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Absorptive Capacity and Achieving the MDGs

The Case of Ethiopia

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I. Introduction

The issues of effectiveness and absorptive capacity have attracted increasing attention in view of growing efforts to raise new and large-scale financial resources—beyond the 2000 Monterrey commitments—to help developing countries achieve the Millennium Development Goals (MDGs). The estimated annual cost of achieving the MDGs range from about $50 billion to $66 billion initially, rising to $126 billion by 2015, in incremental MDG spending requirements, on top of current aid flows.[1] This represents a major increase in official development assistance (ODA) flows to developing countries as a share of OECD-Development Assistance Committee (DAC) country gross national income. At the individual country level, this implies a large increase in ODA, in some cases a tripling or quadrupling of current flows to countries already receiving high levels of aid.

*World Bank. This work is part of a larger effort in the Development Economics Department of the World Bank (DECVP) to examine the financing requirements and economic impact of aid flows to support MDG-based poverty reduction strategies. See Bourguignon and others (2004, 2005) and Lofgren and Diaz-Bonilla (2005).

[1] Lower estimates are from the World Bank and various Development Committee papers (see *Global Monitoring Report,* 2004) and higher estimates from the *Millennium Project Report,* 2005.

Can low-income countries implement MDG programs and effectively absorb much higher levels of aid and efficiently use them to achieve the MDGs? Some have argued that the MDG targets are overly ambitious "stretch targets," whose achievement has no historical precedent (Clemens and others, 2004). Others argue (e.g., the Millennium Project Report 2005) that given the right environment and level of external support, the MDGs are well within reach. All agree, however, that recipient countries must build adequate absorptive capacity. In this paper, we consider the case of Ethiopia and examine several important constraints to its absorption of aid in pursuit of the MDGs.

Ethiopia is a good case study of the impact of increased aid flows since considerable work has been done to assess its needs, limitations, and capacity. A 2003 report by the Development Committee (the Joint Ministerial Committee of the Boards of Governors of the Bank and Fund on the Transfer of Real Resources to Developing Countries) for the 2003 Annual Meetings of the World Bank and IMF included a case study of Ethiopia that examined its capacity to absorb significantly higher aid flows in pursuit of the MDGs. The report concluded that a 60–100 percent increase in aid could be effectively absorbed if capacity-building efforts and accelerated structural reforms were put in place. This would allow Ethiopia to attain most of the core MDG targets (Development Committee, 2003). Ethiopia was also one of the pilot countries for work on Harmonization and Alignment of donor practices, and has made significant progress toward coordinating assistance and harmonizing ODA flows.[2] A study by Foster and Keith (2003) for the British Overseas Development Institute on Ethiopia and other African countries argues that a doubling of aid flows to Ethiopia over the next five years is realistic. The *Commission for Africa Report*, released in March 2005 by the British government, also examines the potential for Ethiopia to scale up spending for the MDGs and argues that a doubling of aid flows over the coming three to five years is feasible. An MDG "needs assessment" has been prepared for the Ethiopian government (Geda and others, 2005) and is being integrated into the government's Poverty Reduction Strategy under the World Bank's Sustainable Development and Poverty Reduction Program (SDPRP). World Bank team and Millennium Project teams have both been helping the Ethiopian government develop the methodology and provide a consistency framework for the country's medium-term MDG-focused forecasts. The World Bank's "Maquette for MDG Simulations" (MAMS) has been one of the modeling frameworks used for this purpose.[3]

Large increases in aid clearly pose important macroeconomic risks and raise questions about the underlying ability of the economy to effectively absorb

[2] Harmonization and Alignment of donors refers to the efforts by bilateral and multilateral donors to harmonize their aid processing requirements with recipient country practices and align their support with the strategic priorities of recipient countries.

[3] See Bourguignon and others (2004) and Lofgren (2004).

much higher resource flows. In this paper, we examine these issues for Ethiopia in a way that distinguishes between the implications of: directing aid at investments in basic infrastructure (roads, energy, and irrigation) to help generate rapid growth and reduce the headcount poverty rate (consistent with pursuing MDG 1); and spending aid on social sectors to achieve the "social MDGs"—those for education, reduced mortality rates, and access to safe water and basic sanitation. We draw on simulations with the World Bank's economy-wide MAMS model to address the issue of "Dutch disease"—whereby heavy aid inflows appreciate the exchange rate and hurt domestic demand and relative prices. We explore the implications of different scenarios for real exchange rates and exports as a share of GDP. We then analyze the trade-offs between front-loading aid disbursements and waiting until more absorptive capacity is in place, and we also look at the implications of a hypothetical increase in the rate of efficiency gain in public services achieved by "improved governance." We provide a brief overview of Ethiopia's macroeconomic performance and its main challenges. And then we briefly present an overview of the MAMS approach, which we use to present the main MDG simulation results for the period 2005–15.

II. Ethiopia's Economy and MDG Challenges

Ethiopia faces macroeconomic challenges characteristic of several low-income sub-Saharan African economies. Historically, it has experienced low growth rates, is deeply indebted (it participates in the Heavily Indebted Poor Countries "HIPC" Initiative), is highly dependent on the agricultural sector and agricultural exports (coffee), and has experienced volatile growth owing to frequent external shocks (mainly from drought and terms of trade shocks).

GDP growth in the 1980s was very low under Ethiopia's socialist Derg regime. The overthrow of the regime in 1991, however, ushered in multiparty elections in 1995 as well as a period of transition to market mechanisms, with reforms that significantly boosted growth. In fact, growth accelerated during the 1990s, reaching 4.7 percent a year for the period from 1993 to 2003 (Table 6.1). Growth remained highly volatile throughout this period, however, and in 2003 growth fell by nearly 4 percent as the result of a drought that badly damaged agriculture output. Preliminary estimates for 2004 indicate that the economy expanded at a rate of nearly 11 percent. Following years of extremely weak performance during the 1980s and early 1990s, per capita incomes are today roughly where they were in the early 1970s.

The Ethiopian economy remains highly dependent on agriculture. The agricultural sector accounts for more than 40 percent of GDP and more than 85 percent of the population still depends on agriculture for its livelihood. This leaves a large part of the population at risk of famine owing to low yields and vulnerability to frequent drought, which is compounded by the weak rural infrastructure. The national infrastructure overall is very poor, with far lower road density

Table 6.1. Ethiopia: Main Economic Indicators, 1983–2003

Average annual growth rate	1983–93	1993–2003	2002	2003
GDP	0.9	4.7	2.7	–3.7
Agriculture	1.8	1.6	–2.3	–12.6
Industry	–3.0	4.8	5.8	4.6
Services	1.6	7.4	4.6	2.3
Exports of goods and services	–0.8	11.4	13.1	18.9
Imports of goods and services	1.2	7.8	10.0	17.1
ODA flows	24.5	3.4	17.1	15.1
Key ratios and indicators	1983	1993	2002	2003
Current government revenue (percent of GDP, includes current grants)	18.6	12.7	22.6	25.4
Overall surplus/deficit (percent of GDP, includes current grants)	–11.6	–6.9	–11.3	–10.5
Exports of goods and services (percent of GDP)	9.1	8.1	16.2	17.1
Imports of goods and services (percent of GDP)	15.9	20.2	34.2	36.5
Trade (goods and services) balance (percent of GDP)	–6.8	–12.1	–18.0	–19.4
Total debt (percent of GDP)	63.5	155.3	107.6	98.5
Total debt service (percent of exports)	18.3	17.9	10.3	9.9
Reserves including gold as months imports	2.5	3.9	3.8	4.6
Consumer price (percent change)	3.8	10.0	–7.2	15.1
Terms of trade (1995=100)	79.0	70.0	47.0	42.0

Source: "Ethiopia at a glance," The World Bank.

than the average for sub-Saharan Africa, and with relatively little of the country's arable land under irrigation. While poverty rates fell during 1995–2000—by between 1 and 5 percent—they still exceeded 40 percent.

Ethiopia's current debt-to-GDP ratio is about 100 percent, with debt service equal to about 10 percent of total exports. The country was one of the early HIPC countries and has been a beneficiary of debt reduction. In 2004, Ethiopia reached its HIPC "completion point" (the point at which it has demonstrated sufficient progress to qualify for debt relief) and has exited from the enhanced HIPC program on a stronger footing. Still, it remains highly vulnerable to export shocks and has an extremely limited capacity to undertake new borrowing. Stress tests using the IMF Debt Sustainability Assessment scenarios suggest that debt service indicators are highly sensitive to the terms of new borrowing and negative export shocks (IMF, 2004).

Despite these challenges, fiscal policy has been well managed since the early 1990s: Ethiopia has relied little on domestic financing of the deficit and monetary and exchange rate policies have kept inflation moderate. In addition, domestic tax and nontax revenues have been relatively high, mobilizing about

Table 6.2. Government Finance, 1998/99–2003/04
(In percent of GDP)

	1998/99	1999/00	2000/01	2001/02	2002/03 Est.	2003/04 Proj.
Revenue	18.0	17.9	18.8	20.0	19.5	18.6
Tax revenue	11.3	12.2	13.7	15.3	14.4	14.8
Nontax revenue	6.6	5.7	5.0	4.8	5.1	3.7
External grants	3.6	3.2	4.8	4.7	8.0	7.8
Expenditure and net lending	31.7	32.3	28.4	32.1	34.8	30.3
Fiscal balance, including grants (cash basis)	–10.1	–11.2	–4.8	–9.3	–9.7	–4.8
	1998	1999	2000	2001	2002	2003
ODA total	10.1	9.9	10.6	17.1	21.6	22.7
Multilateral	5.6	5.0	5.8	5.6	8.1	15.6
DAC	4.3	4.7	4.6	11.1	12.9	6.6

Sources: IMF Staff Report (2004a); OECD Development Assistance Committee, 2004.
Note: ODA data and fiscal data are not on comparable basis.

20 percent of GDP in recent years (Table 6.2). The real exchange rate has been relatively stable since the early 1990s, under a "tightly managed float;" the rate has held close to the U.S. dollar in recent years and depreciated against the euro (IMF, 2005). The Ethiopian authorities have maintained export competitiveness; they have built up reserves and kept them at prudent levels. Aid has been an increasingly important source of financing; it rose as a share of GDP from the mid-1990s, declined as the conflict with Eritrea erupted, and then rose again after the conflict ended. While aid is fairly high as a share of GDP,[4] per capita—between $15 and $20 per capita in recent years—aid levels are much lower than many sub-Saharan African countries.

Ethiopia is far from achieving many of the MDG targets and will need to accelerate progress rapidly if it is to reach them (Table 6.3 shows the historic trends between 1995 and 2000). Depending on how poverty is measured, the rate of reduction in the head count index will need to accelerate substantially. Gross primary enrollment rates increased rapidly during 1995–2000 and appear relatively on track. By contrast, success in reducing the under-five mortality

[4] OECD Development Assistance Committee data on ODA to Ethiopia shows total ODA rising to nearly 23 percent of GDP in 2003, which is not consistent with Ethiopian fiscal accounts. It is difficult to reconcile ODA data since there are many items, such as administrative costs, technical assistance, and aid channeled through NGOS, which DAC countries report but do not pass through the recipient government's budget.

Table 6.3. Historic and Required Rates of Change in Key MDG Indicators

	Recent trend, 1995–2000 (percent p.a.)	Required rate of change to reach MDG (percent p.a.)
Poverty head count rate	–0.73	–3.8
Food poverty head count index	–2.40	–3.2
Gross primary enrollment rates	12.40	3.8
Under five child mortality	–1.00	–7.0
Access to clean water	1.00	6.5

Source: World Bank Country Assistance Strategy Progress Report, 2004.

rate and increasing access to clean water has been far less impressive and will have to accelerate dramatically to achieve the MDGs.

These conditions underscore Ethiopia's need for international efforts to help it speed up the achievement of the MDGs under its Sustainable Development and Poverty Reduction Program. At the same time, however, Ethiopia may also face significant macroeconomic and microeconomic risks attributable to sharp increases in aid flows.[5] Aid flows have been volatile and have shown large swings mainly because of political regime changes and periods of conflict. There appears to be little evidence, however, that high aid flows have led to Dutch disease problems. Recent empirical analysis by the IMF finds that the relationship between aid and the real exchange rate is inconclusive. However, after the 1991 regime change and after structural reforms were initiated, foreign aid had a *positive* impact both on Ethiopia's noncoffee exports (which are driven by international prices and are less sensitive to exchange rate movements) and on their share in total exports (IMF, 2005b). This may have been the result of the positive impact of foreign aid on infrastructure and capital investment, and of the reduction in logistical and transactions costs associated with these investments. This in turn suggests that the impact of aid flows on underlying infrastructure and economic productivity are important determinants of whether large aid flows are associated with Dutch disease effects, a point we return to below.

III. Absorptive Capacity and the MAMS Approach

We now turn to the impact of MDG-targeted aid flows on Ethiopia's absorptive capacity, using a modeling framework developed in the World Bank to address macroeconomic and microeconomic linkages and aid flows. Absorptive

[5] Heller and Gupta (2002) provide a useful overview of macroeconomic risks—inflation, exchange rate appreciation, and a weakening trade balance (Dutch disease), crowding out of private investment, disincentives to revenue collection, fiscal uncertainty and aid volatility. They also review the microeconomic risks—strained capacity, aid-dependence, weakening of accountability, and rent-seeking.

capacity is a dynamic process linked to underlying forces of economic, social, and institutional development. The approach used here focuses on aid requirements to reach the MDGs in Ethiopia. It abstracts from several elements of absorptive capacity seen as instrumental to development, including governance, institutional capacity, ownership, and social and political stability. The approach also abstracts from several very real constraints facing Ethiopia today: severe financing constraints, frequent exogenous shocks (particularly adverse climate and the terms of trade shocks), and unpredictable and volatile levels of foreign aid.

A Brief Overview of the MAMS Model

The MAMS model is a dynamic computable general equilibrium (CGE) model that has been extended to include a module that covers MDGs related to poverty, health, education, and water and sanitation. As noted earlier, the rationale for using a model of this type is that the pursuit of MDG strategies has strong effects throughout the economy—via markets for foreign exchange, factors (especially labor), and goods and services—with feedback effects that may significantly alter the findings of more narrow sectoral analyses. For example, the amount of real health or education services that a dollar in aid can buy may change significantly in light of changes in exchange rates, prices, and wages. In addition, existing relationships between different MDGs (e.g., health and education) may influence the expansion in real services required—for example, improvements in water and sanitation may reduce the expansion in health services required to achieve the health MDGs.

In the application described here, the model is applied to an Ethiopian database and solved for the period 2002–15.[6] More specifically, building on the recent literature and sector studies on health and education outcomes, MAMS considers the following MDGs:

- MDG 1: halving, between 1990 and 2015, the headcount poverty rate;
- MDG 2: achieving universal primary education (100 percent completion rate by 2015);
- MDG 4: reducing by two thirds the under-five child mortality rate by 2015;
- MDG 5: reducing by three fourths the maternal mortality rate; and
- MDG 7: cutting by half the number of people without a) access to safe water, and b) basic sanitation.

[6] The model is presented in detail in Bourguignon and others (2004) and in Lofgren (2004). Preliminary applications to Ethiopia are discussed in Lofgren and Diaz-Bonilla (2005) and in Bourguignon and others (2005). The MAMS modeling remains a work in progress.

The model gives relatively detailed treatment to MDG-related government activities. Government consumption, investment, and capital stocks are disaggregated by function into four education sectors, three health sectors, sectors for water and sanitation, public infrastructure, and other government activities. The major government revenue sources are taxes (direct and indirect), foreign borrowing, and foreign grants. The nongovernment economy is represented by a single activity. The primary factors of production are divided into public capital, private capital, and three types of labor (unskilled, skilled, and highly-skilled). GDP growth is a function of growth in the stock of labor and capital and productivity growth. The composition and overall growth of the labor force depends on the evolution of the education sector whereas capital stock growth depends on investments. Productivity growth is also endogenous, depending on growth in the stock of public capital in infrastructure.

The core MDG module specifies how changes in the different MDG indicators are determined. To the extent possible, it is parameterized on the basis of detailed sector studies on Ethiopia. In the education module, the government has an annual primary education budget covering teacher salaries, recurrent operations and maintenance costs, and capital investment (for example, in new classrooms). Recurrent expenditures and the capital stock in primary education together determine the supply side.[7] Demand for primary schooling and student behavior—the population share that enrolls in the first grade, graduation shares among the enrolled, and the share of graduates that choose to continue to the next grade—depend on six variables: the quality of education (student-teacher and student-capital ratios), income incentives (using current wages as a proxy, the expected relative income gain from climbing one step on the salary ladder), the under-five mortality rate (a proxy for the health status of the school population), household consumption per capita, and the level of public infrastructure services.

This specification of sector demand and supply captures lags between investment and outcomes, which is one strength of the approach. Based on sector studies, the lags between increased enrollments and outcomes at different education levels are related to the number of years required for completion and on actual completion rates.

The specification of health services draws on a World Bank health sector strategy report for Ethiopia. Improvement in under-five and maternal mortality rates (MDGs 4 and 5) are determined by the level of health services per capita (public and private services), per-capita consumption, and the population shares with access to improved water and sanitation services (MDG 7). The package of health services that achieves MDGs 4 and 5 also includes HIV/AIDS prevention services sufficient to halt the spread of the disease (part

[7] Private supply of education services has not been separately included since it is relatively small in Ethiopia, but this could be elaborated for countries where it is important.

of MDG 6). For water and sanitation, the population share with access to improved services is specified as a function of per capita household consumption and per capita provision of government water and sanitation services.

The provision of the additional government services needed to reach the MDGs clearly requires additional resources—capital, labor, and intermediate inputs—that then are unavailable to the rest of the economy. The effects of a program depend on how it is financed—from foreign sources, domestic taxes (which reduce consumption), or domestic borrowing (which crowds out private investment). Even with 100 percent foreign grant financing for additional services, which minimizes domestic resource costs, the rest of the economy is affected through two main channels—labor markets and relative prices. Expanding the provision of health or education services increases demand for teachers and doctors, reducing the number of skilled workers available in other sectors. Increased school enrollment also reduces the size of the overall labor force (since it removes a larger part of the school-age population from the labor force), although in the medium run it adds to the share of skilled labor in the labor force. Two forces drive changes in relative commodity prices. First, domestic demand switches toward MDG-related government services with effects on production costs and prices throughout the economy. Second, increased aid flows lead to an appreciation of the real exchange rate, manifested in increased prices of nontraded relative to traded outputs. These manifestations of Dutch disease can bring about long-lasting changes in the structure of production, which is diverted from exports and competition with imports.

The limitations on absorptive capacity are captured through three main channels—the two channels just mentioned, in the labor market and in changes in the real exchange rate), as well as through potential infrastructure bottlenecks, particularly in transport and energy infrastructure. Large investments in education services, for example, will tend to reduce further absorptive capacity as skilled labor is diverted to education as the relative price of nontradables rises (e.g., real wages are bid up reflecting the Dutch disease effect), and if infrastructure bottlenecks reduce the efficiency of public service delivery. Moreover, the impact will not be limited to the education sector; it also affects costs throughout the economy, including other public services and costs in the private sector.

Policymakers thus face important trade-offs: increased investment in public service delivery is essential for improved MDG outcomes but beyond some point the unit costs begin rising, along with indirect costs to other sectors. The challenge is to keep costs down while targeting social outcomes over time. Building absorptive capacity is clearly a central element of this process.

There are also important complementarities in spending across different MDGs—in our modeling framework represented by cross-elasticities—where progress toward one MDG may contribute to progress toward others. For example, progress in providing improved water and sanitation services has a positive

impact on heath outcomes. Another example is education: provision of primary and secondary education helps expand the skilled workforce needed to increase productivity both in the private sector and with respect to work in publicly funded schools and clinics.

IV. Simulation Results from the Ethiopia MAMS Model

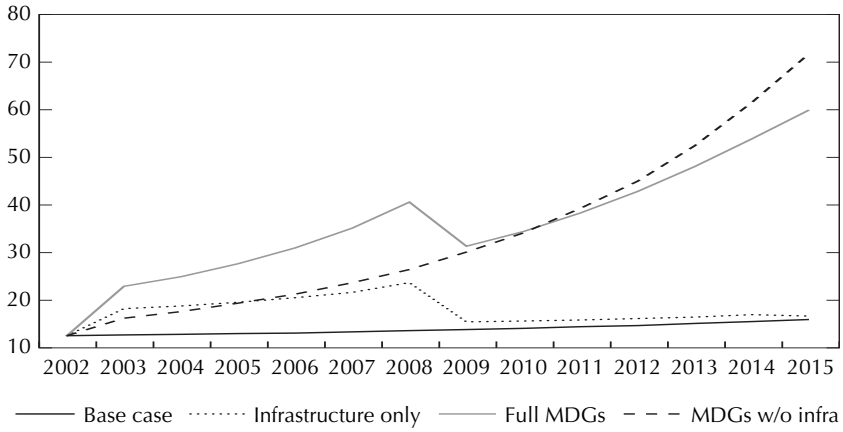
These simulation results build on work under way at the World Bank, in coordination with the Ethiopian authorities, to provide analytic inputs for Ethiopia's development strategy framework (the SDPRP). The model used for this purpose has been calibrated around an Ethiopian country database for 2002 and a basic Social Accounting Matrix prepared for Ethiopia, and supplemented by more detailed sector studies relevant to the MDGs, as described above. The simulations help to identify ODA magnitudes required to scale up public service delivery to achieve the MDGs, illustrate some of the major macro-economic impacts under different financing and sequencing scenarios, and help quantify some of the key trade-offs facing policymakers. The following basic simulations draw heavily on Lofgren and Diaz-Bonilla (2005). We first examine the base case and variants on it and then discuss the issue of Dutch disease and its relevance for Ethiopia, frontloading and the implications of frontloading for costs and outcomes. We then briefly address the key role of governance and institutional reform in capacity building.

The reference point used to compare results is a "business-as-usual" *base case*, under which Ethiopia continues to receive external assistance and to perform along current trends. As a result of increased grant financing (annual foreign borrowing does not increase over time), external aid as grant financing is assumed to expand at an average rate of 1.5 percent a year from its level in 2002—to $19 per capita in 2015—while foreign loans remain at their 2002 level.[8] The different areas of government services as well as GDP all grow at an annual rate of about 4 percent. This performance is similar to the long-run growth trend for Ethiopia's economy.

This *base-case scenario* is contrasted with three other scenarios that include additional ODA levels directed toward: (1) strengthening Ethiopia's basic national infrastructure and "connectivity" (Base + Infrastructure); (2) additional ODA flows targeted to reach each of the five education, health, water and sanitation MDGs in the model; and (3) ODA flows targeted to meet these social MDGs, but without the underlying infrastructure financing. Using these four scenarios allows comparison across different levels ODA inflows with different objectives and economic impact. Figure 6.1 shows the different foreign grant financing paths underlying each scenario. In each of these scenarios, the

[8] ODA here refers to official development assistance *to government* only, excluding flows to "other official entities," and thus differs from data on total ODA.

Figure 6.1. Foreign Grant Financing (US$ per capita)



financing gap (arising from government spending more to reach the MDGs) is covered through foreign grants.

Ethiopia's basic infrastructure requirements have been separated out from investments necessary to reach the key social MDG targets since these investment streams are quite distinct, and raising infrastructure spending is considered particularly critical to improving growth performance. Growth in household incomes and consumption is essential to achieving MDG 1—to reduce national poverty to half of its 1990 level by 2015. The importance of infrastructure to national growth prospects is discussed in detail in a recently completed Country Economic Memorandum on Ethiopia.[9] Improving the basic transport system and expanding power generation and distribution to link the urban, peri-urban, and rural economies, while investing in large-scale water management and irrigation systems to improve agricultural productivity, are all considered core elements of Ethiopia's national growth strategy.

Under *the second scenario, Base-Infrastructure,* the government embarks on a major effort to improve Ethiopia's infrastructure (roads, energy, and irrigation), thereby linking producers and consumer to national and international markets to capture important network effects and enhance growth. Another avenue is through infrastructure investments helping reduce the indirect

[9] World Bank (2005a). The three priorities for growth identified are: (1) to focus public investment on infrastructure to support urban rural linkages; (2) to reduce risks to agricultural producers by investing in improved water management, social safety nets, and security of land tenure; and (3) to improve the investment climate and reduce risk facing private producers and investors.

costs (affected by such factors as the reliability of power and transport logistics and timing) and business-related losses that depress firm productivity, as highlighted in recent work on African economies by Eiffert and others (2005). Higher infrastructure spending (both recurrent and investment) is assumed to be financed through additional foreign grants. Under this scenario, provision of infrastructure services grows at an annual rate of 10 percent between 2003 and 2009 and decelerates to an annual rate of 5 percent thereafter.[10] This requires an increase in grant financing relative to the base case of about $10 per capita to $24 per capita at its peak in 2008. The productivity response of the private sector to the larger public capital stock in infrastructure is raised beginning in 2009, reflecting the impact of network effects when the capital stock exceeds a critical threshold.[11] As a result, annual real GDP growth rises by about 1.3 percent above the base-case trend to 5 percent.

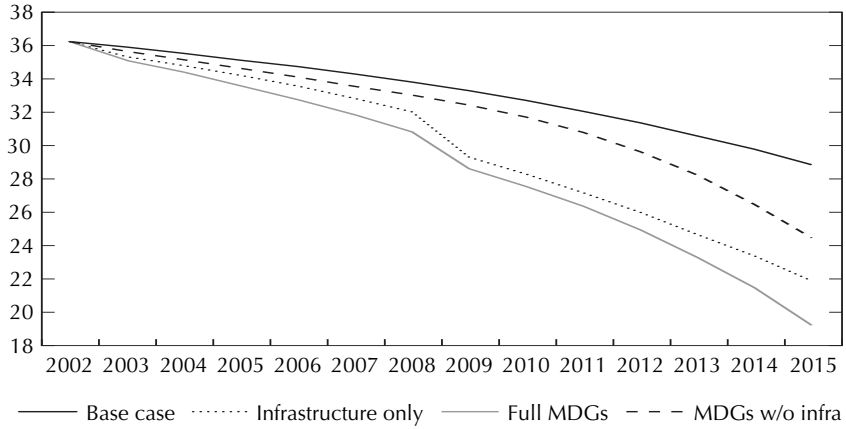
The *third scenario (MDG)*, examines the level and impact of investments calibrated to expand delivery of MDG-related public services to just meet each of the targets (MDGs 2, 4, 5, 7A, 7B), as discussed above, but *without* the underlying investment in infrastructure. Hence, this scenario does not support the productivity gains from improvements in basic economic infrastructure. The expansion of public spending includes capital investment in service-specific infrastructure (schools, clinics, water, and sanitation) as well as recurrent costs to deliver and maintain the higher service levels. This requires a much larger increase in public spending—rising to more than $70 per capita, or nearly half of GDP, by 2015. The higher financing requirement is fully met through external grants.

The *final scenario (Full MDG)* combines external financing on both the infrastructure and MDG services. This scenario most clearly illustrates the impact of full external grant financing in achieving achieve both the required growth improvements to reduce poverty to MDG 1 levels and to achieve the social MDGs. The combined external financing requirements rise to some $60 per capita by the end of the period, or approximately 40 percent of GDP compared with current levels of just below 20 percent. Note that the cost of the Full-MDG scenario is less than where MDGs are met without infrastructure financing ($60 versus $70 per capita). This is attributable mainly to the additional growth and productivity generated by basic infrastructure investment, less erosion of trade competitiveness, and the additional boost to government revenues that accompanies higher growth. Together these reduce overall aid requirements.

[10] Note the sudden drop in financing is a result of both lower growth in infrastructure services and of the increase in growth, which raises government revenues and reduces external grant financing needs.

[11] The underlying rationale for this is described in greater detail in Lofgren and Diaz-Bonilla (2005) and more generally in World Bank (2005a).

Figure 6.2. MDG1: Share of Population Living on $1 (PPP) Per Day or Less (percent)



Meeting the MDGs

The simulation results suggest that, under a set of specific conditions, *it is possible to achieve the MDGs by 2015*. One condition is that a predictable flow of external grant aid is available as needed in each simulation. The progress toward selected MDGs is shown in Figures 6.2–6.4, which illustrate the different contributions made by these investments in basic infrastructure and direct investment in the MDGs. The contribution of investment in basic infrastructure, which helps accelerate the growth rate relative to the base case by about

Figure 6.3. MDG2: Net Primary School Completion Rate (percent)

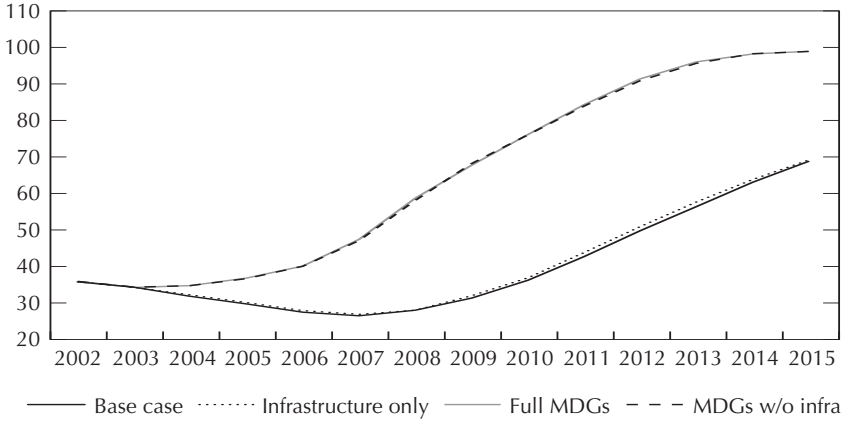
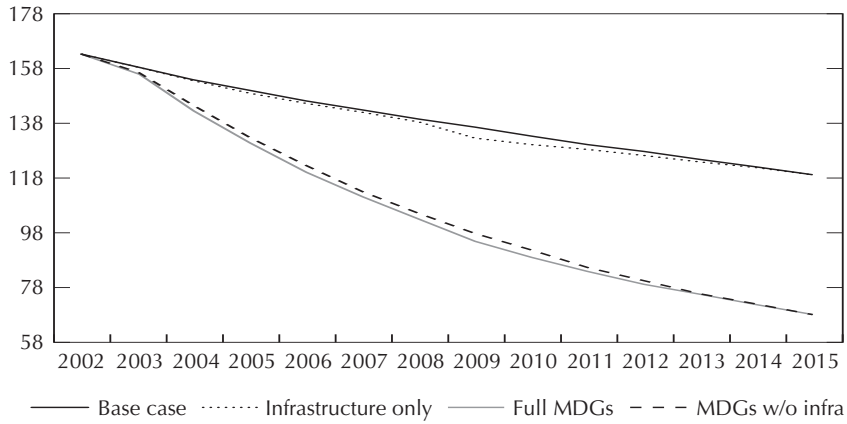


Figure 6.4. MDG4: Under-Five Mortality per 1,000 Live Births



1.5 percent annually, is critical for achieving MDG 1—that is, halving the incidence of poverty from its 1990 level of 36 percent of the population. Growth in household consumption[12] helps drive poverty down to about 22 percent by 2015 (using a poverty elasticity of −1 with respect to mean household consumption per capita). Spending on MDG-related sectors also helps boost growth and household consumption, mainly by raising the supply of skilled labor and through increased employment generated by higher public investment.[13] Relative to the investment share, however, the contribution from basic infrastructure is much greater. In the Full-MDG scenario, where both investments are taken together, the MDG 1 target (to halve the incidence of extreme poverty to about 19 percent) is just met.

Raising the underlying GDP growth rate of the economy is clearly critical to meeting MDG 1. However, a lack of employment opportunities may prevent the economy from generating higher growth rates, despite substantial spending on human-capital MDGs and significant improvements in health and education standards. Capacity is raised, but opportunity is withheld. Put another way, as some argue (Millennium Project, 2005, and World Bank, 2005a), failing to raise growth, generate higher household and public savings, and reduce risk-averse behaviors associated with agrarian poverty will fail to lift Ethiopia out of the poverty traps that currently preclude more rapid growth.

[12] Income growth is assumed to be distributionally neutral across household income groups. Ongoing work with MAMS disaggregates the economy by major sectors—agriculture, services, and manufacturing—allowing greater refinement in the treatment of sector growth rates, intersectoral migration, and more differentiated returns to labor.

[13] Also contributing to higher growth and consumption is the exchange rate effect of the currency's appreciation, which helps raise average real purchasing power.

The converse of this is that growth alone will not achieve the human development MDGs unless accompanied by massive investments to expand public services. Figures 6.3 and 6.4 show the progress made toward meeting the primary school completion target of 100 percent and reducing the under-five child mortality rate by two thirds. The drop seen in the first five years for primary school completion reflects the rapid expansion in out-of-cohort enrollment, reducing educational quality and enrollment for within-cohort children. After this initial period, growth in primary school services is sufficiently rapid to improve quality while absorbing growing shares of within-cohort children.

Without targeted investment to achieve the MDGs, little progress will be achieved beyond the business-as-usual base case. Investment in building up basic infrastructure is important for raising income and consumption growth rates, but the MDG outcomes differ only slightly from the base case. The small differences in completion rates induced by infrastructure investment and higher growth (in Base+Infrastructure) arise mainly from higher government revenues, a portion of which is then directed to the MDGs and to demand-side factors.

Dutch Disease

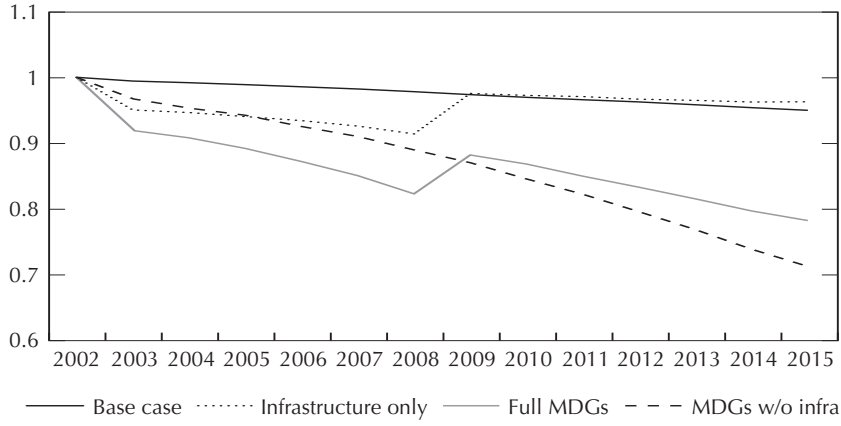
A major concern across the MDG scenarios relates to the risk that large aid inflows will negatively affect domestic demand, relative prices, and the real exchange rate. Aid flows permit a much larger trade deficit, draw resources to nontraded sectors, and place upward pressure on the real exchange rate, reducing competitiveness and resources flowing to traded goods and services. These concerns are well recognized.[14] As Bevan (2005) emphasizes, the extent to which aid flows are associated with the problem of real exchange rate appreciation depends largely on the relative impact on demand and supply. The supply response, depending on the effects of aid on productivity across sectors, largely determines the depth and duration of adverse effects following the surge in aid.

Under all of the scenarios, there is evidence of exchange rate appreciation, rising real wage rates, and a deterioration in the trade balance as imports surge and export performance deteriorates. Differences in the level of external financing and how it is invested determine the impact on the exchange rate, real wages, and trade performance (Figures 6.5-6.8). The effects are more pronounced for the Full-MDG case through the first half of the period, and for the case of the MDGs without infrastructure financing in the second half since it requires much larger ODA flows.

The pressure on real wages is greatest in the first half of the period, before investment in expanding education and the skilled labor base begins to show results (with a lag of several years). Wages of workers with a secondary edu-

[14] Heller and Gupta (2004) provide a clear overview of the issues, citing several country studies.

Figure 6.5. Real Exchange Rate



cation grow most rapidly until 2009 and thereafter stabilize as the number of graduates entering the labor market increases, mitigating wage pressures. Wages for workers with less than a high school education, by contrast, continue to rise through 2015 as supply is outpaced by demand from the growing economy.

Dutch disease effects are clearly a serious concern. Aid-induced appreciation of the exchange rate and the drop in exports are severe. Under the Full-MDG scenario, exports fall from about 14 percent of GDP to 8 percent by 2015, and the real exchange rate appreciates by close to 20 percent. The impact on

Figure 6.6. Real Wage for Workers with High School Completed

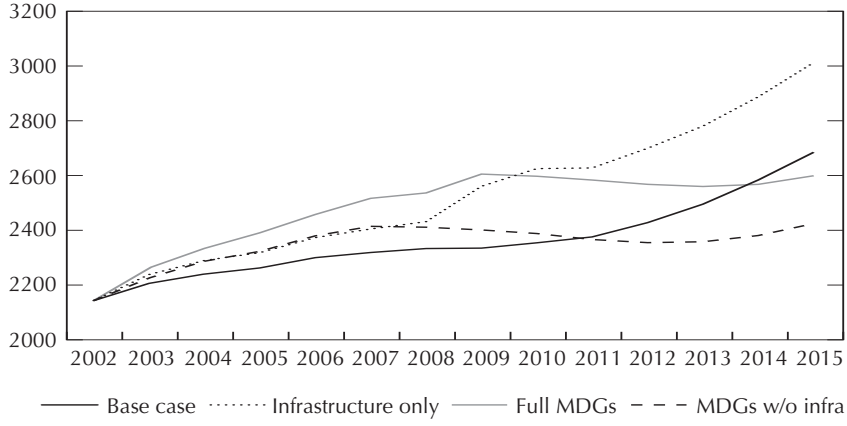
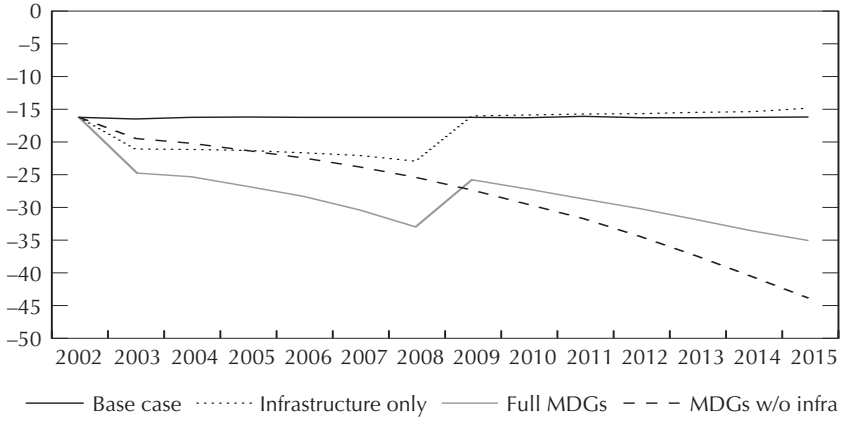


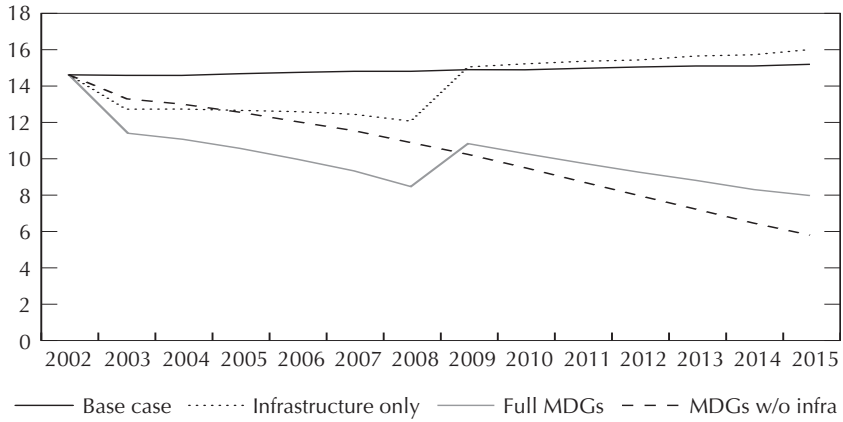
Figure 6.7. Trade Balance as a Share of GDP



real GDP growth, which is driven by factor supplies and productivity, is quite limited however.

Public spending on infrastructure and MDG services differ in their effects on the supply side and in their import intensities. Infrastructure spending has a positive but lagged effect on productivity, whereas spending on MDG services has only a very modest impact on productivity in the short run, but affects supply by adding to the stock of skilled labor. Infrastructure spending initially causes some exchange rate appreciation, until productivity improvements raise GDP growth, incomes, and demand, with a significant import component. In

Figure 6.8. Export as a Share of GDP



the process, government revenues also improve. The import intensity of basic infrastructure in a country with limited domestic capacity is also high, which reduces the adverse price and resource switching effects of Dutch disease, as opposed to public social services, which have a far higher nontraded content, primarily labor.

By contrast, investment in social services takes much longer to affect productivity, placing greater pressure on the exchange rate. In the case of ODA support for the MDGs without basic infrastructure investments, the real exchange rate will appreciate by about 30 percent and exports will fall to less than half their initial share of GDP by 2015. Note that the appreciation of the real exchange rate (the change in relative prices of the domestic good) also reduces the purchasing power of foreign grants, requiring larger flows to drive the MDG investments.

The simulations suggest that while the large surge in aid required for investment in the MDGs will help sharply reduce the incidence of income poverty and dramatically raise human development outcomes, it also poses serious risks to future capacity for growth after 2015. Ethiopia will still be highly dependent on aid flows to maintain the MDG levels of public services, although considerably less dependent on aid than when aid inflows were at their peak level. Moreover, production capacity for exports and import-competing goods may have been significantly eroded and the country may not be prepared to rapidly adapt to less foreign aid and lower trade deficits. This points to the importance of only a gradual reduction in aid after 2015, which will give the country sufficient time to improve international trade access, reduce behind-the-border barriers to trade, and pursue other reforms to attract investment and improve competitiveness of traded goods and services.[15] Aid and trade can be key complements.

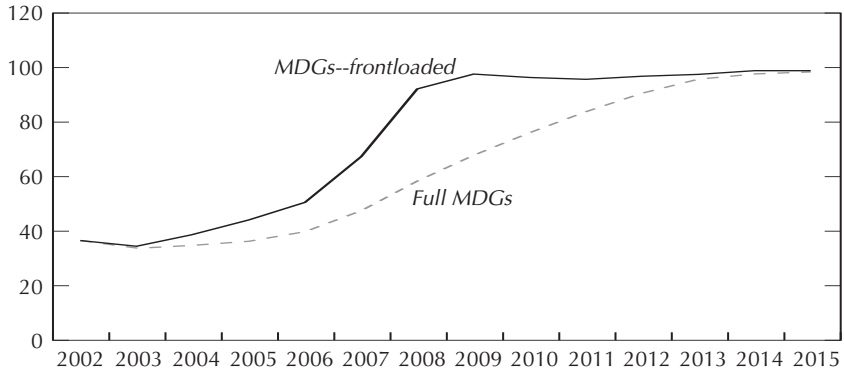
Frontloading Aid to Meet the MDGs

An issue that arises regarding accelerating aid disbursements for the MDGs is how much aid should be frontloaded—that is, disbursed up front[16]—and how much disbursements should await the availability of greater absorptive capacity. Discussion of "fast-tracking" countries with a demonstrated commitment to poverty reduction and a "good" policy environment poses these questions of how much aid and how fast. The simulation results shed light on this. Consider the case where aid disbursements climb sharply in the first two years, effectively increasing growth in service provision 10 times as fast as in subsequent years. Underlying infrastructure investment remains unchanged. This is

[15] IMF (2005) also stresses the importance of further trade liberalization and opening up the Ethiopian economy in response to likely real exchange rate pressure rate from higher ODA inflows.

[16] Frontloading, as the term is used here, should not be confused with frontloading of ODA *commitments*.

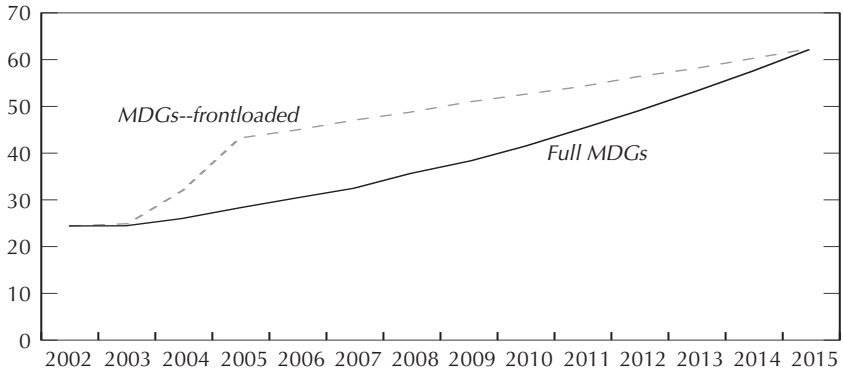
Figure 6.9. MDG2: Net Primary School Completion Rate (percent)



an extreme case that more clearly illustrates the trade-offs from frontloading disbursements. Aid per capita quickly climbs to $55 per capita, and thereafter falls to an average of $40 through 2015.

The impact of frontloading on the time profile of net primary education completion rates and access to potable (improved) water (two of the MDGs), is shown in Figures 6.9 and 6.10. Relative to the Full-MDG case, supply initially increases more rapidly and then stays at a higher level throughout the simulation period. As a result of the surge in aid, the exchange rate appreciates sharply early on, real wages rise strongly as skilled labor is pulled from the private sector, and the trade balance deteriorates sharply. With lower subsequent aid flows in the remaining years to 2015, these changes are mitigated, leaving the economy in a more favorable position.

Figure 6.10. MDG7a: Share of Population with Access to Improved Water (percent)



Note that the extent of real wage pressure and rising costs for skilled labor is a function of the sector parameters of the model, and alternative specifications can help to further illuminate policy choices. The model uses a 40:1 student-teacher objective (current rates are about 75:1) taken from the Education-for-All global fund targets as a quality standard to strive for and requires teachers to have 10 years of schooling plus three more years of teacher training. Some argue that relaxing these standards—allowing, for example, higher student teacher ratios and requiring just eight years of schooling for primary school teachers—could take advantage of more abundant local labor resources and lower wage costs, and free up resources to be used elsewhere. More innovative solutions where resources are scarce can clearly help get around absorptive capacity constraints.[17]

Frontloading aid sharply increases total foreign grant financing required to achieve the MDGs by 2015. In present value terms, grant financing requirements above the baseline (discounted at a rate of 5 percent) increase by nearly one fifth. As absorptive capacity constraints become more binding, unit costs for services rise. Although the more gradual acceleration in disbursements lowers costs while capacity is built up over time, this is not necessarily better since the path of service delivery is clearly quite different. With frontloading, fewer mothers and children will die and the labor force will be better educated by the time the full MDGs are reached in 2015. A comparison of these outcomes therefore requires a welfare function to weigh outcomes across the MDGs, including income poverty. A simple approximation to help illustrate this can be obtained with an index of "welfare" based on a weighted sum of the share of the required change for each MDG since 1990 that has been accomplished, with equal weights for each covered MDG (1, 2, 4, 5, 7a, and 7b). This index suggests that welfare in the frontloaded case is significantly higher, by roughly one fourth. Although it is hard to use this as a metric to guide optimal frontloading, it suggests that some level of frontloading may be desirable (if foreign resources are available in the amounts indicated in the simulations).

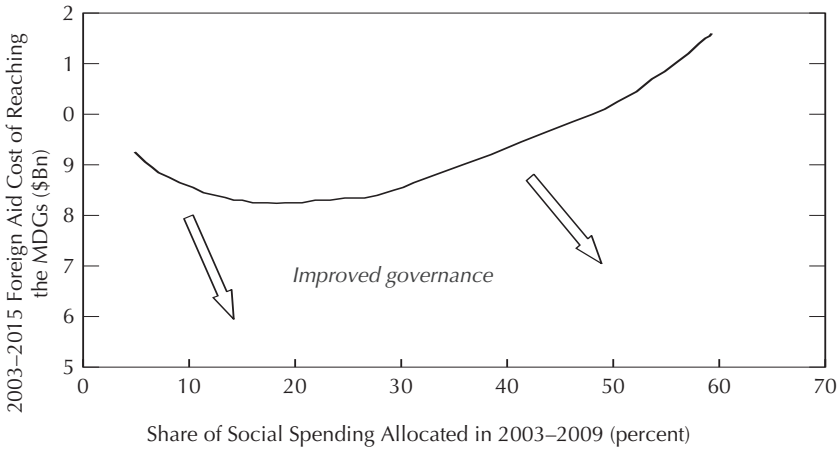
In this example of frontloading, underlying infrastructure investment was unchanged. Infrastructure expenditures have, however, already been frontloaded, as seen from the higher growth rate over the initial five years. This was done because the achievement of network effects and higher productivity growth requires a certain threshold of infrastructure services. For example, until a basic railway network is completed it cannot have a major impact on reducing transport and logistical costs across markets.

This illustrates the importance of *sequencing* investments to minimize costs and maximize efficiency over time. Frontloading of infrastructure investment is a case in point, which is specified to recognize a threshold level of national

[17] Discussion of alternative approaches to overcoming labor constraints in education are elaborated in *Education in Ethiopia* (World Bank, 2005).

Figure 6.11. Costs of Frontloading Different Shares of Total Aid for MDG Services

(Ratio of spending period 2003–09 over 2009–15)



infrastructure that must be met before productivity gains can be realized. The threshold level should ideally be estimated based on detailed infrastructure sector studies.

Among the MDG services, investment in education services must be given priority, since skilled labor can only be produced with a lag, and since skilled labor is a key input to expanding the supply of all the MDG services. In addition, sequencing priority should be accorded to investment in public services that generate positive externalities and thereby help lower the investment cost of other MDGs. If access to improved water is a key element of reducing under-five mortality, then investment in developing and maintaining potable water supplies must precede or accompany other child-health-related investments. If this order of sequencing is reversed (i.e., the other MDGs are expanded before investment in water, education, and basic infrastructure services), total costs would rise and the likelihood of meeting the MDGs by 2015 would be reduced.

To explore the question of frontloading in more detail, Figure 6.11 shows how the total value of additional grants required to reach the MDGs (i.e., grants in excess of those received under the scenario Base+Infrastructure) varies as the proportion of spending in the first half of the forecast period (share spent in 2003–09 versus 2010–15). Frontloading expenditure increases this ratio as more funds are spent in the first half of the period.[18] The resulting "U-curve" shows how the present value of total costs falls as the share of frontloaded

[18] The model has been parameterized around 2002 and hence the actual simulation periods correspond to the two six-year periods, 2003–09 and 2009–15.

expenditures increases from very low shares. Costs are minimized when about 20 percent of resources are disbursed in the first period. Higher shares frontloaded lead to rising costs as constraints become more binding—labor costs rise, exchange rate appreciation reduces the purchasing value of aid, and congestion costs from infrastructure bottlenecks increase. At the extreme, some point above 70 percent of resources frontloaded, costs become effectively infinite and preclude reaching the MDGs.

We urge caution in interpreting this result, however. First, while this suggests that total present value costs are minimized at about 20 percent of outlays, different points along the curve show very different welfare outcomes. As more resources are frontloaded, MDG outcomes are also frontloaded and welfare, measured by the simple MDG index, clearly improves. Second, underlying exchange rate and wage dynamics are very different along the curve, with consequences for competitiveness of traded goods and sharp wage differentials. Our point is not to suggest an optimum, but rather to illustrate the real consequences of frontloading that merit consideration when countries plan aid-financed, long-term public investment programs.

Governance and Institutional Reforms

The model does not address the critical question of how to improve the underlying institutional capacity and governance in Ethiopia. The broad range of issues related to institutional capacity and governance are at the heart of most adjustment programs and poverty reduction strategies. These include improving expenditure management, strengthening accountability mechanisms, reducing leakages through "capture" and corruption, deregulating excessive government controls often associated with rent-seeking, and privatization and strengthening the environment for private business. In Ethiopia, particular importance has been placed on decentralization in the government's reform program, with selective devolution of resources and responsibilities—including important responsibilities over public service delivery[19]—to Ethiopia's nine regions. Successful implementation of the decentralization program is recognized as a key element of the country's poverty reduction strategy (SDPRP).

Taken together, governance and institutional reforms can be thought of as measures to improve the efficiency of public resource use. In terms of the model, they affect the underlying productivity of public activities and reduce the unit costs of achieving the MDGs—falling teacher absenteeism; reduced waiting times for processing legal cases, licensing, and regulatory issues; and less leak-

[19] As Heller and Gupta (2002) note, decentralization to channel resources through local governments in particular runs the risk of administrative constraints and deficiencies in expenditure management.

age in the use of central government resources for delivery of services to end-users. Sometimes simple reforms can have major consequences.[20]

To reflect further on this, we consider the effect of introducing governance and institutional reforms in the form of improvement in the underlying efficiency of public services at the rate of 2 percent, compounded annually, and independent of the rate of public investment. Introducing this to the model and recalculating the U-curve in Figure 6.11 suggests two results:

- The productivity gain in public services significantly reduces the cost of achieving the MDGs along all points of the curve and "flattens" the curve, reducing the total variation in costs. The total cost of achieving the MDGs by 2015 in present value terms falls by about one third.
- The new point of cost minimization leans slightly toward greater frontloading contrary to the expectation that it would shift to the left (less frontloading as productivity levels are higher and unit costs are lower during the second period). The ambiguity in this outcome arises from two underlying effects that push in opposite directions. Behavioral effects would tend to push toward delaying investment and reduce frontloading since it is more efficient to wait and take advantage of productivity gains. On the other hand, there is a change in relative prices between periods with no behavioral shift since the present value of expenditures in period one falls by less than the present value of expenditures in the second period.

One implication of this analysis is that anticipated incremental gains in underlying governance or productivity should not be a reason to delay public expenditures in capacity building and service delivery. Even with underlying efficiency gains that reduce costs over time, there is no reason to delay investment in the MDGs. Rather, the same constraints to absorptive capacity—labor costs, macroeconomic constraints, and infrastructure congestion—should guide the investment path.

V. Conclusions

One of the major concerns of governments over disbursing aid to help low-income countries achieve the MDGs is whether the large levels of aid required can be effectively absorbed. There are both macroeconomic and microeconomic constraints to aid absorption that are well recognized in the literature. In this paper, we have focused on selective aspects of this question related to the level,

[20] One frequently cited example is the Ugandan newspaper campaign to boost schools' and parents' ability to monitor local officials' handling of school grants. Through greater public awareness, "capture" or leakage of budget resources fell from 80 percent to 20 percent between 1995 and 2001 (Reinikka and Svensson, 2003).

sequencing, and frontloading of aid necessary to fulfill the MDGs. If external financing is not the constraint, we have posed the question of what major absorptive capacity constraints will guide identification of a cost-minimizing path to reach the targets. In particular, we looked at labor market, macroeconomic (Dutch disease), and basic infrastructure constraints. To address these questions, we have used a modeling approach that combines a relatively standard and highly aggregated computable general equilibrium model with an MDG module that links MDG performance to the provision of different public services (health, education, and water and sanitation), public infrastructure, per-capita income, and other economic indicators. The MDG module draws on detailed sector studies undertaken by the Ethiopian government and the World Bank.

We have used model simulations to examine a set of alternative scenarios for expanding public infrastructure and MDG-related services, with external grants covering the financing gap. Meeting the first MDG—reducing by half the incidence of income poverty in 2015 from 1990 levels—will require higher economic growth. We argue that one key to raising growth is substantial investment in basic infrastructure, particularly roads, energy, and water control. Reaching the other human development MDGs will require spending to boost the quality and quantity of publicly-supplied services related to MDGs. According to model simulations, for the main scenario—which achieves the different MDGs through a combination of frontloaded expansion in infrastructure spending and growth in MDG services at a constant rate—foreign grant financing requirements will rise from about $16 per capita at present to some $60 per capita in 2015, or nearly 40 percent of annual GDP in foreign grants. This is roughly twice the average level of ODA per capita reached in sub-Saharan Africa during the early 1990s.

On the basis of our analysis of the simulation results, we draw four other main conclusions from the simulations presented.

1. Careful sequencing of public investment is important for minimizing the total cost of reaching the MDGs. From the outset priority investment is needed in basic infrastructure to generate the basis for higher productivity growth and network effects improving linkages across and within regions and sectors. Among the MDG services, accelerating education spending is a priority since skilled labor only results with a lag and is a binding constraint on absorptive capacity. Priority in sequencing should be accorded to public investment in services that generate important positive externalities, and in doing so lower investment costs of other MDGs.
2. The macroeconomic impact of large aid flows on the tradable sector, through pulling resources into nontradables and exchange rate appreciation (Dutch disease), is a serious concern. The danger is that the MDGs may be met but at the cost of a severely diminished export sector—a sector that is a potentially vital source for future growth. This poses a potentially serious trade-off for MDG-oriented poverty reduction strate-

gies. More important, it underscores the need to push further trade liberalization, press for market access in OECD countries, and address behind-the-border barriers to trade.

3. Large-scale frontloading of aid disbursements (other than infrastructure) is costly as it pushes up against absorptive capacity constraints, increases the premium on skilled wages, bids labor away from the private sector (depressing growth), and incurs more serious Dutch disease effects. Comparing the present value of additional MDG grants while varying the share of total aid disbursed in the first five years suggests that costs are minimized when about one fifth of additional resources are used in the first five years. On the other hand, frontloading also has different welfare implications: greater frontloading secures earlier success of social outcomes, whose marginal benefits may outweigh rising costs.
4. Improvements in underlying governance and institutional structures may secure broad productivity improvements in public service delivery. Whether such gains suggest more or less frontloading of expenditures depends on the relative weight of behavior and price effects on supply. This, however, does not constitute a reason to delay public investment pending efficiency gains. Rather, it suggests that the same constraints to absorptive capacity—labor costs, macroeconomic constraints, infrastructure congestion—help guide the investment path.

We are not suggesting that simply tripling or quadrupling aid can achieve the MDGs in Ethiopia. Several other conditions, which may be even more important, must also be met. These include improvements in governance, strengthening institutions, and improving the business climate. At the same time, donor countries and the international financial institutions must take serious steps to improve the quality of assistance through better alignment of aid with national strategic priorities, and harmonization of their administrative procedures with country standards.

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