment efficiency. Finally, the dangerous effects of an aggressive public investment scaling-up for debt sustainability are considered, for instance, in the DIGNAR application to Mozambique (IMF 2013b), where an aggressive investment plan would set public debt on an increasing path.

Takeaway 3: Domestic revenue mobilization helps create fiscal space for investment scaling-ups, by effectively containing public debt surges and their later-on repayments.

The macroeconomic impact of public investment scaling-ups often depends on the strength of complementary reforms. One of these reforms corresponds to mobilizing domestic revenues, which helps contain public debt surges, during the scaling-up, and their principal and interest repayments later on. This policy is broadly in line with taxation scheme that seeks to smooth out the tax burden over time. For developing natural resource-rich countries, revenue mobilization also plays a crucial role, given the price volatility stemming from the commodity cycle in recent years.

One example on this point is the DIGNAR application to the Economic and Monetary Community of Central Africa (CEMAC), a natural resource-rich region, to analyze the role of revenue mobilization in the face of the recent drop in commodity prices (IMF 2018a). Model simulations indicate that non-oil revenue mobilization reduces debt and increases non-resource output

in the long term. The mobilization, however, triggers an output decline in the short term and carries undesirable distributional effects. Cash transfers targeting the most vulnerable perform better than untargeted public investments to mitigate such increased inequality.

Takeaway 4: Aid smooths fiscal adjustments associated with public investment scaling-ups and may lower the risks of unsustainable debt.

Both DIG and DIGNAR models feature foreign aid in the form of concessional loans and grants that affect the government budget constraint. While grants simply represent transfers from external donors that the government does not have to pay back, concessional loans extended by official creditors are characterized by a very low interest rate. In the 2016 *World Economic Outlook* (WEO) application of DIGNAR, concessional loans were also found to help with fiscal consolidation and debt stabilization, in the context of low commodity prices (IMF 2016c). Model simulations suggested that commodity-exporting LICs could face lower growth rates and rapid surges in public debt given the declines in government oil-related revenues. Against this background, improving revenue mobilization, through better tax administration and a broader tax base, as well as measures reducing current expenditures, could help mitigate the effects of reduced oil-related revenues on fiscal balances. In addition, concessional financing could help address the remaining fiscal gap and contain increases in the interest burden and sovereign risk premiums, helping stabilize public debt over the medium term.

Takeaway 5: Government savings invested abroad mitigate the Dutch disease effects and serve as fiscal buffers.

In the DIGNAR framework, part of the government revenues from natural resources can be saved in a fund abroad in the form of sovereign wealth fund. The saved amount is the portion of natural resource revenues that are not invested in public infrastructure projects. By saving this portion, the government can help mitigate Dutch disease effects—real appreciation and productivity losses in the tradable sector—associated with the inflow of foreign currency from exports of natural resources. Saving part of the natural resource revenues also contributes to building fiscal buffers, which can be used in rainy days—for example, when the natural resource-rich economy is hit by negative commodity price shocks. These issues are illustrated in the DIGNAR application to Mozambique (IMF 2013b).

Model Extensions

The DIG and DIGNAR models were extended in various ways to answer specific policy-relevant questions. The following are some of these extensions.

Investing in Public Infrastructure: Roads or Schools? Atolia and others (2017) extend the DIG model to account for human capital. They propose an explanation of why governments in developing economies invest in roads but not enough in schools, despite scarce human capital. The different pace at which roads and schools contribute to economic growth, public debt intolerance, and political myopia are central to this decision. In a thought experiment with a large return differential in favor of schools, a benevolent government would intuitively devote the majority of an investment scale-up to them. However, the fraction of schools chosen by the government falls with increasing levels of debt intolerance and political myopia.

Harnessing Resource Wealth for Inclusive Growth in Fragile States. Deléchat and others (2015) extend the DIGNAR model to explore options to reduce poverty through direct cash transfers financed using a fraction of the government resource revenue. They applied the model to the four Mano River Union Countries (MRU) in West Africa, namely Côte d'Ivoire, Guinea, Liberia, and Sierra Leone. For instance, the Liberia application highlighted that a fiscal plan that devoted a fraction of the resource revenue to transfers to poor financially constrained consumers could lead to a substantially greater improvement in private consumption.

"Growth-Friendly" Fiscal Consolidations. IMF (2016a) uses DIGNAR to design a growth-friendly composition of a fiscal adjustment in Namibia. In 2016, country officials had embraced ambitious fiscal consolidation plans, and the key challenge was to minimize the negative effects on growth. The DIGNAR application then compared two types of consolidations: an *expenditure-based* versus a *revenue-and-expenditure-based*. Simulations highlighted that a combined strategy of revenue and expenditure measures could lower the negative effects on growth by a quarter of a percent point relative to a pure expenditure-based adjustment.

Building Resilience to Natural Disasters. Marto, Papageorgiou, and Klyuev (2017) extend the DIG model to capture the challenges of closing infrastructure gaps in developing countries that frequently face natural disasters. They introduce two forms of public capital: standard and adaptation infrastructure. The extended model was applied to Vanuatu, which was impacted by a cyclone, to assess the debt sustainability concerns associated with the need to rebuild public infrastructure.

Governance Reforms. IMF (2018d) use the DIG model to analyze governance reforms. This extension assumes that weak governance can manifest itself via three channels. First, entrepreneurs can be discouraged from investing and hiring, given that they might have to spend time and resources bribing government officials to obtain required authorizations. Second, weak governance reduces the efficiency of public investment. And third, inefficiencies lead to

losses in tax revenues, since a fraction of taxes might never reach the government budget. The simulations results illustrate how a comprehensive reform package improving all three aspects of governance could deliver much higher growth and expand the fiscal space to a great extent. If a country located at the first quartile of the three indicators' distributions gradually improved along the three dimensions of governance to move to the second quartile, annual output growth would increase by 3 percent points on average and public debt would fall by about 15 percentage points of GDP in 10 years.

DIG Labor. Buffie and others (2020) extend DIG to feature segmented labor markets, efficiency wages and open unemployment, and an informal non-agricultural sector. These features allow for a deeper examination of macroeconomic and fiscal policy programs and their impact on labor market outcomes, inequality, and poverty. They show that investment in human capital is much more effective than investment in infrastructure in promoting long-term economic development when investments earn their average estimated returns. The decision about how much to invest in human capital versus infrastructure involves, however, an acute intertemporal trade-off. Because investment in education affects labor productivity with a long lag, it takes 15+ years before net national income, the private capital stock, real wages for the poor, and formal sector employment surpass their counterparts in a program that invests mainly in infrastructure. The ranking of alternative investment programs depends on the policymakers' social discount rate and on the weight of distributional objectives in the social welfare function.

COVID-19 and Beyond

Government debt dynamics in LICs is a key concern under the COVID-19 crisis. Even with higher needs for funds to face the health emergency, LICs are facing lower growth and government revenue due to the pandemic and its associated lockdowns. The decline in oil prices adds pressures particularly in those countries where oil receipts are the main source of revenue. The developments in external finance are also worrisome. The shocks and the needed policy responses are weighing on the public debt outlook for LICs.

Analyzing the debt-investment-growth nexus in LICs continues to be very important during and after the COVID-19 crisis. There is ongoing work to analyze the key pandemic shocks on debt and growth in LICs as an extension of the DIGNAR model labeled DIGNAR-19. With the high uncertainty facing LICs in this pandemic situation, closely monitoring debt dynamics based on the solid analysis on the debt-investment-growth nexus will be even more essential in sound policymaking both in the near and long terms. Possible uses of DIGNAR-19 include the analysis of fiscal consolidations, financing

gaps, and downside risks such as those to oil prices, remittances, and sovereign risk premiums.

CHAPTER

2 Monetary Policy in Low-Income Countries

Hendre Garbers (RES) and D. Filiz Unsal (RES)

Monetary policy is a cornerstone of the macroeconomic policy toolkit in most LICs. It serves as a crucial lever with which to anchor nominal expectations and influence price stability, which in turn is conducive to sustainable growth and financial stability. The DFID-IMF collaboration has played a key role in understanding the economic landscape within which monetary policy operates, identifying the shortcomings of existing policy regimes, and advancing policy practices through developing conceptual and operational methods suitable for LICs. These research and policy implications have translated into capacity development on numerous fronts and helped steer significant improvements in monetary policymaking in LICs, as well as inform and shape the IMF's view and engagement in LICs in terms of program design, surveillance, and policy advice. The agenda continues to push monetary policymaking further toward robust strategies, tools, and communication practices in these countries.

Monetary Policy Practices in LICs

Takeaway 1: While reserve money targeting remains a common practice, many LICs have made progress in modernizing monetary policymaking.

Enhanced macroeconomic management in LICs over the past two decades have, in no small part, contributed to reducing inflation to single digits and moderating volatility, deepening financial markets, and achieving high growth (IMF 2015a). In particular, with increased central bank independence, reduced fiscal dominance, and greater reliance on market-based procedures, many LICs have been modernizing their monetary policy frameworks toward forward-looking and interest rate-based frameworks. While progress has sometimes been gradual and modest, concerted efforts to adopt elements typically associated with inflation (forecast) targeting, such as the adoption of an

explicit numerical medium-term inflation target, model-based policy analysis to support forward-looking monetary policy formulation and emphasis on an inflation forecast, less reliance on monetary aggregates and a greater role for short-term rates, as well as enhanced communications, are ongoing.[1] Some LIC central banks, for example Uganda and Rwanda, have also fully transitioned to some type of inflation targeting regime. Berg and others (2014b) and Adam, Portillo, and Unsal (2018) give a historical perspective of the evolution of monetary policy practices and their underlying rationale in LICs.

Gauging the Effectiveness and Effects of Monetary Policy in LICs

Takeaway 2: The monetary policy transmission mechanism is endogenous to the policy framework in place and may be stronger than previously thought in LICs.

A top-cited challenge of modernizing monetary policymaking in LICs is the perceived weakness of the monetary transmission mechanism (MTM)—the system of interconnected channels through which monetary policy affects prices, credit, and the real economy. As there may be several contributing factors to an impairment of the MTM, such as underdeveloped and undiversified financial systems or unanchored inflation expectations, a perception has emerged that that monetary policy "does not work" in LICs. However, under the DFID-IMF collaboration, a stream of research has shown that not to be the case. For example, Berg and others (2014b) review the peculiar challenges associated with characterizing the MTM in rapidly changing environments in LICs, while Portillo and others (2018) show that the MTM can be much stronger in policy regimes that achieve clear signaling through policy responses. An overview of the empirical evidence regarding the effects of monetary policy in sub-Saharan Africa (SSA) is presented in Berg and Portillo (2018).[3]

Rigorous methodological advances help avoid contorted empirical results that are suggestive of ineffectual monetary policy. Accounting for LIC-specific considerations, the DFID-IMF research has shown that the effectiveness of the MTM may be stronger than previous studies have indicated.

[12]While the modernization of monetary policymaking is consistent with the adoption of an inflation targeting regime, modernization does not, strictly speaking, assume such a regime. Steps toward modernization can be made within other monetary policy regimes. Moreover, the country-specific purpose of ongoing and prospective modernization ranges from gains to further price stabilization, reducing dollarization, facilitating regional integration, to better managing tradeoffs among inflation, growth, and exchange rate stability, among others.

[3]Other IMF research on the transmission of monetary policy for a broader group of emerging market and developing economies supports the notion that transmission may be stronger than previously thought and is endogenous to the policy framework (Brandao-Marques and others 2020).

1. **Changes in monetary policy frameworks over time may obfuscate results.** As many central banks in LICs have been modernizing their monetary policy frameworks, standard statistical procedures may not be successful in identifying the channels of the MTM. Berg and others (2014a) employ an alternative (narrative) approach to Kenya, Rwanda, Tanzania, and Uganda and find clear evidence of the transmission mechanism in most of the countries, with differences ascribable to the policy regime in place. In a theoretical setup, Portillo and others (2018) show that monetary policy in place plays a role in determining the strength of the MTM.
2. **The quality and granularity of data may play a key role in whether the effects of monetary policy can be accurately identified.** For example, studies relying on aggregate data have typically documented a weak bank lending channel in LICs. Abuka and others (2019), however, undertake the first analysis of the bank lending channel in a sub-Saharan economy using microdata and show that, in the case of Uganda, results indicate significant real effects.
3. **The standard empirical methods may not be capable of detecting a transmission mechanism, even when one exists.** Indeed, the VAR (vector autoregression) methods typically employed suggest that the MTM may be weak and unreliable in LICs. Li and others (2016) investigate the impact of short data samples, measurement error, high-frequency supply shocks, and other features of the LIC environment on VAR-based inference. The results suggest that the estimated effects may be biased in LICs and that the precision of estimates may be undermined, the latter causing results to appear "insignificant" even when underlying transmission is strong.[4]

Other work has shed light on the role of food and oil prices in transmitting shocks to domestic inflation and the economy. Charry, Gupta, and Thakoor (2014) study the MTM in Rwanda and show that, consistent with evidence for other countries in the region, food and oil prices as well as the exchange rate account for the bulk of inflation dynamics. Portillo and Zanna (2018), however, show that the first-round effects of international food price shocks depend crucially on the asset market structure and their results cast some doubt on the view that international food price shocks are inherently inflationary in LICs. In line with this finding, Nguyen and others (2015) report that domestic demand pressures have played a larger role in driving inflation in SSA in the last decade, and the policy regime in place helps explain the role of shocks in driving inflation. Regarding oil prices, Choi and others

[4]Short data samples and measurement errors in LICs may lead to attenuation bias (an underestimation of effects of transmission) when using regression in general (including local projections).

(2018) show that the impact of an oil price shock on inflation in developing countries is not overly large.[5]

Developing Modern Macroeconomic Models to Look into Monetary Policy Issues in LICs

Takeaway 3: Frontier models tailored for LICs provide powerful and flexible tools that provide insights about monetary policy design, such as desirable responses to commodity price shocks, the role of monetary aggregates, and exchange rate management.

The DFID-IMF collaboration has put a lot effort into developing modern macroeconomic models reflecting LIC-specific features with which to look into key monetary policy issues, such as the role of food, monetary aggregates, or the exchange rate. Berg and others (2014b) provide an overview of these key issues in SSA and analyze monetary policy responses to food price shocks. More broadly, Berg and Portillo (2018) comprehensively discuss various novel models and their implications for monetary policymaking in LICs. More specifically:

- **On food,** Andrle and others (2014) develop a model to study the sources of inflation in Kenya and find that while imported food price shocks have been an important source of inflation, accommodating monetary policy has also played a role, most notably through its effect on the nominal exchange rate. Portillo and others (2016) further show that optimal policy prescribes virtually complete stabilization of non-food inflation and that the presence of food subsistence amplifies the welfare losses of policy mistakes.
- **On monetary aggregates:** Berg, Portillo, and Unsal (2018) build a model with an informational role for monetary aggregates in the conduct of monetary policy and examine the conditions under which some adherence to money targets is optimal. Portillo and others (2018) show, however, that money targeting type frameworks result in high unintended short-term interest rate volatility and poor communication about policy intent, resulting in less-effective monetary policy. Moreover, while many LICs do not use interest rates as their main monetary policy instrument, Gonçalves (2015) reveals that in the case of Kenya, Tanzania, and Uganda, monetary policy respected the Taylor Principle—nominal interest rates, on average, increase more than one-to-one with inflation.

[5]A large appetite for further investigation of the MTM in LICs remains. For example, further understanding the extent to which the transmission of monetary policy depends on and is influenced by features such as institutional frameworks, the level of development of financial structures, or the concentration of the banking system, would be useful future avenues of research.

- **On the exchange rate:** Benes and others (2015) build a theoretical model to study a wide range of hybrid inflation—targeting (IT) and managed exchange rate regimes. The analysis indicates that some degree of exchange rate management via foreign exchange interventions, in the context of an inflation targeting regime, can be advantageous (welfare improving). In support of this, Buffie and others (2018) find that so-called "leaning against the wind" (that is, exchange rate management) enhances the efficacy of inflation targeting. Iyer (2017) further shows that the benefits of exchange rate flexibility may depend on the extent of labor and product market development and that a flexible exchange rate can exacerbate currency and factor misalignments in agricultural commodity-exporting economies. That being said, Masson and others (2014) show, using a model-based analysis, that while the existing monetary unions in Africa seem economically viable, the benefits from new or expanded monetary unions are limited due to low regional trade and strong shock and fiscal asymmetries.

Advancing Model-Based Monetary Policy Analysis and Formulation in LICs

Takeaway 4: Model-based monetary policy analysis is critical in developing robust and consistent policy responses and communications in LICs.

A significant contribution of the DFID-IMF research effort has been the development of models suitable for informing monetary policy formulation and subsequent communications in LICs. This suite of models, forming part of the Forecasting and Policy Analysis System (FPAS), are small macroeconomic models into which key features of LICs have been integrated based on the research conducted.[6] These models are useful to produce coherent forecasts and alternative scenarios and provide systematic input for guiding central banks in their monetary policy decisions. This, in turn, fosters consistent policymaking over time.

Andrle and others (2013) develop a forecasting and policy analysis model specifically for SSA countries. Given the continued prominence of money targets in monetary policymaking among developing countries, this work develops a model with an explicit role for money targets and target misses. The model also assigns a central role to food prices and their relation to global developments to analyze the dynamics of inflation. The model, however, is flexible in that it nests various types of money targeting, interest-rate based frameworks, and intermediate cases and can therefore be adapted to other developing countries' specifics. An application to Kenya illustrates the

[6]In addition to models, an FPAS includes a set of procedures and tools to assist monetary policy decision making.

benefits of a model-based approach to monetary policy analysis in LICs, including in countries with money-targeting frameworks.

Baldini and others (2015) further demonstrate the power of model-based monetary policy analysis in LICs and the accompanying key policy implications. The model, fitted to the specifics of LICs and applied to the case of Zambia, yields several important lessons. For one, monetary policymaking should be forward-looking and respond to current or expected shocks, not the current inflationary effects of past shocks. Moreover, overall developments in the banking system should be monitored in order to gauge the right policy stance instead of paying excessive attention exclusively to reserve money. Finally, monetary policy can unnecessarily add to macroeconomic volatility, but even well-designed and implemented policies may not be able to always offset volatility, especially stemming from external shocks. That being said, systematic forward-looking policymaking can enhance credibility and anchor expectations such that trade-offs between output and inflation in the face of external shocks are ameliorated.

Though concerns regarding limited data availability are widespread across LICs, this need not constrain the uptake of model-based research or monetary policymaking. For one, models can be useful precisely when data is not available or to understand a phenomenon (such as an interaction or trade-off) not directly observable with data. Moreover, sensitivity analysis and alternative scenarios can be generated when dealing, for example, with uncertainties about parameters due to limited data. More broadly, however, economic data across LICs typically comes in the form of quarterly national accounts that are available with a lag. In addition to the suite of models themselves, a complementary part of designing a FPAS system is therefore designing a data management process whereby monitoring, forecasting and policy analysis is structured around the available flow of information, using partial higher-frequency indicators where available (see other IMF work in this regard, notably Laxton, Scott, and Rose 2009).

Effecting Change Through Country Applications and Uptake

Takeaway 5: Uptake of model-based monetary policy analysis has translated into significant improvements in the analysis, formulation and communication of monetary policy in LIC central banks.

In recent years, the FPAS analytical tool along with the supportive background research has anchored the IMF's engagement with central banks on the modernization of monetary policy frameworks, particularly in SSA. This uptake has come about through in-house country applications as well as training to and uptake directly by country authorities.

The FPAS continues to influence the IMF's surveillance work by providing country teams with an analytical tool to guide dialogue on monetary policy. Numerous in-house country applications have been completed. For example, in one of the first applications, the 2013 IMF country report on Kenya incorporated the model developed in Andrle and others (2013) to analyze whether disinflation is supply or demand driven in Kenya. Subsequently, the IMF team adopted a simple quarterly projection model to analyze monetary policy based on a medium-term inflation outlook. Support to the IMF team for Ghana similarly helped with the preparation of medium-term projections and formulation of advice on monetary policy. In Uganda, regular support to the IMF team in the form of assessing the appropriate monetary policy stance and preparing inflation forecasts before reviews (in the context of an IMF-supported program) has also been provided. In Rwanda's case, the IMF team benefited from an extension of the model in Charry, Gupta, and Thakoor (2014) to show that the majority of past target misses are explained by monetary policy shocks and the instability of money demand.

The research on monetary policy has further been applied and operationalized directly in several countries, particularly in the form of developing and refining central banks' model-based analysis. The majority of this uptake has involved capacity development missions to central banks—in the form of customized training or technical assistance—with the objectives of developing the ability to analyze and forecast inflation, strengthening the monetary policy formulation process, and improving the management and recording of central bank liquidity processes. Such assistance has been provided in several countries, including Ghana, India, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, and Vietnam.

This uptake of the DFID-IMF monetary policy agenda has helped improve countries' monetary policy analysis, formulation, and communications. For example, in Kenya, the DFID-IMF collaboration has aided the development of the Central Bank of Kenya's forward-looking policy recommendation process underpinned by model-based forecasts, and the changes to its organizational structure. Similarly, in Uganda work on the monetary transmission mechanism and developing quarterly projection models have also translated into staff providing model-based outputs to the monetary policy decision-making committees. Customized training in Ghana has also played a key role in enhancing monetary policy formulation and decision-making processes, developing and improving communication strategies, and strengthening staff's forecasting and analytical capacities and processes. Several other countries are bearing similar fruits in light of DFID-IMF support.

This work has further been supported by regional initiatives that extend and maximize the impact. For example, technical assistance has often been

coordinated with Regional Technical Assistance Centers (for example, East AFRITAC, AFRITAC South, and AFRITAC West II) and the East African Community Monetary Affairs Committee (EAC MAC) endorsed the outreach on FPAS-building efforts by establishing a regional modelling and forecasting working group and encouraging the EAC central banks to continue implementing FPAS to support a forward-looking monetary policy framework.

Efforts to expand the accessibility of these models and tools have been increasing. For example, a training program for members of the IMF's African Department has enabled country team members to use a customized FPAS to facilitate discussions with SSA authorities. More broadly, in 2020 an online IMF course on Model-Based Monetary Policy Analysis and Forecasting was launched as an initiative to expand the influence of FPAS.

Transforming the Engagement of the IMF with LICs

Takeaway 6: Modernization efforts in monetary policy in LICs should be reflected in IMF program design, surveillance, and policy advice to LICs.

The DFID-IMF collaboration has directly helped shape the IMF's view on monetary policy issues in LICs at an institutional level. The research and operational work under the DFID-IMF collaboration forms the core of two key IMF policy papers—one on the modification of IMF conditionality on monetary policy in LICs to be more flexible (IMF 2014a), and one on how LICs can adopt forward-looking frameworks that better anchor inflation and promote stability (IMF 2015a).

Countries with evolving monetary policy frameworks have access to a review-based conditionality option (monetary policy consultation clauses) as an alternative to the IMF's monitoring of "traditional" monetary aggregate criteria. Monetary policy frameworks in a number of countries with IMF-supported programs are evolving toward more flexible operational targets around interest rates and more forward-looking policies around an inflation objective so that the earlier conditionality frameworks designed around monetary aggregates are no longer necessarily entirely appropriate. The policy paper, "Conditionality in Evolving Monetary Policy Regimes" (IMF 2014a), instead proposes that a review-based monetary conditionality framework for these countries may be more well-suited, whereby a set of quarterly or semi-annual monetary or inflation bands are introduced and deviations from target bands trigger formal consultations with the IMF in the context of a program review.

LICs can make rapid progress in modernizing their monetary policy frameworks along several key dimensions, which feeds into greater effectiveness of monetary policy, better anchored expectations and enhanced stability. The board paper, "Evolving Monetary Policy Frameworks in Low-Income and Other Developing Countries" (IMF 2015a), building on the wealth of research on monetary policy issues in LICs and experience from technical assistance and training, sets forth an outline of how LICs can make progress in strengthening and modernizing their monetary policy frameworks, and the role of the IMF in supporting them. It provides guidance on key elements of effective monetary policy frameworks for low- and lower-middle income countries, such as the importance of assigning primacy to the statutory goal of price stability and embodying this goal in a medium-term (numerical) inflation target. It further makes the case that progress can be rapid and places emphasis on the endogeneity of the monetary policy framework in improving policymaking capacity and effectiveness, as well as financial and macroeconomic development and stability.[7]

An Ongoing Agenda on Monetary Policy in LICs

Building on these earlier contributions, the agenda on monetary policy under the DFID-IMF collaboration is ongoing. Most notably, efforts are currently being directed towards gauging monetary frameworks across countries and over time and, in doing so, developing a tool with which to provide granular guidance on the various parts that constitute the monetary policy framework, both to country authorities and to assist in IMF surveillance.

Based largely on the policy paper, "Evolving Monetary Policy Frameworks in Low-Income and Other Developing Countries" (IMF 2015a), Unsal, Papageorgiou, and Garbers (forthcoming) construct an index of the soundness of monetary policy frameworks. All the earlier work done under the DFID-IMF collaboration has made it clear that a holistic view of monetary policy frameworks—encompassing both legal foundations and practices—is necessary to understand monetary policymaking and guide improvements. Worth noting: this is as true for advanced and emerging economies as for LICs. However, the tendency remains, both in policymaking and academic dialogues, to focus on the classification of monetary policy or exchange rate regimes, which does not account for the significant variation across countries that are actively evolving.

[7]For a review of country experiences, see the background IMF policy paper, "Evolving Monetary Policy Frameworks in Low-Income and Other Developing Countries—Background Paper: Country Experiences" (IMF 2015a).

Several broad principles underpin any sound monetary policy framework, regardless of the regime in place, income level, or stage of development. These include, for example, forward-looking monetary policy formulation centered around price stability as (one of) the primary objective(s), having a clear and well-functioning operational framework, and timely and effective communications. Focusing on the framework and these broad principles accommodates various regimes while safeguarding policymaking that is disciplined, rigorous, and sound. Depending on the country specifics, monetary and macroeconomic stability may in some cases be better served by retaining a money aggregate- or exchange rate-based regime, while strengthening the underlying framework.

The constructed series provides the first comprehensive cross-country measure of monetary policy frameworks, providing the structure and accompanying data with which to further guide dialogue on monetary policy frameworks. It can be used as (1) a diagnostic tool to identify gaps and guide country-specific steps that can be taken in various dimensions to improve monetary policy frameworks, (2) a gauge of evolution within a country over time or to benchmark against other countries (for example, advanced or emerging market economies), and (3) data in further studies of open issues relating to monetary policy in LICs. This work has already informed several LIC country teams at the IMF, including Rwanda and Uganda.

The focus on monetary policy frameworks continues to be highly relevant in the current context. Central banks the world over, including in LICs, have had to take swift and unprecedented action to deal with the economic fallout from COVID-19. However, a track record of inconsistent pursuit of multiple objectives with multiple instruments in the absence of a clear, and forward-looking medium-term framework has often afforded LIC central banks less credibility and hence less flexibility in their responses, be it through unconventional policy (such as asset purchases), contentious practices (such as debt monetization), or even through communications (such as forward guidance). It therefore remains paramount for LICs to continue making progress in improving their monetary policy frameworks, though the moment to make the biggest strides may not necessarily be during such a dramatic global shock.

A range of other issues relating to monetary policymaking in LICs also warrant attention going forward, including in light of the challenges brought by the COVID-19 pandemic. These important considerations—in many cases linking to ongoing IMF research separate from the DFID-IMF collaboration—include, for example, further understanding the transmission of monetary policy in LICs, the interaction of and appropriate policy mix of monetary, macroprudential, exchange rate, and fiscal policies (see IMF

2020c); the adoption of digital currencies (Mancini-Griffoli and others, 2018); and mitigating cybersecurity risks (Adelmann and others 2020) and climate change (Krogstrup and Oman 2019). The importance of understanding the interactions between monetary policy and inequality as well as fiscal-monetary interactions have also become particularly pronounced in the context of COVID-19. In addition, further drilling down on specific country groups within the broader LIC group, such as fragile states with scope for monetary policy, may also be warranted going forward. Indeed, ongoing work under the DFID-IMF collaboration focuses on, for example, monetary policy in disaster-prone developing countries (Cantelmo and others 2019). The agenda going forward will continue to be informed and shaped by ongoing developments and the most pressing open issues.

CHAPTER

3 Gender Issues

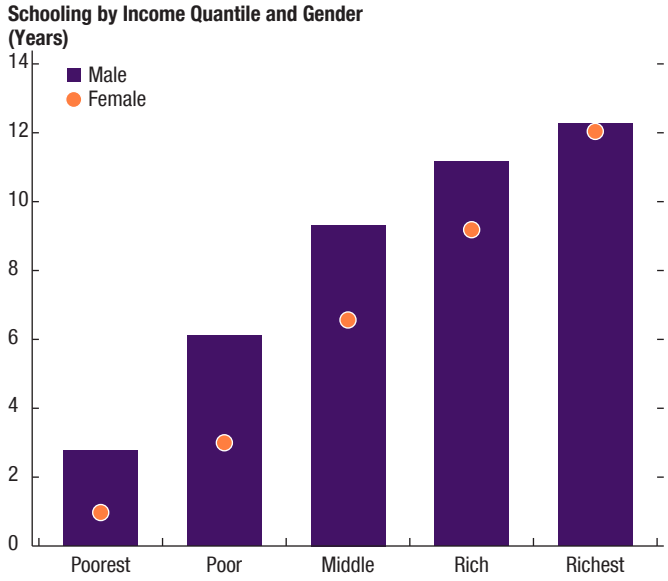
Vivian Malta (SPR)

The DFID-IMF collaboration has been increasingly focusing on issues related to gender equality and the economy. Significant research has been produced in the last years, such as complex frameworks to assess the effects of economic policies on gender inequality and to quantify the impact of gender gaps on economic growth. Other examples include studies on gender inequality and informality; the importance of female work on economic diversification; and recent global trends regarding gender gaps. Furthermore, the collaboration has produced an extensive survey on gender budgeting around the world, providing empirical knowledge from more than 80 countries regarding authorities' efforts to reduce gender gaps. The DFID-IMF collaboration has resulted in not only research that confirms the macro-criticality of gender inequality in a broad set of circumstances, but also the incorporation of gender issues into the IMF's operational work, including country surveillance and capacity development (technical assistance, training, and peer-learning workshops—see IMF 2018b). The IMF's close work with government authorities on gender issues has also been important for the achievement of the 5th UN Sustainable Development Goal, that is, gender equality and empowering of all women and girls.

Women and the Macroeconomy

As 50 percent of the population, women have an enormous role to play in the economy and can be a pivotal force in boosting economic growth and raising income levels around the world. However, barriers preventing women from fulfilling their economic potential are still present in many countries, such as lower provision of education for girls, lower wages for working women, gender discrimination in the labor market, and lack of laws supporting women's rights and gender equity. With ongoing concerns about

Figure 4. Gender Gaps in Education and Income Level



Sources: Nigeria Demographic and Health Survey (2013); UNESCO; and IMF staff calculations.

COVID-19 effects that threaten to widen gender gaps (Alon and others 2020, Georgieva and others 2020), research and policy support on gender issues continue to be a priority.

Barriers to Women's Economic Empowerment

Female economic empowerment starts at a young age, during the education stage. In several countries, however, boys spend many more years studying at school than girls. In addition to unequal provision of education, women face other barriers throughout their professional development, such as carrying a much higher burden in taking care of the home and the family, unpaid work or lower wages in paid work, and gender discrimination in the labor market. The DFID-IMF collaboration has conducted extensive research to understand the role of education and these other gender gaps that hinder women's economic empowerment, economic growth, higher productivity levels, and income equality. This subsection presents some of the findings of the studies performed for Nigeria, Senegal, Sierra Leone, and Lao P.D.R., which were published as part of the IMF Article IV Consultations for these countries.[1]

In Nigeria, access to education is highly unequal across genders, states and individuals' income levels. The gender disparity is larger for lower-income groups than for richer ones. For instance, Figure 4 shows that, among the poor and the poorest individuals, men have almost double the number of years of education of women, while among the richest individuals, the number of years of education is almost the same for men and women. Lower education levels translate into fewer skills to offer in the job market and therefore lower wages. Chances to be in the informal market also increase when skills

[1]See Article IV Reports: (IMF 2018e, 2019a, 2019b, 2020b). In these papers, the authors have calibrated, for each country, a general equilibrium model with overlapping generations. For more information on the framework (besides the aforementioned references) and details on the model, see Malta, Martinez, and Tavares (2019).

are not developed (see Box 1 on gender inequality and informality). Lower wages are a disincentive for women to pursue careers—instead of getting a low-paying job they can stay home doing housework or unpaid work.

More education means higher labor productivity, which in turn translates into greater economic growth. Simulations conducted using a framework built for Nigeria finds that, closing – for each income group—the gender gap in years of schooling would boost long-term GDP in Nigeria by 5 percentage points. More education would generate higher wages for women (8 percent), which in turn would attract more women into the labor force. The study estimates that this education policy would increase female labor force participation from 76 to 87 percent. Meanwhile, calculations show that men's average wages would not be negatively affected—as the larger economy would provide more opportunities for men as well. Lastly, this policy would also improve income equality in Nigeria. Since gender gaps in education are larger for the poor in Nigeria, this policy would be very effective in increasing labor productivity of lower-income women, and thus reducing income inequality as measured by the Gini coefficient (by 2 percentage points).[2]

A similar analytical framework was applied to study Senegal, a country where gender gaps are high in both education and labor opportunities. Women in Senegal tend to receive 30 percent less than men after taking into account differences in education, work experience, sector of employment, geographical area, type of contract, type of activity, age, and ethnicity. In particular, analyzing micro data on Senegal, the study observes that women's experience is not translated into higher wages at the same rate as men's experience. In a simulation exercise in which the government enforces anti-discrimination policies that drops average gender wage gap by 5 percentage points, female labor force participation would increase by 9 percentage points. Furthermore, the higher incentives for skilled female workers to participate in the labor market and the enlargement of labor opportunities for women would boost GDP by 5 percent and tax revenues by 1 percent of GDP.[3]

In Sierra Leone, where education and health outcomes continue to lag behind most other countries, an DFID-IMF collaboration study finds that the gains from providing each child with at least lower secondary education could, in the long term, boost GDP by an impressive amount of 40 percent, as well as substantially lower income inequality, and generate additional revenues through higher individual incomes. Moreover, the paper finds that

[2]In 2020, Nigerian authorities have been showing interest in the assistance that the IMF and the DFID can provide for technical assistance to implement gender budgeting in the country.

[3]In addition to this work during Senegal's 2018 Article IV Consultation, in January 2020, the IMF and the DFID have organized a large workshop on gender inequality issues in Dakar, Senegal, with the participation of the UN Women and representatives of Senegal's Ministry of Finance.

Box 1. Gender Gaps and Informality

Informal employment is often characterized by less stability, reduced-or-no social protection, and lower earnings. Malta and others (2019) provide international comparisons demonstrating that higher female presence in the informal sector is associated with larger gender gaps in education, fewer family planning needs being satisfied, and higher rates of early marriage.

The paper focuses on sub-Saharan Africa, where women work relatively more often in the informal sector than men. Many factors could explain this gender difference, including women's lower education levels, legal barriers, social norms, and demographic characteristics. Using microdata from Senegal, the authors find that in urban areas, the simple fact of being a woman increases the probability of working in informality by 8.5 percent. Further, having kids reduces men's probability of being an informal (instead of a formal) worker but increases that of women.

closing gender gaps in education across income groups or increasing the quality of education could yield gains of 8 and 27 percent of GDP, respectively.[4]

A study conducted for Lao P.D.R. has simulated a set of measures to close the gap in returns to experience between women and men as well as to eliminate any residual sources of discrimination in the workplace that reduces women's wages and productivity. Such measures can include the implementation of the law on gender equality promotion and launching awareness campaigns on gender inequality especially in rural areas. The study finds that this policy could lead to a decrease of the gender pay gap by almost 12 percentage points.

Women and Economic Diversification

One of the drivers of sustainable economic growth is diversification—indeed, a substantial body of the economic literature has highlighted the importance for countries to have multiple sources of income from a range of sectors instead of focusing on a certain sector or product, in order to achieve sustained growth. For instance, the sharp drop in oil prices since 2014 has put enormous toll in many non-diversified oil-exporting economies, requiring significant macroeconomic adjustments as exports and fiscal revenues declined dramatically. An DFID-IMF collaboration paper on economic diversification and gender equality shows that gender inequality decreases the variety of

[4]The analytical work on Sierra Leone was featured in an August 2020 course on gender and macroeconomics at the Africa Training Institute.

goods countries produce and export, in particular in low-income and developing countries (Kazandjian and others 2016). The authors argue that this happens through at least two channels: first, gender gaps in opportunity, such as lower educational enrollment rates for girls than for boys, harm diversification by constraining the potential pool of human capital available in an economy. Second, gender gaps in the labor market impede the development of new ideas by decreasing the efficiency of the labor force. The paper finds empirical evidence supporting these hypotheses, therefore showing that gender-friendly policies could help countries diversify their economies.

Global Trends in Gender Gaps

In the past several decades, the world moved closer to gender equality and saw the advancement of women across a wide range of economic, social, and political indicators, in all regions of the globe. Nonetheless, throughout the world, women remain at a disadvantage to men in important areas of social, economic, and political life.

Stotsky and others (2016) use multiple indicators to evaluate the progress in achieving gender equality across countries. The authors find that the trends in individual indicators point toward improvement in education, health, economic opportunity, and political empowerment, but progress across the world is uneven. For instance, girls' secondary education enrollment rates have stalled since the 2000s in the Middle East, Central Asia, and Africa, while these gaps have closed in Europe and in the Americas. Also, female labor force participation in the Middle East and Central Asia have been persistently low. Overall, when grouped by geographic regions, the paper observes that South Asia, the Middle East, and Central Asia, and sub-Saharan Africa lag other regions in terms of key gender gaps indicators, even though these regions have all recorded significant improvement.

Gender Budgeting

Fiscal policy is the use of government spending and taxation to influence the economy. Governments typically use fiscal policy to promote strong and sustainable growth and reduce poverty. But fiscal policy can also be actively shaped to achieve gender equality goals—and this is the idea behind the so-called "gender budgeting."

With gender budgeting, fiscal authorities consider the expected outcomes on gender equality and women's empowerment when designing their policies. Gender budgeting in a broad sense involves not only the adoption of fiscal policies (on the expenditure and revenue side) related to gender equality but

also gender-responsive public financial management. Well-designed gender budgets can improve the efficiency and equity of the overall budget process and improve gender-related outcomes. For example, gender budgeting in Morocco is associated with an increase in female primary school enrollment in rural areas by more than 18 percentage points over 10 years (Kolovich and Shibuya 2016). In India, states with gender budgeting efforts have made more progress on gender equality in primary school enrollment than states without (Stotsky and Zaman 2016).

Results from a global study made through the DFID-IMF collaboration on gender budgeting show that:

- Gender budgeting has been implemented by countries across all regions and income levels and at the national, state, and/or local levels. Countries with state and/or local level initiatives include Germany, India, Mexico, Spain, and Uganda.
- The leadership of the ministry of finance is crucial—as in Afghanistan, Albania, Ecuador, Finland, the Philippines, and Sweden—since this ministry is usually responsible for allocating the budget.
- Legal requirements for gender budgeting matter: Austria, Bolivia, and Rwanda[5] mandate gender budgeting in their constitutions.
- Public financial management institutions play an enabling role in operationalizing gender-responsive fiscal policies and can be adapted to achieve improved gender outcomes at the various stages of the budget cycle. Ukraine's gender budgeting effort has been implemented within the framework of public financial management reforms.
- Civil society, gender and other ministries, parliaments, and academia are also key players. The United Kingdom's Women's Budget Group and Canada's Alternative Federal Budget are two examples of civil society organizations. Gender units in line ministries have proved useful in gender budgeting streamlining, but in some countries coordination of these units is found to be an issue. Political support may be particularly important when additional resources and concerted efforts across the administration are needed, such as for the development of gender-related indicators.
- Gender budgeting has typically focused on expenditures and overlooked taxes, but tax policies are not always gender neutral. Discriminatory tax and financial laws remain in many legal systems. Several countries have

[5]Rwanda is a focus country in DFID's development work. Besides IMF's Selected Issues Paper (IMF 2017e) in the 2017 Article IV Consultation ("Staying the Role Model: Advancing Gender Equality In Rwanda"), which describes, among other things, how gender budgeting has emerged as one of Rwanda's key policy tools, the DFID-IMF collaboration also organized a gender inequality conference in 2017.

incorporated a greater focus on revenues, including Finland, Iceland, India, and Uganda. A significant number of countries engaged in gender budgeting have not incorporated program or performance budgeting, though it is widely recognized that these practices can improve the effectiveness of gender policies.[6]

To strengthen gender budgeting efforts, countries should aim to improve reporting, transparency, and cooperation between various levels of government. Gender budgeting statements can help ensure transparency. Also, collecting gender-disaggregated data to allow for better gender-based analysis is very important. Ex ante impact assessments of gender policies, as well as ex post monitoring and gender auditing are common gaps in most surveyed countries though. Among the G7 countries, Japan and France have made the most progress in systematically collecting fiscal data disaggregated by gender. Korea stands out as one country that requires that the government examine the gender impacts of the budget and whether men and women are equally receiving benefits from the budget (taking into account both direct and indirect budget allocation).

All in, fiscal policy design and budget systems can play a large role in reducing gender inequality. Fiscal authorities can ensure that tax and spending policies and/or public financial management instruments address gender inequality and the advancement of women in areas such as education, health, and economic empowerment. If designed well, gender budgeting can improve the efficiency and equity of the overall budget process. Fiscal authorities at any level of government can assess the needs of boys and girls and men and women; identify key outcomes or goals; plan, allocate, and distribute public funds; and monitor and evaluate achievements.

To promote gender budgeting efforts across the globe, the DFID-IMF collaboration has launched in 2017 the IMF Gender Portal, the first-ever global review of policymakers' use of tax and spending policies to promote gender equality, including an online database toolkit of gender equality indicators worldwide.[7]

Key Messages from the IMF's Research on Gender Budgeting

1. Gender budgeting has been implemented by countries across all regions and income levels and at the national, state, and/or local levels.

[6]As an example of tax policy to reduce gender inequality, the note "Women in the Labor Force: The Role of Fiscal Policies" (Fabrizio and others 2020) shows how removing tax provisions that discriminate against secondary earners can improve gender equality and boost economic growth.

[7]This information can be found in www.imf.org/external/datamapper/datasets/GD

2. The leadership of the ministry of finance is crucial.
3. Legal requirements for gender budgeting matter.
4. Public financial management institutions play an enabling role in operationalizing gender-responsive fiscal policies.
5. Civil society, gender and other ministries, parliaments, and academia are also key players.
6. Gender budgeting has typically focused on expenditures and overlooked taxes, but tax policies are not always gender neutral.

CHAPTER

4 Income Inequality in Low-Income Countries

Xin Tang (SPR)

Achieving the UN Sustainable Development Goals (SDGs) in LICs requires not only rapid economic growth, but also far-reaching benefits for these countries. In many LICs, however, growth outcomes are not always shared by the entire population, which raises concerns on the sustainability and inclusiveness of their growth. Understanding the growth and distributional implications of major macro-structural changes are thus important to guiding a path forward for LICs. Recent research produced by the DFID-IMF collaboration provides insights on three of such reforms: fiscal reforms, financial sector reforms, and the deepening of globalization.

Persistent Income Inequality in LICs

LICs achieved unprecedented annual growth in income per capita of 2.4 percent in the 2000s (Johnson and Papageorgiou 2020). Despite the rapid growth, income inequality in LICs has been staying at a persistently high level during the same period; the average level of Gini coefficient for disposable income is 40 percent compared to 30 percent in advanced economies (AEs) (Fabrizio and others 2017).[1] The ongoing COVID-19 crisis is expected

[1]Note that cross-country analyses on inequality have important measurement issues. First, for a broad country coverage, the Gini coefficients examined in the cited analyses are based on either income or consumption, the latter of which is relatively popular for LICs. Second, inequality estimates are rather sensitive to assumptions on uncertain factors such as capital gains and untaxed income. As discussed by *The Economist* (2019), Piketty, Saez, and Zucman (2018) and Auten and Splinter (2019) reached different degrees of the increase in inequality in the United States. Relatedly, Gini coefficient is only one aspect of the whole inequality spectrum. Other statistics summarizing different aspects of the distribution of economic resources, for instance income share of the top 10 percent, often do not move in the same direction as Gini coefficients do (Blotevogel and others 2020). Third, although this essay focuses on the Gini coefficients, there are many other measures of inequality including non-income ones such as education and financial access, respectively capturing important

to widen income inequality across the world, including LICs, since the pandemic and its associated containment measures affect disproportionately those already vulnerable (Adams and others 2020; Chetty and others 2020; Galasso 2020; Palomino, Rodríguez, and Sebastian 2020; Shibata 2020).[2] Parsimonious estimates based on varied telework ability among workers indicate that the COVID-19 crisis could more than offset the slow reduction in inequality in LICs since the global financial crisis (see Cugat and Narita 2020 and its IMF blog).

The nexus between growth and inequality is complicated; under different circumstances, growth can be linked to either higher or lower inequality.[3] Therefore, it is debatable whether lower inequality is always desirable as an immediate policy objective. That being said, there are many reasons which make high inequality in LICs concerning. For instance, several empirical studies find that inequality is harmful to the pace and sustainability of growth.[4] Hence, persistently high inequality would cloud the path of sustained growth for LICs. High income inequality could also weaken the growth prospect of LICs by eroding the support for growth-enhancing reforms, creating economic and political instability, aggravating social division, etc. Moreover, the contents of SDGs decide that to accomplish them, inequality would eventually need to go down at some point in time. Put together, it makes it important for various stakeholders to understand the growth and distributional implications of major macro-structural changes in the context of LICs.

There are many events that can have large impacts on growth and inequality at the same time, ranging from secular changes in economic fundamentals to active intervention by governments. Among all the factors, the DFID-IMF collaboration concentrates on three prominent macro-structural changes: fiscal reforms, financial sector reforms, and globalization. This chapter

aspects that may be missed by the analysis on the income- or consumption-based Gini coefficients. Fourth, though related, inequality is different from poverty. If the growth outcome reaches everyone, but the rich receive a higher share, then higher inequality would appear together with lower poverty.

[2]Using historical data, Furceri and others (2020) find that past pandemics were associated with an increase in inequality.

[3]Cerra and others (2021) provide an extensive survey of the literature. Important contributions surveyed in the chapter include the classic Kuznets (1955) paper and many recent contributions including Banerjee and Duflo (2003), Lea and McGowan (2015) and Berg and Ostry (2017) among others. Ostry, Berg, and Tsangarides (2014) and Berg and others (2018) provide a contemporary literature reviews. Ostry, Loungani, and Berg (2019) highlight a key role played by political choices, in examining the relationship between inequality and growth.

[4]See for instance, Persson and Tabellini (1994), Easterly (2007), Berg, Ostry, and Zettelmeyer (2012), Ostry, Berg, and Tsangarides (2014), Dabla-Norris and others (2015), Berg and Ostry (2017), and Berg and others (2018).

summarizes the findings and lessons from these studies. Overall, there are three key messages.

1. The economic structure of LICs causes marked changes to the equity-efficiency trade-off of commonly used fiscal instruments (taxation and public spending) compared to when being implemented in advanced economies. A comprehensive evaluation of a fiscal reform package needs to jointly consider the effects of taxation and spending instruments, as well as their interactions with the characteristics of the country's economy.

Several features of LIC economies—large agricultural sector, limited labor mobility, informality, etc.—affect the growth and distributional implications of commonly used taxation and public spending instruments. Theoretical researchers find that an instrument could lead to equity-efficiency trade-off in opposing directions through different transmission mechanisms. For instance, consumption taxation has small efficiency cost, but the tax incidence falls disproportionately on rural population; income taxation, on the contrary, distributes tax burden more evenly, but incurs significant efficiency loss.[5] Meanwhile, fiscal reforms usually come as a package in which different instruments have opposing effects. For example, an increase in personal income taxation (which reduces economic efficiency) when implemented together with an increase in public investment (which improves productivity) would cause the overall impact on economic efficiency to be ambiguous. For these reasons, the overall impacts of fiscal reforms have to be evaluated case by case to figure out which channel eventually dominates quantitatively. A toolkit which implements a structural model featuring major channels has been developed and deployed for this purpose.

2. The development of financial institutions—an important structural reform—has strong growth and distributional implications, with the three core dimensions being their breadth, depth, and efficiency; policy reforms should target the most binding constraints.

Another area that LICs often lag behind is financial sector development. The stage of financial development and the extent of financial inclu-

[5]These trade-offs differ from their AE counterparts. In AEs, consumption taxation has qualitatively the same equity-efficiency trade-off, but the mechanism is quite different. In AEs, it is because poor people tend to spend a higher share of their income in consumption, which makes consumption taxation implicitly works as a regressive income tax. On the contrary, in LICs, it is driven by limited labor mobility which allows urban population to shift tax incidence to rural population by reducing demand. Meanwhile, in AEs, labor income taxation is usually estimated to be regressive because rich people obtain a large share of their income from capital. While in LICs, it is considered progressive because income taxation is primarily levied upon rich formal sector workers. The properties of these tax instruments in AEs are well documented by the literature, see for example Domeij and Heathcote (2004); see the analysis by Peralta-Alva and others (2019) for LICs.

sion can be summarized by their breadth, depth, and efficiency. Broadly speaking, breadth captures how easy it is for people to access credit; depth relates to the amount of collateral required for borrowing; and efficiency refers to the ability of financial intermediaries to provide services at low cost. Like before, financial development on different frontiers have different growth and distributional implications with these features themselves varying across countries as well. Therefore, once again, identifying which constraint binds the most and designing the corresponding financial reforms call for quantitative case-by-case investigation.

3. Globalization has been an important engine of economic growth for LICs; however, it also raises income inequality in many countries, with capital account liberalization being one important channel.

Perhaps the most prominent secular change in the economic environments LICs face in the past decades is the rapid deepening of globalization. Regardless of the measure used—the degree of trade protection, the share of imports/exports in GDP, the magnitude of cross-border capital flows—the exposure of developing countries to international markets has increased substantially. Empirical analyses show that globalization is associated with income convergence across countries but divergence within countries. This means that while the variation of average income across different countries is shrinking (poor countries are catching up), income across individuals within a country is expanding (poor people are lagging behind). Capital account liberalization is found to be one important driver of the rising inequality within countries. The impact is stronger in countries with under-developed financial system.

The rest of the chapter presents the three key messages in more detail and concludes with recommendations for policymakers and academic researchers.

Fiscal Reforms

LICs have a low tax-to-GDP ratio. The average tax-to-GDP ratio in LICs is 15 percent compared to 30 percent in advanced economies. Meanwhile, sustainable and inclusive growth requires large public investment in many areas (infrastructure, education, medical system, etc.), which has to be funded largely by tax revenue (Gaspar and others 2019). With declining availability of external fund especially with the onset of the global pandemic, the need to raise tax revenue domestically becomes even more pressing. A well-designed fiscal reform should strike a balance between efficiency-equity implications, especially so in LICs given their need for overall economic growth and poverty reduction in economies with population ravaged by the pandemic. It is

thus important to evaluate the macroeconomic and distributional impacts of commonly used fiscal instruments in the context of low-income countries.

The Quantitative Macroeconomic Approach

LICs have unique economic structure, including a large unproductive agricultural sector, serious informality, limited development in financial sector, and sizable rural-urban difference. These features alter how commonly used taxation and public expenditure instruments function in those countries. Theoretical research has found that many of the elements drive the growth and distributional impacts of these instruments in opposite directions, making it rarely the case that one instrument dominates another definitively. In addition, the impacts of a particular fiscal instrument also interact with country-specific characteristics in complex manners.

For these reasons, although how each channel works theoretically has been studied rather extensively in the literature, it is important from a policy perspective that the overall impacts can be gauged quantitatively. As a result, an analytical framework that can accommodate these features flexibly is needed. Box 2 provides a high-level introduction to such a framework, which is referred to as the quantitative macroeconomic approach. A generic toolkit which can be tuned (referred to as "calibrated" henceforth) to each country was developed and published in the public domain (IMF 2019d).

Lessons from Several Case Studies

Different versions of the model have been used in a number of pilot studies; Fabrizio and others (2017) summarized the lessons from these applications, which this section draws upon. Table 1 provides a list of pilot studies with references in chronological order.

It turns out that the key mechanism to gauge the distributional impacts of a fiscal instrument is its *de facto* incidence—the people that eventually bear the tax burden (or reap the benefits) after interactions in the economy—with the general equilibrium effects on prices playing a key role.[6] Despite that the exact quantitative impacts depend on the specific contents of the reforms as well as the country-specific context (Figure 5), meaning that there is no one-size-fits-all recipe, four lessons appear to be common across all studies (Peralta-Alva and others 2019).[7]

[6]Take the classic tax incidence analysis in public finance, for example. While a tax may be imposed on (say) producers de jure, if consumer demand is highly inelastic, through market interactions, producers are able to pass most of their tax incidence to consumers by raising prices.

[7]Box 3 sketches a case study for Senegal as an example.

Box 2. The Quantitative Macroeconomic Approach

The analytical tool used by the studies surveyed in this chapter is often referred to as the *Quantitative Macroeconomic Framework*. The framework contains theory that builds on microeconomic foundation and with an aggregate perspective. The models are quantitative in nature, which means that they do not necessarily develop new concepts or ideas but rather can be classified as applications of existing theories with parameter choices made so as to replicate key macroeconomic patterns. Besides, the mathematical structure of these models is often so complex that no analytical solution can be obtained; the models hence are mostly solved numerically.

There are two reasons that these quantitative models are widespread in studies addressing the distributional impacts of macro policies. First, the treatment-control group comparison identification strategy that forms the pillar of modern applied econometric studies is ill-suited for these questions because the control group often does not exist.[1] For instance, almost by design, an economywide tax reform will reach a sheer amount of population such that nearly everybody in the economy will be affected by the policy to some extent.[2,3] This means that the aggregation of individual behavior is likely to have macroeconomic impact, a phenomenon often termed *general equilibrium effect*. Meanwhile, by adopting a structural approach, different mechanisms are also allowed to have complicated nonlinear interactions with each other following the guidance of economic theory. Economic theory can provide important insights when direct observations or relevant historic data are hard to come by, which is rather common in LICs.[4]

Second, the number of quantitatively significant factors that affect income distribution is too large to be handled by simple models with closed-form solution; moreover, the impacts of these factors on a particular macroeconomic moment (for instance output) often go in different directions. Therefore, it is important to adopt an analytical framework in which different mechanisms can be weighed against each other and aggregated in a realistic way. The process that the parameter values are pinned down, which the literature calls *calibration*, is designed such that the "weighting scheme" is chosen scientifically and the calibrated model is "realistic."

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[1]See Angrist and Pischke (2009) for a textbook treatment on modern applied econometrics.

[2]Even in recently developed econometric methods designed to estimate the impact of macroeconomic policies, explicit models need to be involved. For example, see Donaldson (2015, 2018) for references.

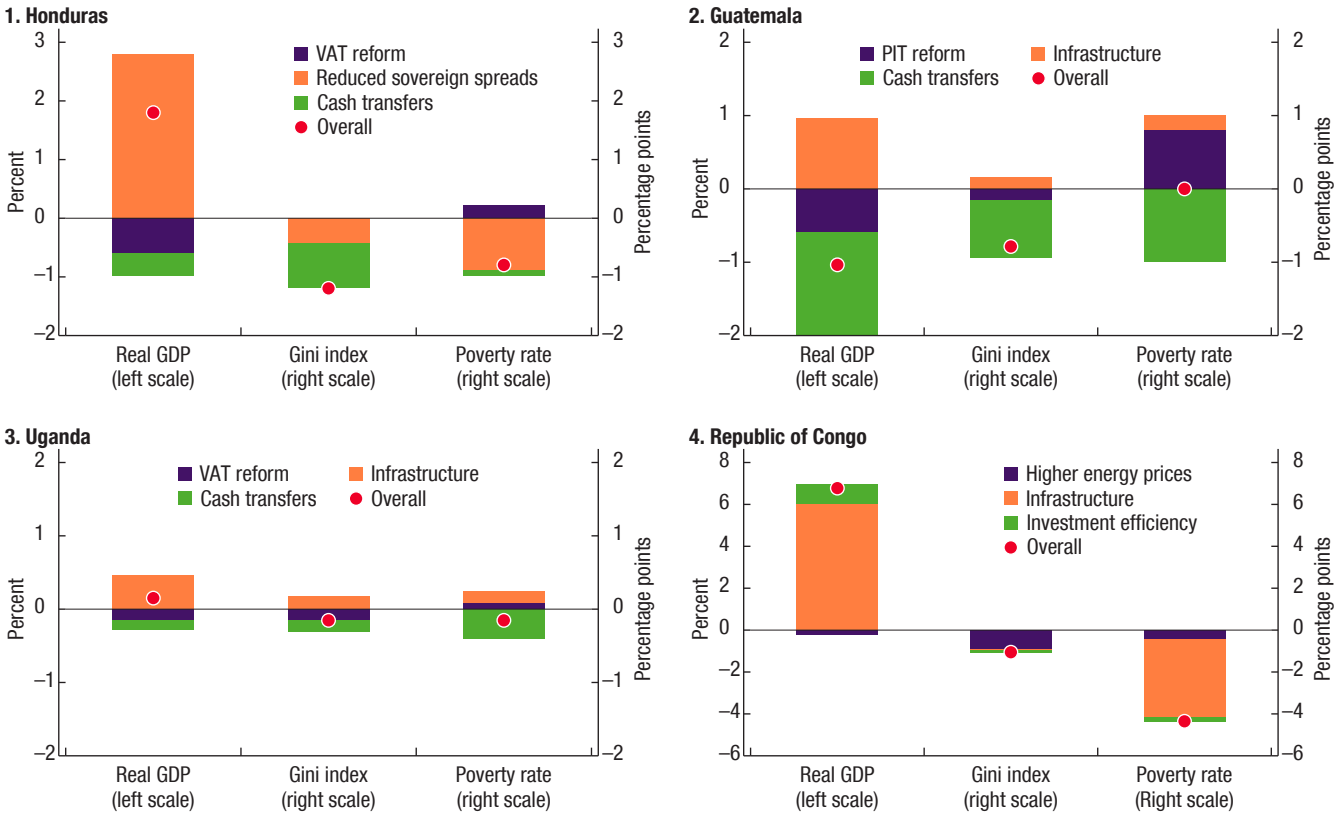
[3]Such general equilibrium feedback also complements traditional tax incidence analysis which usually assumes fixed prices by providing information on the possible medium- to long-term consequences of a reform.

[4]If the reduced-form approach is viewed as fitting the data using a linear model, the structural approach can be thought of as using a different model with different sets of assumptions and data requirements. Viewed in this way, if the model is built upon a wrong theory, it is equivalent to model misspecification in regression analysis, albeit in a more mathematical complex way. Put differently, the elements included in a model are usually only those that the researchers judge as quantitatively most important; undoubtedly, they are not exhaustive. Therefore, when interpreting the results, the readers should always have the context of the model in mind.

Box 2. The Quantitative Macroeconomic Approach *(continued)*

The *calibration strategy*—the selection of data moments used in calibration—requires an integrated consideration of the research question and the model mechanisms, which unfortunately does not follow any simple rule of thumb. In the examples in the section "Fiscal Reforms" in this chapter, a model that captures salient characteristics of LIC economies—large agricultural and informal sectors, sizable rural-urban gap, and limited financial development—and features an endogenous distribution of population, is built. When the model is used to compare the equity-efficiency trade-off of different tax instruments, it is important that the model captures the tax base and tax rate of the instruments considered, as well as the average level of inequality. Different policy proposals are then simulated using the calibrated model.

Figure 5. Macroeconomic and Distributional Impacts of Domestic Revenue Mobilization: Case Studies



Source: Fabrizio and others (2017), Figure 13.
Note: Panels 1–4 contain the main results from the first four studies in Table 4.1. The contents of the reforms in these studies are different and thus should not be directly compared with each other. PIT = personal income tax.

Table 1. Selected Pilot Studies of Fiscal Policy Reforms

Country	Reform Package	Reference
Uganda	Revenue mobilization by VAT, PIT, or CIT Expansion of public investment	IMF (2015b)
Honduras	Revenue mobilization by VAT Expansion of cash-transfer	IMF (2016a)
Guatemala	Revenue mobilization by VAT or PIT Expansion of cash-transfer	IMF (2016b)
Republic of the Congo	Revenue mobilization by VAT Revenue mobilization by increasing fuel price	IMF (2016c)
Benin	Revenue mobilization by VAT, PIT, or CIT Expansion of cash-transfer or public investment	IMF (2018c)
Senegal	Revenue mobilization by VAT, PIT, and CIT Expansion of cash-transfer and public investment	IMF (2019c)

Note: The first four studies are covered in detail in Fabrizio and others (2017) as well. For more cases using similar models, please refer to the list on the GitHub repository of the inequality toolkit at https://github.com/IMFInequality/inequality/blob/master/Documentation/IMF_Applications.pdf.

1. Consumption taxation (for instance, value-added tax) appears to be generally regressive, but its efficiency costs are small. However, in low-income countries, as opposed to the usual channel of higher effective tax rate, the regressiveness is caused by the uneven distribution of tax incidence between poor rural area and rich urban area. This is due to the limited labor mobility across the sectors. With limited labor mobility, the supply elasticity of rural households whose products are crucial ingredients to domestically consumed goods are low. As a result, urban households can transfer the consumption tax incidence to rural households by reducing demand, which makes rural households bear most of the tax incidence.

2. Labor and capital income taxation (for instance, personal and corporate income taxes), on the other hand, incur higher efficiency costs because they are levied upon the small formal sectors. However, since workers in the formal sector on average tend to be richer, income taxation is on average progressive.

3. Cash transfers programs (for instance, universal basic income) battle effectively against inequality. However, they lead to reductions in savings and hence investment since poor people tend to have higher marginal propensity of consumption.

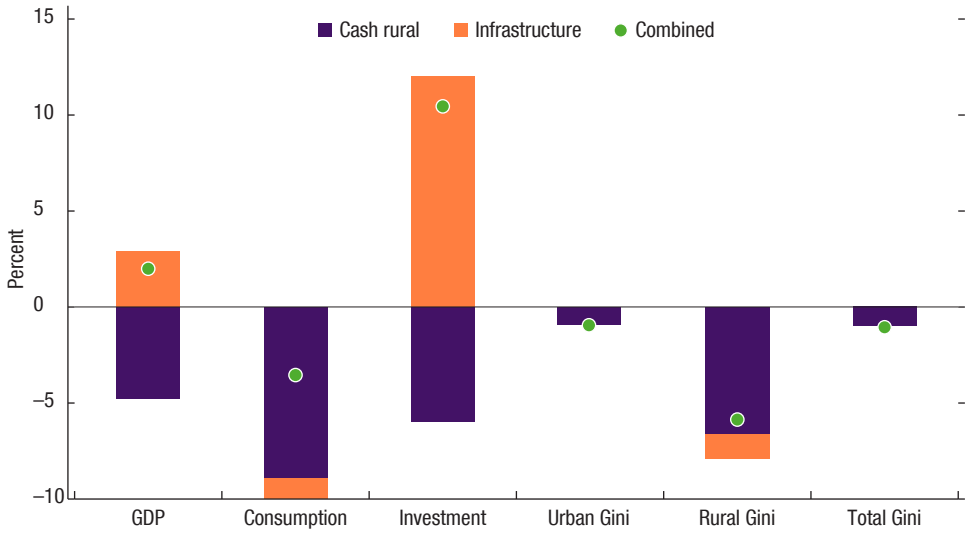
4. Public investment in infrastructure which raises the overall productivity of the economy in infrastructure compensates the efficiency loss with little distributional impacts. However, sector-specific investment would have distributional implications when labor mobility is limited. The general equilibrium effects tend to mitigate the impacts by passing some of the benefits through higher demand.

Box 3. Revenue Mobilization and Inequality in Senegal

This case is based on IMF (2019c). Senegal has maintained strong economic growth in recent years and has improved the living standards of its citizens. However, for the growth to be sustainable and to meet the development objectives of the government, extra revenue is needed to finance its public investment agenda. For this purpose, the government plans to increase its tax-to-GDP ratio from 16 percent to the regional target of 20 percent in the West African Economic and Monetary Union.

A comprehensive reform package which raises revenue mobilization by value-added tax, corporate income tax, and personal income tax to finance expansions of cash transfer and infrastructure investment programs is proposed. The green dots in Box Figure 3.1 show the simulation results. The results suggest that the package, if successfully implemented, can lead to sizable economic growth (about a 2 percent increase in GDP) with marked benefits to the economic disadvantaged population (Gini coefficient decreases substantially in the rural area).

Box Figure 3.1. Fiscal Reforms in Senegal



Source: IMF (2019c), Figure 3.
Note: Each bar represents the percentage change of the corresponding variable with respect to its level before each reform. The bars and dot capture respectively revenue mobilization with cash transfers to rural area (purple), infrastructure investment (orange), and the two spending programs combined (dot). The six variables plotted here are: GDP, aggregate consumption, aggregate investment, urban income Gini, rural income Gini, and total income Gini.

The four findings show clearly the equity-efficiency trade-off for different fiscal instruments. They confirm the old argument that in a comprehensively designed fiscal reform package, taxation and spending are two inalienable components that need to be considered together (Burgess and Stern 1993) in a quantitative context. In particular, the findings suggest that consumption taxation is best implemented together with cash transfer programs or in countries where inequality is not high to limit its distributional costs; income taxation, on the other hand, is more suitable to be paired with public investment or adopted in countries with robust economic growth to mitigate the efficiency costs.

Financial Sector Reforms

LICs have consistently fallen short in the development of a mature domestic financial system. Financial sector reforms, too, have significant macroeconomic and distributional implications. For instance, financial reforms can vibrate economic activity by lowering the cost of financing investment; however, the reforms are likely to benefit rich people who already have access to the financial markets, hence raise distributional concerns. These reforms are analyzed in this section.

The development of financial systems is a multi-faceted issue. Dabla-Norris and others (2021) argue that the development stage of a financial system can be captured by its breadth, depth, and efficiency. Breadth captures how easy it is for people to access credit; depth relates to the amount of collateral required for borrowing; and efficiency refers to the ability of financial intermediaries to provide services at low cost. In practice, the stages of development of a financial system along these three dimensions are correlated, but the correlation is far from perfect. Take the comparison between Pakistan and Bangladesh as an example. While the fractions of firms having access to credit in Pakistan and Bangladesh are 7 percent and 34 percent, meaning that the financial system in Bangladesh has a wider coverage, the average collateral requirement measured by loan-to-collateral ratio is 77 percent higher in Bangladesh, suggesting that its depth is much shallower.

Not only does the degree to which these three constraints bind vary across countries, but the macroeconomic and distributional impacts of these constraints also differ from each other. The complex interactions among the constraints themselves and with other country-specific characteristics once again make theoretical predictions ambiguous. Dabla-Norris and others (2021) calibrated another quantitative model to a number of countries and investigated the common lessons from these applications. In the context of the model, four insights appear to be general:

1. Financial sector reforms are most effective when the most binding constraint is alleviated. Using the previous example, reducing credit entry cost leads to higher output growth in Pakistan than in Bangladesh, because credit entry is more limited in Pakistan. This also implies that financial sector reforms should be designed to develop a well-rounded financial system with no obvious shortages.

2. Relaxing collateral constraints is more effective in raising output and productivity compared to reducing credit market entry cost or intermediation cost. It is because doing so simultaneously allows more people to access the financial market (extensive margin) and those who have already accessed the financial market to borrow more (intensive margin). As a result, it benefits the largest number of people.

3. Reducing credit entry cost and relaxing collateral constraints initially lead to an increase in inequality, however, further development of the financial system along these two dimensions eventually pushes inequality down. The reason is that the two reforms would initially benefit wealthy people who can afford the collateral requirements to borrow (the intensive margin); later, they allow people who previously have not used the financial system to start benefiting (the extensive margin).

4. By contrast, increasing the efficiency of financial intermediaries always drives inequality higher, because people who use the financial system—the relatively rich—benefit the most from the efficiency gains. Within the structure of the model, the general equilibrium spillovers to workers through higher demand or wages tend to be small quantitatively.

Further, financial sector reforms also interact with fiscal reforms in quantitatively significant manner. Box 4 illustrates the interaction using two case studies of Ethiopia and Myanmar.

Globalization

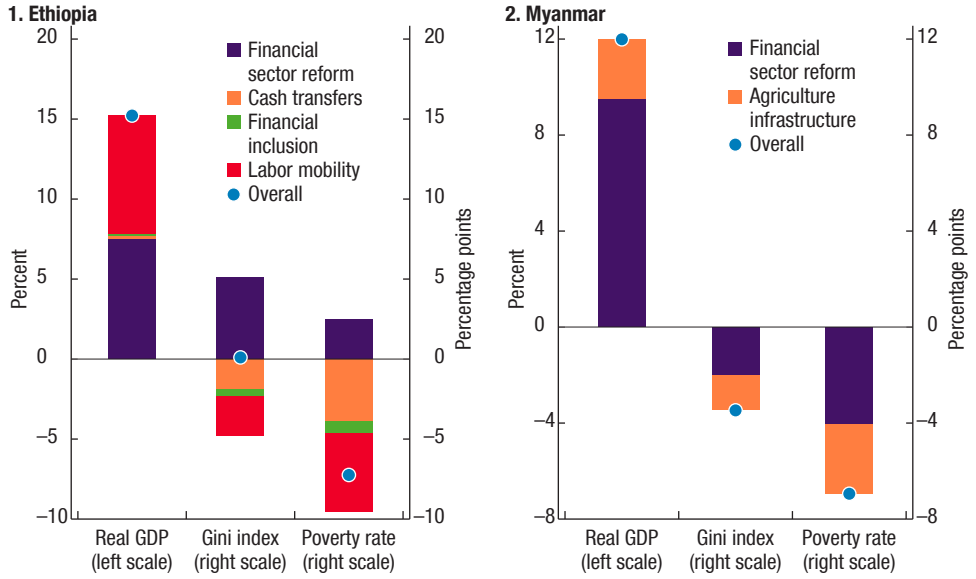
Over the past few decades, LICs have been rapidly integrating into the global economy. Despite the coincidence in the timing of globalization with accelerated growth and higher inequality, the causal relationships between globalization and the other two phenomena are less clear. The correlation could well be driven by causal relationship in the opposite direction: for instance, fast-growing economies are more likely to open up. Against the backdrop of a contemporary backlash on globalization, whether globalization indeed stimulates growth and how the gains are distributed could be vital determinants of its future.

Box 4. Financial Reforms in Ethiopia and Myanmar

The two cases in Box Figure 4.1 are based on IMF (2015a) for Ethiopia and IMF (2017b) for Myanmar. The financial sector in Ethiopia is relatively underdeveloped, with policies oriented toward funding public enterprises. Interest rates on deposits are negative in real terms. The reform expects to increase deposit rates and reduce the share of funds channeled to the public sector. Simulation results confirm the findings in Dabla-Norris and others (2021) that increasing the efficiency of financial intermediaries raises private sector activity and economic growth but causes inequality to rise as well. The study shows further that increasing sectoral labor mobility (for instance by strengthening land rights or providing accessible training and education) would mitigate the negative distributional effect of the financial reform.

Similar messages are also found in the case of Myanmar with one notable difference: because labor mobility appears to be less constrained in Myanmar, financial reforms lead to lower inequality even without the aid of complementary labor market interventions.

Box Figure 4.1. The Interaction between Financial Reforms and Fiscal Reforms



Source: Fabrizio and others (2017), Figure 14.

Lang and Tavares (2018) shed lights on the discussion.[8] The authors use the KOF Index of Globalization (Gygli and others 2019) as their measure of globalization. The index is a comprehensive indicator that aggregates a country's openness along 14 prominent dimensions.[9] The estimates provide evidence of a positive but diminishing effect of globalization on growth. This means that while weakly globalized countries benefit substantially from integrating into the global economy, countries in which globalization is deep receive much less gains in growth. As a concrete example, at the average globalization level of low-income countries (Nigeria), increasing the globalization index by one point (which is half of its average annual change) is estimated to increase the five-year growth rate by about 2 percentage points. The effect fades completely, however, when the globalization level of a country reaches that of Australia, Chile, or Poland.

Using the Gini coefficient as a proxy for inequality, the estimates suggest that globalization indeed leads to higher income inequality. There is no sign of the effects being nonlinear in this case. The estimates reveal that a one-point increase in the globalization index would lead to one-third of a point increase in the Gini coefficient. Given the slow movement of the Gini coefficient over time, the effect is economically significant. To understand the mechanism behind the increase in the Gini coefficient, the authors further estimate the impact of globalization on each income decile within country using the Global Consumption and Income Project (GCIP) database. The estimates show that while the average income in each income decile all increases following globalization, the rich benefits nearly three times more than the poor from the process.

Overall, because low-income countries on average are less integrated into the world economy, the first set of results suggests that globalization acts as a force that helps narrow cross-country income disparity. But because within each country globalization appears to favor richer people, domestic income distribution worsens. There is no evidence, however, that any income group is systematically hurt by globalization. Therefore, despite that income inequality has become higher, globalization does appear to be contributing to poverty reduction, which further strengthens the redistributive role of domestic fiscal policies covered in the section, "Fiscal Reforms."[10]

[8]See, for example, Winters, McCulloch and McKay (2004); Goldberg and Pavcnik (2007); and Harrison, McLaren, and McMillan (2011), and the references therein, for previous literature that tries to link globalization with growth and inequality.

[9]The 14 aspects are trade in goods, trade in services, trade partner diversity, foreign direct investment, portfolio investment, international debt, international reserves, international income payments, trade regulations, trade taxes, tariffs trade agreements, investment restrictions, capital account openness, and international investment agreements.

[10]It should be noted that these are not estimations based on panel data that track individuals across time. As a result, the identity of the people falling in each quantile may change across periods, causing potential com-

Capital Account Liberalization and Rising Inequality

One prominent reason that globalization is associated with higher inequality is through capital account liberalization; Furceri and Loungani (2018) estimated its impact. Capital account openness is measured using the Chinn-Ito index (Chinn and Ito 2006, 2008). The index summarizes the codified tabulation of de jure restrictions on cross-border financial transactions in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* database. The index is then used to construct a series of binary variables that label capital account liberalization episodes for each year. A country is marked as undergoing a capital account liberalization episode at a particular year if the annual change of the index is larger than two standard deviations of its average level. Capital account liberalization episodes defined in this way are associated with a contemporaneous increase in capital flows of about 5 percent of GDP.

Capital account liberalization episodes are estimated to have long-lasting effects on income inequality. They cause an immediate increase of the Gini coefficient by about 0.8 percent in one year; and the cumulative increase five years after the episodes rises to about 1.4 percent (Figure 6). The degree of financial inclusion plays an important role in shaping the distributional response of an economy to capital account liberalization, especially in the medium term. The comparison between the responses of countries with high and low degree of financial inclusion shows that while the Gini coefficient increases for both groups of countries in the short term, high degree of financial inclusion allows a country to gradually absorb the distributional impact with the Gini coefficient returning to its original level in about five years. On the contrary, for countries with low degree of financial inclusion, the distribution of income gets worse as time goes on (Figure 7).

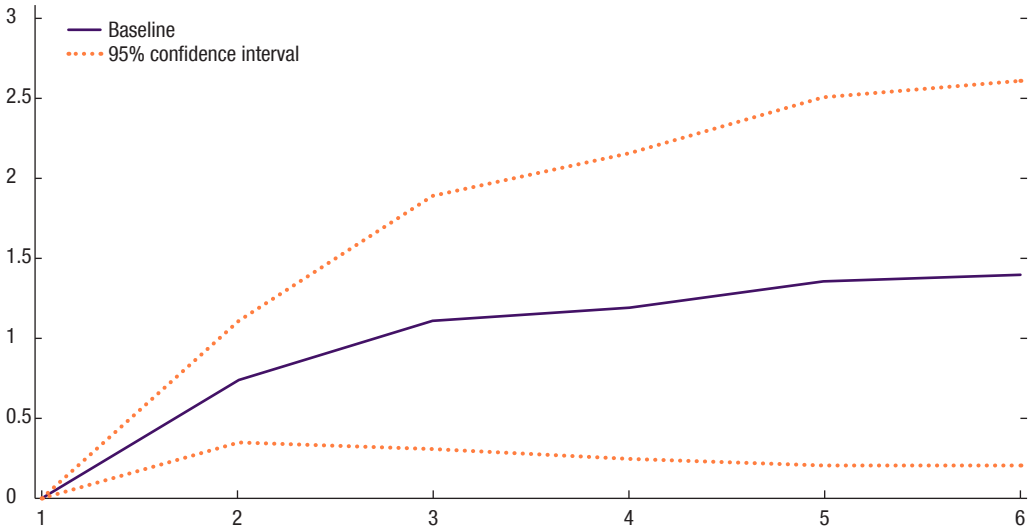
Key Messages Going Forward

The findings in the studies illuminate several pathways forward for both policymakers and academic researchers.[11]

positional bias when interpreting distributional quantiles as indicators of what happens to "the rich" or to "the poor." For example, a change that benefits the traded sector at the expense of the nontraded sector could make new people rich and formerly rich people poor.

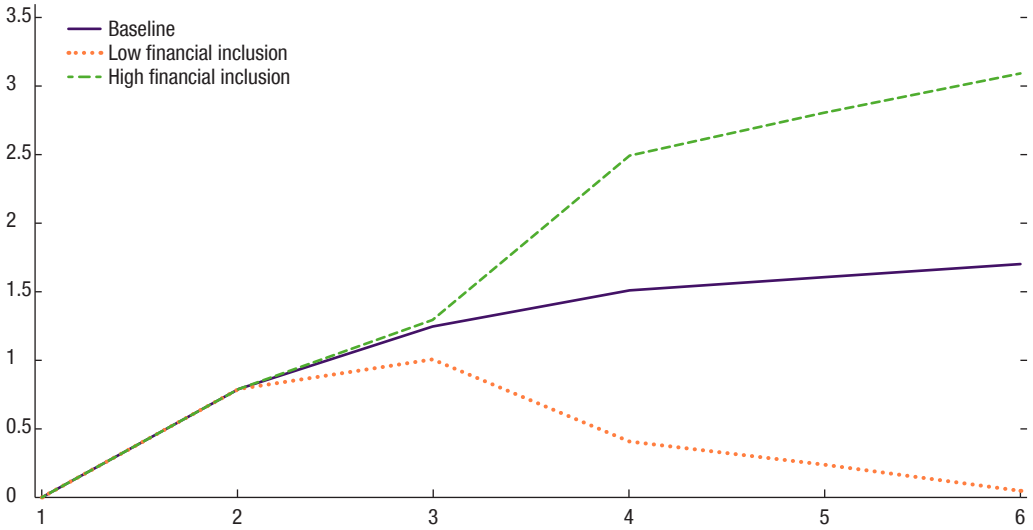
[11]The role that international partners can play is not directly discussed here but would be an important aspect to be discussed in future studies, examining the activities and policies of international development partners. Recent studies conducted under the DFID-IMF collaboration document evidence that multilateral development banks played key roles in catalyzing private financial flows (Broccolini and others 2020) and providing financing to borrowers with high credit risks (Gurara, Presbitero, and Sarmiento 2020), both of which have distributional implications.

Figure 6. The Effect of Capital Account Liberalization on the Gini Coefficient



Source: Furceri and Loungani (2018), Figure 2.
Note: In the figure, the horizontal axis is year after the liberalization. The vertical axis is the percent change of the Gini coefficient. The solid line is the point estimates, while the dotted lines indicate the 95 percent confidence interval.

Figure 7. The Role of Financial Inclusion



Source: Furceri and Loungani (2018), Figure 15.
Note: In the figure, the horizontal axis is year after the liberalization. The vertical axis is the percent change of the Gini coefficient. The lines are the point estimates for different group of countries.

Policymakers

- There is evidence that globalization leads to higher economic growth. It has also created challenges for financing public expenditure in LICs and opens doors for redistributive policies to let the benefits of growth reach a wider population.[12]
- Macro-structural policies can have important distributional consequences in LICs. A comprehensively designed fiscal reform package needs integrated consideration of taxation and spending instruments.
- Modern analytical tools can greatly improve policymakers' ability to identify the most binding frictions and distortions in the economy; they can be very useful in gauging the macroeconomic and distributional impacts of potential reforms prior to implementation.
- A caveat of the findings in this chapter: the studies surveyed do not examine how these interventions can best be implemented in practice in the presence of weak domestic administrative capacity or political economy constraints. The actual cost-benefit of a reform should consider both the theoretically predicted impacts and practical implementation issues.[13]

Researchers

- LIC economies differ substantially from advanced economies. Despite that the neoclassical growth model is considered as the benchmark of a workhorse model that richer features of advanced economies can be built on, how such a benchmark should look like for LICs is debatable. Efforts to establish such a framework should be a research priority.
- The studies surveyed demonstrate the power of modern quantitative tools in guiding policymaking. Researchers should develop analytical tools that are suitable for analyzing other macro-critical issues in LICs, for instance regional integration, labor market mobility, public debt, etc.
- Macroeconomic studies are developed largely in parallel with microeconomic ones that study practical issues on the implementation of reforms in LICs. Researchers from both areas should join force to provide better profiling of the impacts of proposed policy reforms.

[12]One reason that globalization creates public financing challenges is by universal tariff reduction, which used to be the primary source of tax revenue for LICs (IMF 2011).

[13]Several comprehensive surveys of these issues include Burgess and Stern (1993), IMF (2011), Keen (2012), and Besley and Persson (2013).

CHAPTER

5 Diversification

Mattia Coppo (RES) and Giovanni Melina (RES)

Export and output diversification are at the forefront of the policy debate. A recent IMF internal survey found that during 2014–18, IMF economists produced approximately 140 pieces of single and cross-country analyses related to diversification covering 59 developing countries. Commonly cited reasons compelling countries to diversify include natural resource dominance or commodity depletion (in the case of commodity exporters), dependence on the demand from a few trade partners, and demographic pressures for employment. Fostering diversification into new products and trading partners can indeed play an important role in influencing the macroeconomic performance, especially of LICs. In fact, diversification is a crucial determinant of economic growth for countries at early stages of development and is conducive of lower output volatility. Notable examples of countries, such as Malaysia and Vietnam, show how they have been able to increase their development level through trade diversification.

Diversification and Macroeconomic Performance

The COVID-19 crisis and the 2014–15 commodity price shock were two strong reminders of the benefits of economic diversification. At the onset of the COVID-19 pandemic, oil prices sharply dropped and remain at low levels after some recovery, adding a challenge for the countries, including LICs, that rely heavily on oil-export proceeds. Many of these countries had not yet fully recovered from the previous commodity price shock starting mid-2014, while more diversified LICs fared better during this episode (IMF 2016b).

Diversification can occur both with respect to products or trading partners (export diversification), or with respect to the domestic production process (output diversification). In addition, economists tend to distinguish between

two dimensions of product diversification. Diversification into new higher value-added sectors is defined "horizontal." Quality upgrading represents the vertical dimension and focuses on producing higher quality (and generally higher priced) products within existing sectors. Producing higher-quality varieties of existing products helps build on existing comparative advantages to boost export revenues and productivity.

IMF work (see, for example, IMF 2014c) demonstrates that increases in income per capita at early stages of development are typically accompanied by a transformation in a country's production and export structure, and that improving diversification into new products and trading partners can play important roles in influencing the macroeconomic performance of developing countries, especially LICs. Lee and Zhang (2019) also find that the economic benefits of export diversification are bigger for LICs.

Potentially distinct channels can explain the link between diversification and macroeconomic performance. There is both a growth payoff and a stability payoff to diversification, underscoring the case for paying close attention to policies that facilitate it. Diversification in exports and in domestic production enables a gradual allocation of resources to their most productive uses, rebalancing of factor prices in favor of labor, or the expansion into higher value-added sectors, which are conducive of faster economic growth (Acemoglu and Zilibotti 1997), especially in LICs. The existing literature also provides some evidence that economic diversification can increase a country's resilience to external shocks. Although openness to trade is often a source of output growth volatility, it also helps insulate against domestic growth slowdowns by providing access to additional markets. When an economy becomes less concentrated in specific products, especially those products with volatile prices or high demand volatility, such as primary commodities, the country could experience a decrease in growth volatility. The reliance on a few export categories results in high volatility of export proceeds, output, and fiscal revenues and can be destabilizing for the macroeconomy especially when hit by negative terms of trade shocks. Economic diversification also has a social impact and is conducive of sustainable growth, as it is associated with lower income and gender inequality, higher innovation and foreign direct investment, and a larger number of businesses (Francis, Hasan, and Zhu 2016).

Diversification Is at the Forefront of the Policy Debate

Diversification has become central to policy discussions. Commonly cited reasons compelling countries to diversify include natural resource dominance or commodity depletion (in the case of commodity exporters), dependence on the demand from a few trade partners, and demographic pressures for

employment. Deficient infrastructure (including, in some cases, the lack of a reliable energy sector), lack of investment in both physical and human capital, a weak business environment, and inequality of opportunities, including between men and women, that constrain labor market participation are often mentioned among the determinants for lack of diversification. Other region-specific reasons are also at play, such as security concerns (Middle East and Africa), overvalued exchange rates and labor market rigidities (Asia-Pacific region), and insufficient levels of financial market development (sub-Saharan Africa).

Historically, LICs have depended heavily on a narrow range of traditional primary products and on a small number of export markets for the bulk of their export earnings and sources of growth. These patterns have been changing over the past two decades, albeit with significant variation in the extent of diversification both across LICs and within regions. For example, over the past decade, in many sub-Saharan African countries the process of diversification has been slower than in countries at similar levels of development elsewhere. In addition, economies exhibiting some degree of diversification are often constrained by stagnating export quality.

Recent theories suggest that such limited diversification reflects market and government failures which limit technology spillovers and hamper productivity and economic growth. Dabla-Norris and others (2013) showed that many LICs, particularly those in sub-Saharan Africa, have higher agricultural shares and lower manufacturing shares than as predicted by the level of economic development and country fundamentals. The agricultural employment share tends to decline much more rapidly in economies with a more diversified export base, possibly thanks to the availability of alternative productive opportunities that greater diversification provides.

Solving government failures, although necessary, is not sufficient to support export diversification as the example of oil exporters in the Gulf Cooperation Council (GCC) illustrates. Market failures need to be tackled as well, suggesting an important objective for diversification policies to steer firms and workers toward non-oil tradable sectors (Cherif and Hasanov 2016). This should be done while avoiding import substitution and focusing on removing specific bottlenecks (such as a weak legal business environment, entry barriers, or a lack of transportation infrastructure) which hamper entry of new firms.

Export diversification is an important growth policy target for LICs. In fact, there is still ample scope to upgrade the quality of LICs' existing export basket and/or introduce new higher value-added products, in not only manufacturing but also agriculture—often the least-productive sector in these countries. Development policies should therefore include rather than aban-

don agriculture. High productivity growth in agriculture and a diversified export base are associated with productive sectoral shifts. Part of the process of moving labor out of agriculture would occur unconditionally, that is, countries with an initially large agricultural sector have more scope to reduce the agricultural share and therefore are more likely to benefit from structural transformation. However, decreasing the labor share in agriculture should not be a target per se, as it entails social costs (for example, migration and urban unemployment). Lea (2017) makes a strong case for the tradable sector in developing countries, because it has the potential to grow very quickly over a long period of time and generates foreign exchange to finance inputs that a country cannot produce itself.

Successful Country Experiences

There are notable examples of countries that have been able to increase their development level through trade diversification. Over the past four decades, Malaysia witnessed rapid economic growth accompanied by significant transformation of its economic and trade structures. GDP per capita rose 17 times in 40 years, while exports of goods and nonfactor services increased from about 40 percent of GDP in the early 1970s to more than 100 percent in the mid-2000s. Largely an agricultural economy until the 1980s, Malaysia managed to successfully diversify its output and exports, first within agriculture, and then to manufacturing of increasingly sophisticated products. Similarly, Vietnam has had remarkable success in achieving broad-based economic growth over the past quarter-century.[1] GDP per capita rose nearly five times in 20 years. At the same time, the economy became much more open: exports of goods and services rose from about one-third of GDP to 86 percent of GDP. Hand in hand with growth went significant structural change of the economy. The agricultural sector declined from 32 percent of GDP in 1990 to 16 percent in 2011, while industry and construction rose from 25 percent of GDP to 42 percent over the same period.[2]

Analytical Work on Diversification at the IMF

The research outcomes from the DFID-IMF collaborations made important steps that fostered analysis and advice to countries on diversification and structural transformation. These include a Staff Discussion Note (Papageor-

[1]The authors note that growth and diversification can also be led by common factors (such as transition from a planned economy, or political reforms. However, economists are also able to discern the effects of diversification on growth. For example, Dutt, Mihov, and Van Zandt (2008) demonstrate that export diversification correlates with subsequent GDP growth.

[2]For more cases, such as Mexico and Indonesia, the authors refer to Cherif and Hasanov (2016).

giou and Spatafora 2012), a Board Paper (IMF 2014c), two data toolkits (one on export diversification—Papageorgiou, Spatafora, and Wang 2015—and the other one on export quality—Henn and others 2020), data sets on service exports (Loungani and others 2017) and on commodity terms of trade (Gruss and Kebhaj 2019). Covering 200 economies including most low-income countries, the export diversification toolkit provides indicators on export product diversification and export product quality from 1962–2014. The measures in this toolkit are based on an updated version of the UN–NBER data set, which harmonizes COMTRADE bilateral trade flow data at the 4-digit SITC level. The Export Diversification Database has three main indicators: the Export Diversification Index, the Extensive Margin, and the Intensive Margin. A recent IMF internal survey found that during the 2014–18, IMF economists produced approximately 140 pieces of single and cross-country analysis related to diversification covering 59 developing countries. Nearly half of these analytical pieces used the above-mentioned data toolkits. This large array of work asserts the importance and prominence that diversification has in policy discussions across all regions and types of countries.

The inter-related themes of structural transformation and economic diversification have increasingly acquired prominence with respect to both country-level and cross-country analytical work carried out at the IMF. Some studies aimed to define the issue and draw some stylized facts. For example, IMF (2016b) shows that most LICs continue to have concentrated export structures, especially commodity exporters.

Another stream of work focuses on the role of diversification in improving growth. Quantifying any link between export diversification and economic growth is complicated by the fact that there are likely to be numerous feedback effects between export diversification and growth. However, using novel econometric techniques, IMF economists were able to demonstrate that diversification is a crucial determinant of economic growth for countries at early stages of development, and that it has also been conducive of lower output volatility (IMF 2014c). Other studies find additional evidence that diversification reduces volatility. For instance, Cerdeiro and Plotnikov (2017) demonstrate that higher diversification of exports is associated with a smaller effect of oil price movements on economic activity in a sample including both oil exporters and importers. Embedding diversification in the overall development strategy could also benefit small states (McIntyre and others 2018), with narrow production structures and natural disasters constituting an important source of vulnerability. Diversification spurts are also associated with sharp subsequent growth accelerations (Papageorgiou, Spatafora, and Wang 2015), and initial levels of diversification and complexity (IMF 2015c) have been seen to predict long-term average growth of real GDP per capita.

Further, reforms to boost diversification could also contribute to narrowing external deficits (IMF 2017c).

IMF economists also focused on the drivers of diversification. Macroeconomic stability, access to credit, good infrastructure, a conducive regulatory environment, a skilled workforce, and income equality (IMF 2017a) are all associated with higher levels diversification. Refinements to fiscal and macroprudential policy frameworks (Callen and others 2014) could also aid diversification by reducing macroeconomic volatility. Expanding on Callen and others (2014), Giri, Quayyum, and Yin (2019) added that to diversify, policymakers should prioritize human capital accumulation and reduce barriers to trade, especially in commodity-exporting countries. Empirical evidence highlights that gender-friendly policies (Kazandjian and others 2016) may also help by alleviating gender gaps in human capital accumulation and resource allocation.

While structural characteristics play an important role, analyses show that there is significant room for policy interventions (IMF 2016d). Specific policies must build on a country's starting point, its endowments and circumstances (IMF 2017a). For example, countries with a substantial proportion of labor force in agriculture, could encourage diversification through greater value-addition in agricultural production (IMF 2017d); oil-exporting countries could pursue financial diversification and fiscal diversification (Callen and others 2014) in tandem with output and export diversification. Giri, Quayyum, and Yin (2019) add that for commodity exporters reducing barriers to trade is the most important driver of diversification, followed by improving education outcomes at the secondary level and financial sector development. Atolia and others (2020) provides a rethink on development policy that can facilitate structural transformation, noting the importance of public policy to generate self-sustaining incentives to strengthen private fundamentals such as technology, skills, and innovation. Overall, the state's role is paramount, and policies need to support the creation and development of dynamic export sectors while aligning incentives for firms and workers to enter these sectors (Cherif, Hasanov, and Zhu 2016).

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