



# Linking Fiscal Policy and Growth in PER Reports: An Operational Framework for Low-Income Countries

*Emmanuel Pinto Moreira, Senior Economist, Latin America and Caribbean Region*

*Public expenditure reviews (PERs) could be a key analytical tool in policy dialogue and World Bank financial support (normally under Development Policy Loans) to public finance reforms. However, there is a widely held perception that some PERs are analytically weak when it comes to linking fiscal policy choices and their economic growth implications (Swaroop 1999).*

PERs normally give little emphasis to quantitative and dynamic analysis of the linkages between the composition and quality of public expenditure and growth, a key issue in developing countries. Thus, most Bank PERs have limited themselves to a “classical” analysis of the three dimensions of expenditure analysis: fiscal discipline, intersectoral allocation of spending, and intrasectoral allocation of spending.

One implication is that the average PER report does not provide an integrated approach to fiscal discipline and growth, because PERs do not capture fully (if at all) the various channels through which fiscal policy affects economic growth. This weakness is often due to the lack of readily available operational macroeconomic models where these channels are featured prominently.

This note describes a framework for linking fiscal policy and growth issues in low-income countries. The framework has been developed in the context of a recently-completed Public Expenditure Management and Financial Accountability Review (PEMFAR)

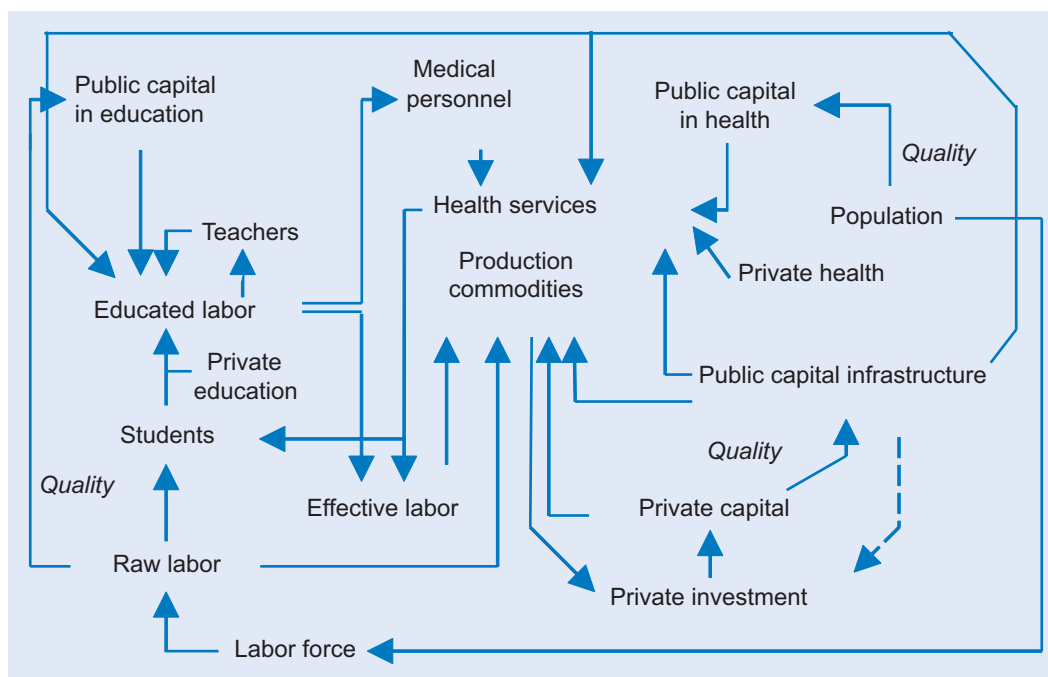
report in the Latin American and Caribbean (LAC) region. The note describes first the framework and then illustrates its application to fiscal reform and growth prospects in the context of Haiti. The note concludes by laying out an agenda for developing this framework further—ideally to facilitate use of this framework in preparing more PERs and elaborating medium-term budget frameworks.

## Linking Fiscal Policy and Growth: An Operational Framework

In recent years, there has been progress in understanding how fiscal policy affects growth. In particular, the allocation of public expenditure to “productive” and “unproductive” components, and the various externalities associated with public capital (most notably the impact of infrastructure capital on education and health outcomes), have received increased attention, both at the World Bank and in academic circles.<sup>1</sup>

However, progress in developing disaggregated macroeconomic models for analyz-

**Figure 1: Public Capital and Production**



Source: World Bank, June 2008.

ing the impact of fiscal policy on growth has been more limited. The model proposed by Bayraktar and Pinto Moreira (2007) offers one operational approach based on an representative agent framework.<sup>2</sup> This model draws from the macro monitoring SPAHD framework for low-income countries developed in Agénor, Bayraktar, and El Aynaoui (2008).<sup>3</sup>

A key feature of the model is that government spending is disaggregated into various components, including maintenance, security, and investment in education, health, and core infrastructure.<sup>4</sup> In line with recent research, it also accounts for the externalities associated with infrastructure spending—including its impact on private capital, as well as education and health. The model accounts for various ways through which improved political stability and reduction in violence can affect growth. Improvements in economic security contribute to the rise of private investment by decreasing downside uncertainty on the return to investment and securing property rights. Moreover, improved security may enhance the efficiency of resource allocation and thus growth. In the

model, spending on security lowers violence and increases private sector confidence in the economy's prospects; this tends to reduce the rate of time preference and to increase private saving—which in turn stimulates private investment and growth.

A more detailed description of the links between public capital and production is provided in figure 1. Four categories of goods and services are produced in the economy: a commodity (produced by the private sector), and three types of services—education and health (both of which produced by the government and the private sector) and infrastructure (produced solely by the government). The privately produced commodity is a tradable good whose price is taken as given; it can be used for either consumption or investment. Production is consumed only domestically and represents the sole source of supply on the domestic market. The provision of education and health services by the public sector are free of charge, whereas public infrastructure services are sold at a nominal price that is fully indexed on the price of the private good. Excess demand for all services prevails; quantities consumed are

thus determined by supply. There is a single household-producer, which includes all workers (educated and noneducated, employed in both the public and the private sectors) in the economy. The model therefore abstracts from distributional issues.

Production of public health services requires combining inputs in sequence. In the first round, public capital in infrastructure and public capital in health are combined to obtain the “effective” capital stock in the production of health services. In the second round, the effective capital stock is combined with medical personnel, which represents a fixed fraction of the public labor force, to produce public health services. Effective (educated) labor employed in private production is produced by combining the supply of health services with the prevailing stock of educated labor in that sector.

The production of commodities is also specified as a multistage process. In the first stage, production requires combining effective educated labor and private physical capital to produce a composite input; at the second level, this composite input is combined with uneducated labor to produce another composite input. In the final stage, the supply of commodities is obtained by combining the last composite input with (quality-adjusted) public capital in infrastructure.

The transformation of raw labor into educated labor requires accumulating skills in part through a publicly funded education system, which in the model is free of charge for users. As before, a multilevel nested structure highlights the role of infrastructure and health on education. At the first level, the stock of public capital in infrastructure and the stock of public capital in education produce a composite input, which is referred to as “effective” education capital. At the second level, effective education capital and the number of teachers on government payroll (which represent a fixed fraction of total public employment) are combined to produce a composite public education input. At the third level, the total number

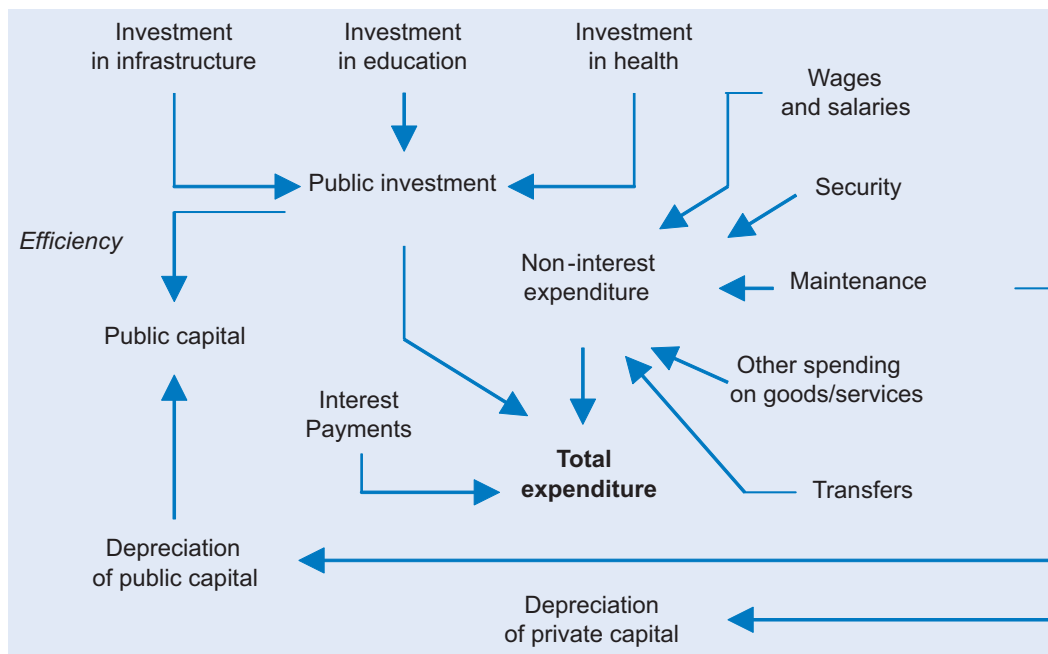
of students is combined with the supply of health services to determine a composite input, which we refer to as the “effective” supply of students. At the fourth level, the “production” of newly educated workers by the public sector depends on the fraction of the effective supply of students attending public schools, as well as the composite public education input. Given the new flow of educated workers produced in the economy, the total stock of educated labor in the economy can be calculated, for a given rate of attrition. Assuming that public sector employment is fixed as a proportion of total supply, the supply of educated labor involved in private production of commodities is determined residually.

The government collects taxes (on wages of educated workers, private capital income, and private consumption), and spends on goods and services (including for maintenance and security purposes). It also services its debt and invests in education, health, and core infrastructure. Education and health services are provided free of charge, whereas core infrastructure is subject to fees. It receives foreign assistance, which serves to balance the budget.

More explicitly, total government spending, whose composition is described in figure 2, is given by the sum of consumption (current) spending, capital (investment) spending, and interest payment. Current spending consists of salaries to public sector workers, spending on maintenance, spending on security (other than salaries for the army, police, and judiciary), and other spending on private commodities. Spending on security and other items are both taken as a fixed fraction of output, whereas maintenance outlays are assumed to be proportional to total depreciation of all components of the public capital stock.

Total public investment is a fixed fraction of output. Public investment is allocated to education, health, and core infrastructure, as well as a residual item. Each component is given as a fixed fraction of total investment. Stocks of public capital in education, health,

**Figure 2: Composition of Public Expenditure**



Source: World Bank, June 2008.

and infrastructure are determined by using the perpetual inventory method, modified to account for partial efficiency of public investment. The rate of depreciation of each public capital stock is taken to depend inversely on the ratio of public spending on infrastructure maintenance to the relevant stock of public capital. Thus, maintenance expenditure enhances the durability of public capital.

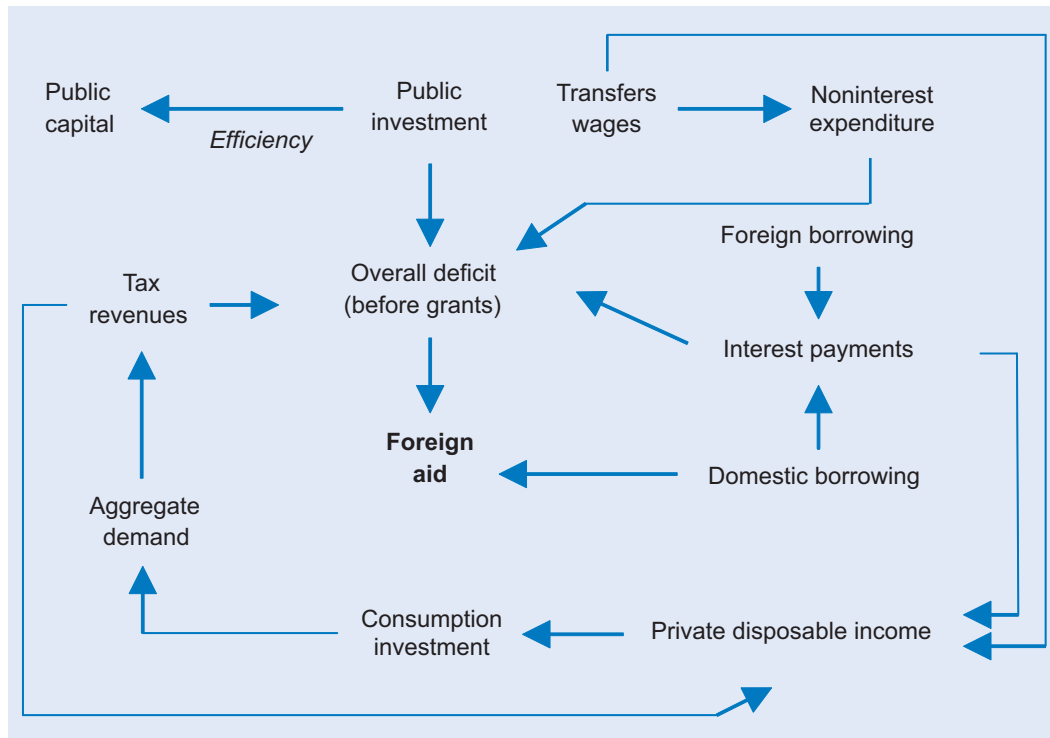
Taxes are subject to collection costs; these costs (which are measured in terms of the private commodities) reduce the yield of each tax by a fixed proportion.<sup>5</sup> User fees are also subject to the same type of collection costs. Total government revenue is determined as the (cost adjusted) income and consumption taxes, as well as user fees. With borrowing fixed as a fraction of output, the government budget balance is used to determine the flow of aid (grants). In this mode, therefore, the model allows one to calculate aid requirements for a given path of spending, taxes (net of collection costs), and borrowing, as illustrated in figure 3. This is a sensible way to proceed for a low-income country, in a medium-term growth context.

### Application: The Haiti PEMFAR Report

The Haiti PEMFAR Report presents an application of the above model to Haiti (see World Bank, 2008). The model is calibrated for 2005. After constructing a baseline scenario for 2007–15, the model is used to analyze the growth effects of a composite “fiscal reform” package consisting of the following policy measures:

- an increase in total public investment in GDP by 5 percentage points starting in 2008 until 2011, then dropping by 1 percentage point each year after 2011
- a permanent reduction of 1 percentage point of GDP, starting in 2008, in the “other” category of public spending, which is reallocated (across the board) to investment, with (at the same time) a permanent reduction in the share of the category “other” in public investment by 5 percentage points, reallocated in its entirety to health
- an increase in the effective indirect tax rate to 6 percentage points starting in 2008

**Figure 3: Government Budget: Overall Structure**



Source: World Bank, June 2008.

- an increase in the direct tax rate by 1 percent for 3 years, starting in 2008
- an increase in security spending by 3 percentage points of GDP between 2008 and 2011, 2.5 percent in 2012, 2 percent in 2013, and 1.5 percent in 2014 and 2015
- a reduction in collection costs by half, starting in 2008.

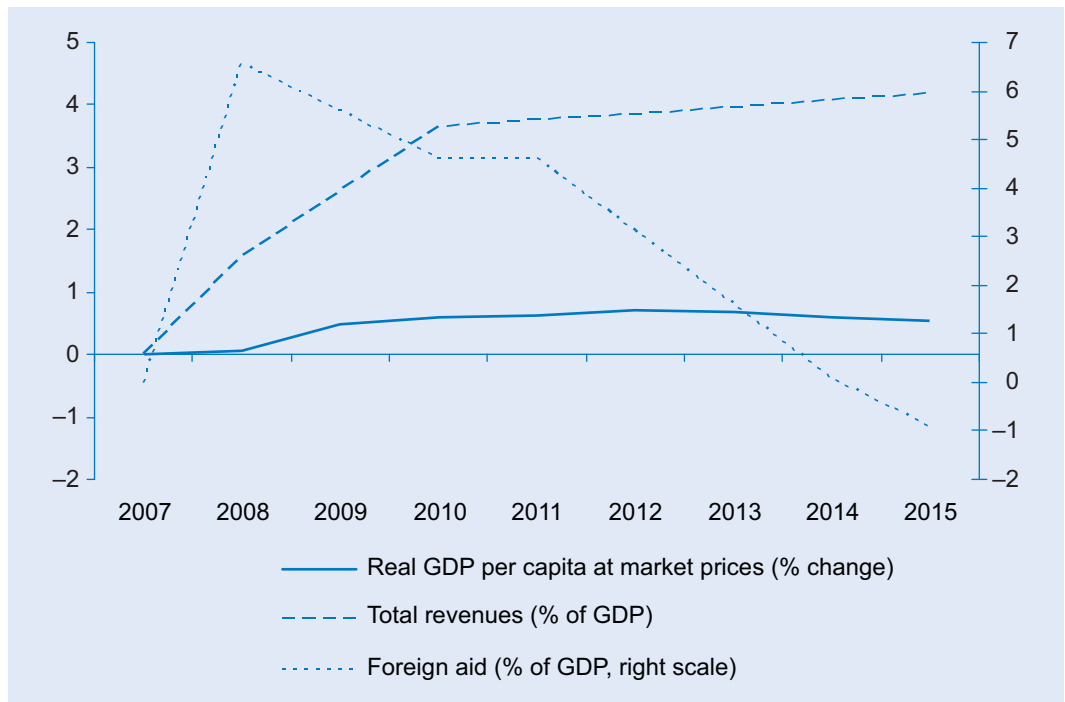
Figure 4 presents the simulation results. We observe two opposite effects on growth. As the tax rates increase, people start saving less. As a result private capital accumulation slows down. This leads to an initial negative impact of the fiscal package on growth. But at the same time, the higher tax rates and lower collection costs raise government revenue, which increases public investment and thus the various components of public capital. Over time, the larger public capital stock raises (directly and indirectly) saving and investment, increases output, and lowers poverty. In the medium term, the impact on growth turns out to be positive. The growth rate of real GDP per capita increases by 0.5

on average. If the elasticity of security spending is higher, private investment increases more, because private sector confidence in the economy's future prospects improves. This leads to a higher rate of output growth by 0.6 percentage points (see figure 5).

### Extensions

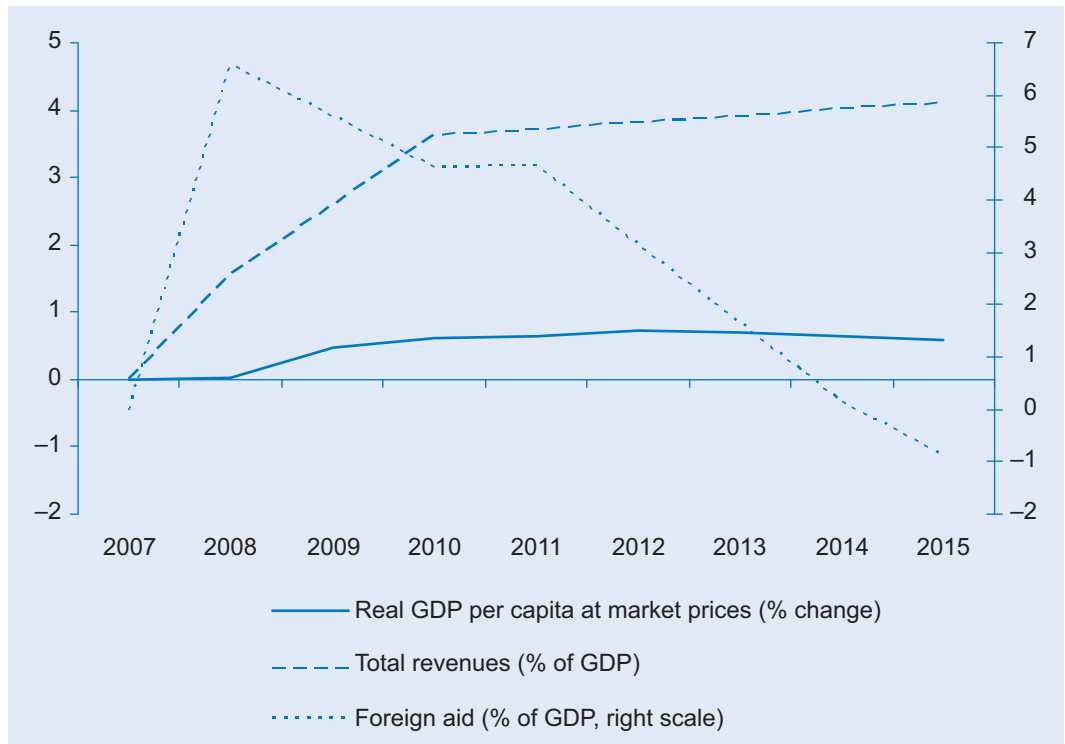
For Bank economists interested in assessing the impact of tax reforms, the model described in this note is also useful because it allows one to go beyond a medium-term *expenditure* framework and focus instead on a medium-term *budget* framework. This is because it accounts not only for the interactions between expenditures and growth, but also for the links between taxes with growth. Moreover, the model can also be linked to human development indicators as in SPAHD models developed in the contributions cited earlier—including therefore not only poverty but also malnutrition, infant mortality, literacy rate, access to safe water, and life expectancy (see Agénor et al., 2006).

**Figure 4: Combined Shock with Lower Collection Cost, Higher Direct Tax and Security Spending, 2007–15 (deviation from the baseline scenario)**



Source: Author's calculations.

**Figure 5: Combined Shock with Higher Security Expenditure, Direct Taxes, and Elasticity of Security Expenditure, 2007–15 (deviation from the baseline scenario)**



Source: Author's calculations.

An extension worth considering (particularly for middle-income countries) would be to account for public debt accumulation, as opposed to the case of aid-financed fiscal deficits presented here. This would significantly expand the scope of PERs in their analysis of debt sustainability issues, and therefore enhance their role as the analytical underpinnings of World Bank operations.

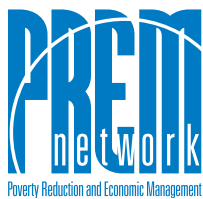
## References

- Agénor, Pierre-Richard. 2009. *Public Capital, Growth, and Welfare*. Book in progress, University of Manchester (March).
- Agénor, Pierre-Richard, Nihal Bayraktar, and Karim El Aynaoui. 2008. "Roads out of Poverty? Assessing the Links between Aid, Public Investment, Growth, and Poverty Reduction." *Journal of Development Economics* 86 (June): 277–95.
- Agénor, Pierre-Richard, Nihal Bayraktar, Emmanuel Pinto Moreira, and Karim El Aynaoui. 2006. "Achieving the Millennium Development Goals in Sub-Saharan Africa: A Macroeconomic Monitoring Framework." *World Economy* 29 (November): 1519–47.
- Bayraktar, Nihal, and Emmanuel Pinto Moreira. 2007. "The Composition of Public Expenditure and Growth: A Small-scale Intertemporal Model for Low-Income Countries." Policy Research Working Paper 4430. World Bank, Washington, DC (December).
- Glomm, Gerhard, and Felix Rioja. 2004. "Fiscal Policy and Long-Run Growth in Brazil." Unpublished paper. Indiana University, Bloomington, IN (May).
- CREAM (Center for Research, Evaluation, Assessment and Measurement). 2007. "Modèle SPAHD pour l'analyse des stratégies de croissance et de développement humain à Madagascar." Unpublished paper. Antananarivo, Madagascar (October).
- García, Carlos J., Santiago Herrera, and Jorge E. Restrepo. 2008. "Government Expenditure Composition and Growth in Chile." Unpublished paper. Central Bank of Chile, Santiago (November).
- Moreno-Dodson, Blanca. 2008. "Assessing the Impact of Public Spending on Growth: An Empirical Analysis for Seven Fast Growing Countries." Working Paper 4663. World Bank, Washington, DC (July).
- Nganou, Jean-Pascal. 2009. "The Impact of Debt Relief on Growth, Poverty, and Human Development: A SPAHD-Based Analysis for Burundi, 2009–20." Unpublished paper. World Bank, Washington, DC (March).
- Pinto Moreira, Emmanuel, and Nihal Bayraktar. 2008. "A Macroeconomic Framework for Quantifying Growth and Poverty Reduction Strategies in Niger." *Journal of Policy Modeling* 30 (May): 523–39.
- Swaroop, Vinaya. 1999. "Public Expenditure Reviews: Progress and Potential." PREM Note No 20. World Bank, Washington, DC (April).
- World Bank. 2008. *Republic of Haiti PEMFAR: Improving Efficiency of the Fiscal System and Investing in Public Capital to Accelerate Growth and Reduce Poverty*. (Task Manager: Emmanuel Pinto Moreira; Peer Reviewer: Blanca Moreno-Dodson). World Bank Country Study. Washington DC: World Bank.

*If you are interested in similar topics, consider joining the Public Expenditure Thematic Group at the PREM Web site (<http://www.worldbank.org/prem>).*

## Notes

1. See Agénor (2009) for a detailed review of the analytical literature. Moreno-Dodson (2008) conducted a recent study of the impact of public expenditure on growth, focusing on a small group of fast-growing economies.
2. An alternative approach is to rely on an overlapping generations model (see Glomm and Rioja, 2004; and García, Herrera, and Restrepo, 2008).
3. See CREAM (2007), Pinto Moreira and Bayraktar (2008), and Nganou (2009), for other application of SPAHD models. The acronym SPAHD stands for Strategy Papers for Human Development.
4. A detailed description of the model is also available in the Republic of Haiti PEMFAR (World Bank, 2008).
5. Collection costs refer here only to direct administrative costs incurred by governments.



This note series is intended to summarize good practices and key policy findings on PREM-related topics. The views expressed in the notes are those of the authors and do not necessarily reflect those of the World Bank. *PREMnotes* are widely distributed to Bank staff and are also available on the PREM Web site (<http://www.worldbank.org/prem>). If you are interested in writing a *PREMnote*, email your idea to Madjiguene Seck at [mseck@worldbank.org](mailto:mseck@worldbank.org). For additional copies of this *PREMnote* please contact the PREM Advisory Service at x87736. *PREMnotes* are edited and laid out by Grammarians, Inc.

Prepared for World Bank staff