Reaching the Millennium Development Goals (MDGs): An International Perspective

A Researcher-Stakeholder Forum

June 12, 2007

Challenges to MDG Achievement in Low Income Countries: Lessons from Ghana and Honduras

Maurizio Bussolo
World Bank, USA
Challenges to MDG Achievement in Low Income Countries: Lessons from Ghana and Honduras

Maurizio Bussolo and Denis Medvedev*

May 2007

[First draft - Do not quote]

1 Introduction

The adoption of the UN Millennium Declaration in September 2000 has committed the international community to a broad vision of development that includes not only higher incomes but also enhanced education and health levels, better access to water and sanitation and improvements of other human development (HD) objectives. Achieving by 2015 the ambitious set of the Millennium Development Goals (MDGs) is requiring efforts on multiple fronts. First of all, new data collection and more systematic monitoring are necessary to assess the current situation and recent progress. Although poverty statistics exist for most developing countries, other social indicators – such as mortality, education completion rates, or access to basic services – are not always readily available. Secondly, once the ‘distance’ between the current situation and the various goals can be determined, the costs to cover that distance need to be calculated. Given that there are alternative paths to cover that distance and costs depend on which path is chosen, estimating these costs can be complicated.

These points highlight the need for country-specific analytical tools to assess the prospects of reaching the MDGs and the economy-wide consequences of specific strategies for MDG attainment. In order to address this need, the World Bank has developed a framework for the empirical assessment of the costs and benefits of various MDG strategies: the Maquette for MDG Simulations (MAMS).

To date, MAMS has been applied in close to 30 countries in Latin America, Middle East, and Africa. It is a flexible analytical tool that can accommodate a wide variety of datasets and country-specific circumstances. The main advantages of MAMS over other approaches to MDG analysis include explicit “production” of various MDG indicators, numerous links from HD service provision to the rest of the economy through the labor market and government budget constraints, and the recognition of potential positive

* This draft was prepared for the conference “Reaching the MDGs: An International Perspective – A Researcher-Stakeholder Forum”, organized by the PEP network on June 12, 2007 in Lima, Peru.

1 At the UN Millennium Summit of 2000, the world’s leaders agreed on a set of goals and targets for 2015:
1. Halving poverty and hunger rates (relative to the 1990 rates);
2. Achieving universal primary education;
3. Eliminating gender disparity in education;
4. Reducing by two thirds the under-five child mortality rate (relative to the 1990 rate);
5. Reducing by three quarters the maternal mortality rate (relative to the 1990 rates);
6. Reversing the spread of HIV/AIDS, malaria and other major diseases;
7. Halving the population shares without sustainable access to safe water and improved sanitation (relative to the 1990 rates);
8. Developing a global partnership for development.
spillovers when multiple MDGs are targeted at the same time. The objective of this paper is to illustrate these features of the MAMS model and to delineate some general policy lessons by drawing on two recent applications of MAMS to Ghana and Honduras. There are five main messages emerging from this analysis. The first is that full MDG achievement is unlikely without a large scale-up of resources, although progress is likely to be uneven across the different MDGs and improvements in efficiency can offset the need for more financing. The second is that the choice of financing mechanisms—foreign grants, borrowing, taxation—has significant implications for the macroeconomic performance and poverty reduction. The third message is that the overall growth environment is key to both poverty reduction and achievement of the non-poverty MDGs, as faster growth increases demand for HD services and creates incentives for attaining higher educational levels. Fourth, scaling up aid (or mobilizing domestic resources) is not the only way of reaching the MDGs, as significant cost savings can be realized from improving efficiency in the public sector service delivery. Finally, efforts to reach the MDGs can have important distributional effects by increasing skill premiums and raising inequality.

The structure of this paper is as follows. Section 2 provides a brief summary of MAMS and discusses the main policy-relevant features of the model. Section 3 gives a detailed assessment of the main lessons learned from MAMS applications in Ghana and Honduras. Section 4 offers concluding remarks and discusses the next steps in MAMS and MDG research at the World Bank.

2 The MAMS modeling framework

Devarajan, Miller and Swanson (2002) appropriately warn that: “any attempt to determine the aggregate costs of achieving the development goals is a highly speculative exercise”. Among others, two major obstacles need to be overcome: most MDGs tend to be jointly produced and future income growth rates and progress on the MDGs are both endogenous. In other words, interventions that further a given MDG are often likely to promote other MDGs and ‘double counting’ of costs can be an issue. For example, expenditures specifically aimed at improving the health of the young will help reducing child mortality but they may also improve the ability of kids to learn at school and thus promote the achievement of the education MDG. The second obstacle consists of the simultaneous determination of economic growth and progress on social MDGs. Future growth rates are not only difficult to forecast but are also important determinants of the cost of achieving the MDGs. Future input prices, wages, exchange rates may be quite different in a fast growing economy vis-à-vis those in a slow growing one. On the other hand, improved health and educational outcomes can increase productivity and support higher growth rates.

No existing approach completely resolves these issues and policy makers should be aware of these limitations when using current cost estimates. These can be classified in two main groups: the bottom-up costing and the economy-wide modeling. The remainder of this section briefly describes these two costing approaches highlighting their advantages and shortcomings.

The stylized analytical steps of bottom-up costing consist of: a) determining needed “physical” inputs – investments, labor (at different skill levels), intermediate inputs – for
each MDG; b) computing costs of providing inputs using projected or current prices, wages, and exchange rates; c) assigning costs to different agents (government, private sector, NGOs, others). This method has some clear advantages: it is quite transparent, not very technically intensive and it is based on micro evidence. However it has some problems, too. Physical input needs by MDG are not well-defined – different combinations of the determinants can achieve the objective; MDG-specific inputs cannot be identified since some inputs contribute, directly or indirectly, to more than one MDG; and finally, marginal returns to inputs may vary depending on the value for the MDG indicator. In addition the bottom-up costing does not consider that the scaling up effort to expand social service provision may crowd out private activity and in certain cases reduce overall economic growth. This in turn can negatively influence the achievement of the goals and increase costs.

Economy-wide modeling (normally in the form of Computable General Equilibrium - CGE models) avoids these problems by explicitly accounting for the direct and indirect effect generated by the pursuit of MDGs. For most poor countries, the increased government current and capital spending on education, health and other basic services – and its connected financing via foreign grant, taxation or borrowing – represent major economic shocks with uneven repercussions across sectors of the economy, its labor markets, its trade performance and so on. Even with these advantages, two major limitations of current CGE models are that they normally aggregate public expenditures into a single category and do not explicitly account for the output side of government spending. As a large theoretical and empirical literature has pointed out, some types of public spending can raise the growth rate by improving the marginal productivity of the private sector’s physical capital and labor. Infrastructure, health and education expenditures are among these types and their detailed accounting is a desirable feature of a model aiming at assessing alternative policies for MDGs attainment.

MAMS, the Maquette for MDG Simulations, is a dynamic general equilibrium model which explicitly links public expenditures on individual social services and infrastructure to social outcomes in terms of MDG attainments and aggregate growth.\(^2\) A key objective of MAMS is to capture the key interactions between the pursuit of the MDGs and the evolution of the economy. For this reason, it focuses on the sub-set of goals that is likely to be the most costly to achieve and that is expected to have the largest impact on the economy. These are: universal primary school completion (MDG 2), reduced under-five and maternal mortality rates (MDGs 4 and 5), and increased access to improved water sources and sanitation (part of MDG 7). To the extent that a package of interventions that curtails child and maternal mortality helps to reduce the incidence of major diseases other than HIV/AIDS, the model also implicitly tracks MDG 6. In addition, achievements in terms of poverty reduction (MDG 1) are addressed, although the model does not contain mechanisms for specific MDG 1-related interventions.\(^3\)

\(^2\) A more detailed description of the model is available in Annex G and in Lofgren and Diaz-Bonilla (2006).
\(^3\) Of the 8 MDGs of the 2000 Millennium Declaration, only three are left out of the current version of the model: MDG 3 – promote gender equality and empower women, MDG-7 – ensure environmental sustainability, and MDG 8 – develop a global partnership for development.
Production of a typical MDG is modeled as a system of two functions: the first models the production of an aggregate measure of MDG service delivery which depends on direct MDG spending and on other determinants. The second function relates MDG outcomes with this aggregate measure. In the first function, the production of MDG-related services requires three broad categories of inputs: labor (which is disaggregated according to skill/education levels), capital goods and intermediary products. In addition to these inputs, which basically account for spending on specific MDG interventions, the aggregate measure of MDG service delivery is also determined by some other variables as listed in Table 4.2. For example, reaching the education MDG requires additional schooling services, but is also facilitated by improvements in health conditions (proxied by MDG 4 and 5), by better infrastructure (e.g., better roads to schools), by higher income levels (better-off parents may not need their children to work), and by good returns to education (proxied by the wage premium paid to skilled workers). The aggregate measure is strictly increasing in all of its components, and does not capture potential bottlenecks and/or the decreasing returns to scale as the target approaches (due to the difficulty of reaching the most remote parts of the population or, for example, necessity of high-level medical care to diminish maternal mortality beyond a certain threshold). In order to account for these effects, the second function is introduced and this requires greater and greater improvements in the level of aggregate service delivery for the same rate of improvement in the MDG indicator.

Table 1: Determinants of MDG Achievement in MAMS

<table>
<thead>
<tr>
<th>MDG</th>
<th>Per-capita ServiceDelivery</th>
<th>Per-capita consumption</th>
<th>Wage incentives</th>
<th>Public infrastructure</th>
<th>Other MDGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Poverty</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>2 Education</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3 Infant Mortality</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Maternal Mortality</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>7a,7b</td>
</tr>
<tr>
<td>5 Water</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Sanitation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although improvements in public infrastructure are not part of the MDGs, they serve as a key input in the MDG production function, and contribute to overall growth by adding to the productivity of other production activities. This means that real GDP growth (and poverty reduction) is partly influenced by government policies and in particular by its investment in public infrastructure (roads, ports, energy, etc).

The MAMS model does not explicitly track the progress of MDG 1. A simple approach to follow the progress on poverty reduction is to use an estimated elasticity of poverty

---

4 The modeling of the education MDG is more complex given that MAMS considers the full educational system disaggregated into different cycles: primary, secondary, and tertiary. The primary cycle is needed to estimate attainments of the MDG 2. The higher cycles are needed to link education to the labor market. They are also required to provide a complete picture of the dynamic fiscal consequences of achieving MDG 2 and expanding the educational system.

5 The empirical link between growth and public infrastructure has been analyzed widely, but there is no universal consensus on the strength of this link. Given the lack of consensus, this paper does not consider any scenarios where poverty (MDG 1) is actively targeted by boosting growth via increased public investment in infrastructure.
with respect to growth in households’ per capita consumption. This study takes a more sophisticated approach by utilizing a macro-micro framework, where a set of aggregate results from MAMS are passed on to household survey data by means of a micro-simulation module. The data for our micro-simulations come from recent surveys, which allow us to identify employment and wages by skill and sector. The simulations then apply changes in employment, skill levels, relative wages, and consumption per capita from MAMS to each individual in the survey, producing a new distribution of income and translating the evolution of macro variables into poverty outcomes. Unlike the simpler poverty elasticity-based methods, the micro-simulation approach allows for four main avenues of escaping poverty: moving from agricultural employment to non-farm activities where the wages tend to be higher, upgrading individual skills (through schooling), changes in relative wages, and an economy-wide growth component that equally benefits all households.

3 Policy lessons from MAMS work

3.1 Millennium Development Goals for Honduras and Ghana: current achievements and forthcoming challenges

The first important message that emerges from a quantitative assessment of the MDG situation in the two countries under study is that significant differences exist across the two countries when individual goals are considered. In other words, given the initial situation and if current trends continue some goals may be reached in Ghana and some others in Honduras. Thus, even if the overall total financing requirements are broadly similar in the two countries, the challenges facing Ghanaian and Honduran policy makers – as well as the strategies to overcome these challenges – reflect the specificity of each country’s circumstances (see Table 2 and Table 3).

<table>
<thead>
<tr>
<th></th>
<th>Honduras 1990</th>
<th>2004</th>
<th>BaU (Target)</th>
<th>Distance covered in BaU</th>
<th>Ghana 1990</th>
<th>2004</th>
<th>BaU (Target)</th>
<th>Distance covered in BaU</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDG 1: People living on less than $1 (PPP) a day (% of pop.)</td>
<td>38</td>
<td>21</td>
<td>19</td>
<td>52</td>
<td>35</td>
<td>26</td>
<td>167%</td>
<td></td>
</tr>
<tr>
<td>MDG 1: People living below the national poverty line (% of pop.)</td>
<td>84</td>
<td>64</td>
<td>42</td>
<td>24%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDG 2: Primary completion rate (% of relevant age group)</td>
<td>65</td>
<td>76</td>
<td>100</td>
<td>48%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDG 4: Under-five mortality rate (per 1,000 births)</td>
<td>59</td>
<td>31</td>
<td>20</td>
<td>16%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDG 5: Maternal mortality rate (per 100,000 live births)</td>
<td>180</td>
<td>108</td>
<td>70</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDG 7a: Access to an improved water source (% of population)</td>
<td>73</td>
<td>82</td>
<td>95</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDG 7b: Access to improved sanitation facilities (% of pop.)</td>
<td>66</td>
<td>77</td>
<td>95</td>
<td>15%</td>
<td>21</td>
<td>35</td>
<td>85</td>
<td>24%</td>
</tr>
</tbody>
</table>

Source: various publications XXX and authors calculations. Say that the targets are a percent improvement from 1990. Note:
In 2004, the base year for MAMS, Honduras seems in a better position than Ghana for all the MDGs. The Latin American country shows lower poverty headcount\(^6\) and better achievements in terms of education, mortality rates and population coverage for basic water and sanitation services. However this better initial situation does not necessarily mean that the 2015 targets are more easily reachable. In fact, since the targets are expressed as a relative improvements from the 1990 situation (apart from education where universal primary completion is a common threshold), the ‘distance’ that the two countries have to cover are comparable. The country specific challenges are thus determined by the progress that each country has made during the 1990-2004 period and, more importantly, by the sector costs needed to achieve the individual targets. These two elements – recent past progress and sector costs – are connected because, as mentioned above, getting closer to achieving a given goal often means rising costs. Providing social services to the poorest, most remote population groups, even if these are a small fraction of the total population, is usually complex and expensive.

In terms of the non-monetary poverty MDGs and starting with education, in Honduras, the rate of alphabetization of the young has increased from 79.7 percent in 1990 to 85.5 percent in 2001 and the enrollment rates for primary education have reached 89.3 percent in 2004. Moreover, there is no apparent gender gap, as the data for primary education shows boys and girls having almost identical access and completion rates. In Ghana, significant progress is taking place in basic education, aided by the recent (2005) abolition of basic school fees and enhanced expenditure allocation towards the lagging regions (G-JAS, 2007).

<table>
<thead>
<tr>
<th>Government Spending categories</th>
<th>Honduras</th>
<th>Ghana</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Infrastructure</td>
<td>16.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Primary education</td>
<td>15.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Health</td>
<td>11.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Water and Sanitation</td>
<td>14.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Total Government Expenditures</td>
<td>17.7</td>
<td>24.5</td>
</tr>
</tbody>
</table>

Although these developments in the education indicators exhibit clearly positive trends, a number of studies have raised serious concerns about the quality of education received by Honduran and Ghanaian pupils and the efficiency public education spending.\(^7\) These

\(^6\) Notice that the government of Honduras has defined its own poverty headcount target by adopting a national poverty line that at XXX USD a day is quite higher than the international poverty line of 1 USD a day.

\(^7\) For example, the World Bank (2001) Honduras Public Expenditure Review cites a study assessing language and math skills in the third and fourth grades of education, where, out of twelve Latin American
apparently similar concerns are however reflected in quite different estimated costs of reaching universal primary completion in 2015. As shown in Table 3, although Honduras is already allocating close to 4 percent of GDP of its public expenditures to primary education, experts estimate that its resource needs in this sector will grow at the average rate of 15.6 percent for the period 2004-2015. This contrasts markedly with Ghana that is spending about 3 percent of GDP on primary education and needs to expand its educational services by just 3.4 percent per year. Various factors may explain these stark differences: Honduras distribution of primary education attainments may be more unequal than that of Ghana meaning that reaching uncovered groups may be harder; inefficiencies in the primary school system may be more widespread and serious in the Latin American country; or it may use more intensively expensive resources such as highly qualified teachers. It is important to underline that MAMS relies on sector studies to assess the empirical strength of these factors and embeds them in its general equilibrium framework. In particular, to incorporate the key feature of decreasing returns to spending as the goal approaches, MAMS uses logistic, S shaped, functions as shown in Figure 1. This figure also helps explaining the counterintuitive situation where Honduras is closer to achieve its goal in education but needs to spend more resources than Ghana.

**Figure 1: Honduras is closer to its primary education goal but reaching it may be costlier than in Ghana**

![Graph showing primary school completion rate in percentage, comparing Honduras and Ghana.](image)

Note: the point ‘x’ on the horizontal axis represents the current (2004) public spending on primary education, see values in terms of shares of GDP in Table 3. The points 1.11x and 2.38x represent the spending in 2010 (when every school aged child, in a 6 year primary cycle, has to enter and graduate from grade 1 in order to reach MDG2 by 2015) and are calculated as the compounded growth rates of Table 3; so for the case of Honduras: $2.38 = (1+0.156)^6$.

The ‘flatter’ logistic curve for the case of Honduras indicates that decreasing returns to spending in education are more severe and begin at lower completion rates than in the case of Ghana. This graph thus summarizes in a graphical form the information on the countries participating in that study, Honduras ranked last in language and next-to-last in math. Also, the World Bank (2004) Honduras Development Policy Review found that the recent expansion in public spending on primary education was accompanied by declining efficiency.
current MDG2 status and on the required spending growth rate found in Table 2 and Table 3.

Similar arguments can be used to compare the health MDGs with the important difference that in this comparison Honduras is in a better position than Ghana. In Honduras, the under-five mortality rate decreased from 59 to 31 per thousand births and the infant mortality rate was reduced from 47 to 23 per thousand between 1990 and 2005/6. While data inadequacies do not permit a precise assessment of the evolution of maternal mortality, the available survey results\(^8\) suggest that considerable progress has been achieved: the maternal mortality rate was reduced from about 180 (per 100 thousand) in 1990 to around 108 in 2000. The rapid pace of reductions in infant and child mortality rates between 2001 and 2005/6 bodes well for the achievement of MDG 4, but continued progress is conditional on maintaining the recent growth of public health expenditures, which grew nearly four times as fast as real GDP between 1999 and 2005. If this growth is not sustained, additional inroads in improving health outcomes are likely to be minor. In Ghana, efforts to reduce child and maternal mortality have practically stalled since GPRS I, which is even more worrisome since health sector expenditures have risen over the same period (G-JAS, 2007). The required additional resources to reach the health MDGs differ markedly across the two countries reflecting these recent uneven performances and their associated expenditure patterns. Partial equilibrium estimates shown in Table 3 suggest that Honduras will need to increase its health services provision by 12 percent per year close to almost half of the required 19 percent rate of growth needed in Ghana.

With regard to water and sanitation, Honduras’ national coverage for potable water increased from 73 percent to 82 percent over 1990-2004, while sanitation coverage increased from 66 percent to 77 percent. However, large disparities in coverage rates are observed across rural and urban areas, and even across large and smaller cities. In addition, Honduras faces severe challenges in reaching its ambitious coverage rates on account of the high growth rate of its population and the low efficiency of sector institutions. According to official forecasts, reaching a 95 percent coverage rate for water and sanitation in 2015 (a goal which is above that set by the Millennium declaration) means providing access to water for an additional population of 2.6 million in total – 1.2 million in rural areas and 1.4 million in urban areas – and supplying sanitation services to an additional population of 3.5 million in total, distributed between 1.3 and 2.2 million in rural and urban areas respectively. In Ghana, although access to water and sanitation services has been improving, inequalities in access (particularly between rural and urban areas) and issues of quality in this sector remain a major bottleneck for development. Recent estimates suggest that the costs of inadequate water and sanitation facilities may be as high as 2.1 percent of GDP, indicating need for policy attention (G-JAS, 2007).

The above constraints determine the path of the MDGs in the baseline scenario for each country. This baseline scenario is simulated with MAMS and it is based on the following assumptions. In Honduras, real GDP per capita grows at 1.8 percent per year—which coincides with earlier growth projections prepared by the IMF and Government of

---

\(^8\) Surveys aimed at measuring maternal mortality rates were administered in 1990 and 1997, and the national statistical institute (INE) estimated the rate for the year 2000.
Honduras, but is much faster than the 0.5 percent average annual growth recorded over the 1990-2004 period; the level of government service provision in public infrastructure, water and sanitation, health, and education sectors is assumed to grow at the same rate as real GDP (3.9 percent per year); finally, spending in the general government sector is also set to grow exogenously at this rate, so that total public consumption grows at the rate of real GDP expansion in the projected period. The same assumptions and information sources are used for the case of Ghana. However, the rate of real GDP growth is much higher in this African country. Ghana’s real GDP grows at an average annual rate of 6.9 percent through 2015, while its population grows at 2.6 percent per year, leading to an impressive 4.2 percent annual improvement in per capita income.

Even with these optimistic growth performances assumed for the baseline case, none of the non-poverty MDGs is likely to be reached in Ghana or Honduras. In Ghana, the high and sustained pace of growth bodes well for reaching the poverty MDG, which is likely to be surpassed in the baseline scenario. Our estimates show that solid progress is likely to take place in education, where 90 percent of children will complete the primary cycle in 6 years. Although this falls short of the MDG of universal primary completion, more than 81 percent of distance to target is covered in the baseline scenario (see the last column of Table 2). In contrast, relatively little progress is likely to take place in water and sanitation, where only 21 and 24 percent of total distance to target will be covered in the baseline. Finally, reductions in child and maternal mortality are even slower, with one-fifth of the required improvement likely to take place by 2015. In Honduras, given the high rates of growth of service provision required to reach the MDGs and the slow growth assumed in the baseline for these same services, it is not surprising that the distance towards the goals covered in the baseline scenario is less than in the case of Ghana. The largest improvement, 48 percent of the distance to target, is observed for the education goal, while progress towards health, water-sanitation, and poverty goals is much slower. Only 16 percent of the distance to target is covered for the child and maternal mortality goals, while water and sanitation fare slightly worse at 14 and 15 percent of total distance covered. Finally, the baseline improvement in the poverty headcount is 24 percent of the total distance to target. That is, the 1.8 percent per capita income growth generated in the baseline scenario is not sufficient to make major progress in poverty reduction.

The modest achievements of the baseline scenario signal the need of increasing the efforts to expand public provision of MDG-related services. Table 3 showed estimates of

---

9 These macro projections are obtained from the Joint IDA/IMF Debt Sustainability Analysis completed in 2006.
10 Note that the poverty figures quoted for Ghana rely on a simple calculation using the poverty elasticity of growth of -1, rather than more sophisticated micro-simulation techniques that take into account changes in the distribution of income and the heterogeneity of income sources across households.
11 In the case of education even if Honduras has to spend much more than Ghana (see Table 3), the distance to the common 100 percent completion target is much shorter for Honduras than for Ghana.
12 In the baseline MAMS micro-simulation, poverty reduction is modest due to increasing inequality between 2004 and 2015. The Gini coefficient rises by 1.5 percentage points, while the Theil index increases by 4.8 percentage points. The trend towards rising inequality is explained by high demand for skilled and tertiary-skilled workers, which drives up their labor earnings and increases wage inequality. Additionally, the wages of unskilled workers grow slower than the economy-wide average because of the demographic structure of Honduras, where large cohorts of young people enter the labor market at low skill levels.
how much is needed to reach each individual MDG under the restrictions that synergies
and general equilibrium effects are not accounted. The next session addresses the
question of how much will cost to reach all the MDGs when these restrictions are
removed.

3.2 How much will it cost to reach the MDGs?

The second important message emerging from analyzing the MDGs challenge is that –
notwithstanding the differences across Ghana and Honduras with respect to individual
goals – the overall cost to achieve all the non-poverty MDGs at close to 10 percent of
GDP (for the year 2015) is quite large for both countries. The substantial expansion of
social services behind this large cost is also likely to generate significant general
equilibrium effects throughout the economies of these countries, and these will be
considered in the sections below. The starting point to estimate the total cost consists of
using MAMS to simulate the joint implementation of all the expanded service provisions
described in the previous section. Expanded service provision can be obtained in two
ways: a) by increasing spending with the current unchanged ‘production structure’ or b)
by a lower increase in additional spending combined with a more efficient production
structure. Although this second strategy of mixed additional spending and improved
efficiency is more likely to occur in the real world, it is useful to consider the size of the
financing envelope without any productivity improvements over baseline. This approach
helps establish the size of the challenge, and also highlights the potential magnitudes of
structural impacts on the host economy, including implications for labor markets and
government fiscal space.

In order to reach the full set of non-poverty MDGs, the growth rate of HD service
provision per capita (excluding the provision of public infrastructure) in Ghana would
have to almost quadruple from 2.4 percent per year in the baseline to 9.2 percent per year
in the full MDG achievement scenario. In Honduras, the level of service delivery per
capita would need to grow approximately three times faster than in the baseline, rising
from 1.8 percent per year to 7.0 percent per year. Assuming for simplicity that the
financing gap is filled by foreign grants, the total cost of providing these services in
Ghana is likely to reach US$14.3 billion over the 2004-2015 period, while the
comparable figure for Honduras is US$9.3 billion. These results imply that by 2015,
MDG-related foreign grants would need to rise by US$89 per capita in Ghana and
US$142 per capita in Honduras. Reflecting the increasing unit costs of service provision
(as coverage of MDG services extends to parts of the population who are more difficult
to reach, socially or geographically) as well as overall population growth, the required
amounts of aid are likely to rise over time, reaching 12 percent of GDP in Ghana and 10
percent of GDP in Honduras (Figure 2).

13 The implications of alternative financing scenarios will be considered in the following section.
What are the implications of alternative financing mechanisms?

Although the required expansion in HD service provision does not depend on the choice of financing mechanism, the total costs (in local currency units or US$) of providing these services can vary significantly across different financing scenarios. Besides foreign grants, one may envision alternative scenarios where the MDG financing gap is filled by raising taxes, or through foreign or domestic borrowing. It is also possible, and even likely, that an MDG achievement strategy would rely on a combination of these approaches, but for simplicity we consider each of them separately.

For both countries, the foreign grants scenario represents the “best-case” strategy of reaching the MDGs since the required funds are freely available through foreign donors. However, as is often pointed out in the literature on foreign aid, absorption of large inflows of foreign currency is often associated with real exchange rate appreciation and the Dutch disease problems that stem from it. In our simulations, both Honduras and Ghana experience a substantial appreciation of real exchange rate, by 12 and 10 percent over the 2004-2015 period, respectively. While the appreciation benefits the consumers of imported goods, it has two important drawbacks: first, the purchasing power of each dollar of foreign aid declines in step with the falling real exchange rate; and second, the growth rate of exports falls significantly below baseline levels. This potential loss of competitiveness on international markets is an important signal to policymakers that financing MDG activities through large amounts of foreign aid and focusing on export-led growth may not be compatible strategies.

The impact of MDG financing through foreign borrowing is similar to foreign grants, with the exception that the government fiscal space is further constrained by the necessity of making interest payments. Furthermore, accumulation of external debt may not be a welcome strategy in countries that only recently received reprieve from crippling external debt burdens through the HIPC initiative. As an alternative, governments may consider raising the required revenues domestically, either through domestic bond issues or increased taxation. However, doing so is likely to have adverse effects on private consumption (tax financing) or crowd out private investment (bond financing). For example, financing MDG expenditures through direct taxes in Honduras requires a near
tripling of the tax rate from 6.0 percent to 15.3 percent. As a result, private consumption growth slows from 4.1 percent per year in the baseline to 3.2 percent in the tax scenario, and the 2015 poverty headcount in the tax simulation is 4 percentage points higher than in the baseline (Figure 3). In other words, if public expenditure on MDGs were to be financed exclusively through direct taxes, Honduras would only cover 5 percent of total distance to its poverty target between 2004 and 2015, compared with 23 percent in the baseline and 24 percent if the MDG financing were provided through foreign grants.

Figure 3 Financing MDG-related expenditure through direct taxes penalizes consumption

The impact of tax financing in Ghana is similar, with consumption growth declining to 6.3 percent per year relative to 7.6 percent per year in the baseline and 8.1 percent per year if the MDGs were financed through foreign grants. Therefore, the progress on poverty reduction is also significantly reduced, although Ghana is still likely to be on track for meeting the MDG 1 due to the robust pace of growth anticipated over the next decade. Thus, the main message is not whether a given country is more or less likely to achieve the poverty targets—the progress on poverty reduction is largely determined by the baseline growth performance—but that the choice of financing mechanisms for MDG strategies has explicit costs: losing international competitiveness, penalizing private consumption, or reducing private sector growth. Policymakers should be aware of these costs and weigh them carefully against the HD benefits of reaching the MDGs.

3.4 Income growth and MDG achievement: complements or substitutes?

A key feature of the MAMS model is that the costs of attaining the MDGs depend not only on the estimates by sector experts, but also on the availability of necessary resources (labor, capital, and intermediate inputs), complementary policies (e.g., provision of public infrastructure), and the overall growth environment of the country. Costs to reach the MDGs are likely to be lower when demand for services is higher, the contribution of the private sector is larger, and the requisite infrastructure is in place and of sufficient quality. Therefore, the baseline growth path as well as the ability of the government to stimulate additional growth through investment in productive activities (such as public infrastructure) are key determinants of the overall cost of reaching the MDGs. At the same time, good MDG performance has important positive spillover effects on growth.
For example, improvements in the schooling increase the share of skilled and tertiary-skilled workers in total employment, which in turn leads to higher average labor productivity.\textsuperscript{14}

In order to illustrate the importance of growth for achieving the non-poverty MDGs, we consider a scenario where the government is able to accelerate growth by increasing investment in public infrastructure. In Ghana, this accelerated growth scenario—which addresses the infrastructure gaps that have constrained Ghana’s growth performance in the past by doubling the growth rate of current spending on infrastructure from 5 to 10 percent per year—quickens the growth rate of GDP per capita to 4.7 percent per year (from 4.2 percent per year in the baseline). As a result, total savings in the costs required to reach the MDGs reach US$2 billion, or 14 percent of the expenditures that otherwise would have been required over the 2004-2015 period (Figure 4). Furthermore, the accelerated growth scenario leads to important improvements in all of the non-poverty MDG through spillover and demand-side effects: additional 7 percent of distance to target is covered in primary education, 3 percent in child mortality, and 4 percent in access to safe sanitation facilities.

While the previous discussion highlighted the many complementarities between MDG achievement strategies and growth, there also exist important trade-offs between HD- and growth-targeted activities within the fiscal space constraints of the government. Faced with a fixed budget envelope, policymakers may not be able to raise sufficient resources to finance a full set of MDG activities and maintain adequate investments in

\textsuperscript{14} There exist other potential spillovers, such as higher labor productivity due to improved health of workers and higher survival rates of children who then go on to join the labor force. However, this possibility is not considered in the simulations presented in this paper due to the time scope of the analysis: improvements in child health are likely to translate into larger and healthier workforce with a time lag greater than the endpoint of our simulations (2015).
infrastructure. In this case, one may broadly distinguish between investing in activities that are beneficial to growth (such as infrastructure) and HD-related activities that do not have immediate feedbacks to growth. In order to quantify this HD-growth trade-off, we undertake a series of simulations where the overall public budget is fixed at baseline levels, but the allocation of government resources varies from infrastructure-intensive to HD-intensive. The results of each simulation in terms of ‘distance towards the poverty target’ and ‘average level of achievement of the non-poverty MDGs’ are then represented as points of a trade-off curve as those shown in Figure 5.

Figure 5 Investing more in growth may require sacrifices in HD progress

![Graph showing trade-off curves for Ghana and Honduras.](image)

The trade-off curve is concave, implying that additional investment in either HD or infrastructure services results in progressively smaller improvements in the relevant indicators. At the same time, Bourguignon and Sundberg (2006) suggest that the trade-off between human development and growth becomes flatter as a country comes closer to achieving its HD targets. In other words, because the unit costs of reaching the most remote parts of the population (both economically and socially) are likely to rise as a country comes closer to the MDG targets, making the final steps towards the MDGs is much more costly in terms of foregone growth than when the MDG strategies are initially implemented.

3.5 What if the available MDG financing falls short of the required amounts?

If the total amount of MDG financing is constrained at some amount below the total requirements, improvements in the efficiency of service delivery may be required in order to assure that the targets are reached. Accordingly, higher levels of productivity in the HD sectors are likely to reduce the need for additional spending. A scenario of limited financing and increased efficiency in services provision is policy relevant in view of the
large size of the additional public spending (required to achieve the MDGs in absence of efficiency gains) and in light of earlier observations on the apparently low efficiency performance in Honduras and Ghana.

Assuming that the objective is to reach all the MDGs, the policy alternatives can thus be grouped in two categories: increasing the efficiency of public spending or increasing the amount of spending. For the same level of full MDG achievement, these two alternatives are once again graphed as a policy trade-off curve in Figure 6 for the case of Honduras. At one extreme of this tradeoff, the MDGs (excluding the poverty target) are attained exclusively by scaling up MDG-related expenditures, while keeping efficiency constant at the baseline levels. As discussed earlier, this would require an increase in MDG-related spending by 10 percent of GDP by 2015. At the other extreme, the non-poverty MDGs are attained exclusively by improving efficiency, while keeping expenditures at the same levels as in the baseline scenario. In the MAMS model, the efficiency of public spending is entirely determined by labor productivity, and improvements in efficiency can be measured by the ratio of the productivity level in 2015 versus their level in the base year (2004). If the MDGs in Honduras are to be reached with additional (grant-funded) spending fixed to zero, the overall productivity level would have to increase by 89 percent. This implies, for example, that the primary education MDG may be achieved with 52 percent fewer skilled workers and 37 percent fewer tertiary-skilled workers, while the comparable savings in health are 54 and 40 percent.

Figure 6 MDGs in Honduras can be achieved by a combination of aid and efficiency gains

Finally, one can envision different combinations of efficiency and additional public spending amounts between the two extreme cases, each of which is sufficient to attain the MDGs. For example, if the level of foreign grants in Ghana is constrained to 40 percent of the amount needed, the overall level of public sector efficiency would need to rise by

Note that Figure 5 assumes that financing is provided by foreign grants. This figure over-simplifies the problem suggesting that the policy mix is two-dimensional. As discussed earlier, MDG attainment also depends on spending on infrastructure as well as the growth in household per capita income.
55 percent relative to the 2004 levels. This means that in primary education, the same outcome could be achieved with 22 percent fewer teachers (relative to the foreign grant scenario), while in health, the MDGs could be reached with 24 percent fewer doctors. Overall, cost savings from increased efficiency in Ghana could amount to 6.9 billion USD over the 2004-2015 period.

3.6 What are the effects of the pursuit of MDGs on the labor markets?

There are a number of links between MDG achievement strategies and labor market dynamics. On the one hand, in order to reach the MDGs, the public sector must hire more doctors, teachers, and engineers. This raises demand for skilled workers (increasing their wages and/or stimulating additional employment) at the economy-wide level and also limits the availability of skilled workers in the private sector. On the other hand, by the virtue of encouraging children and young adults to remain in school, the pursuit of MDGs boosts the supply of skilled workers relative to the baseline. Finally, there are important inter-temporal effects due to the length of the education cycle. During the transition phase when unskilled individuals choose to go to school rather than entering the labor market, the economy experiences a growth penalty of a smaller total labor force.16 During this phase, additional public spending in education is needed to offset the lower growth in consumption per capita. Obviously, a better educated labor force would contribute to stronger growth rates in the future. However, before reaching this new higher growth path, a country is faced with an important trade-off similar to that experienced by poor households who have to decide whether to send their young members to school and forego their incomes or get them to work but deprive them of potentially higher earnings in the future.

The effects described in the previous paragraph combine to produce the wage dynamics depicted in Figure 7. This figure plots the absolute differences in annual wage growth (expressed in percentage terms) for the three skill categories in Ghana and Honduras. The acceleration in growth of tertiary-skilled wages is directly attributable to the increased demand for high-level skills workers in the public sector, which more than compensates for the increased supply of these workers due to improvements in the education system. The reason is that the public sector in general, and MDG-related public services in particular, are much more skill-intensive than the rest of the economy. However, these wages increase economy-wide—meaning higher production costs for the whole economy—and can affect, together with other variables, macroeconomic performance.

The evolution of unskilled and skilled wages highlights important differences in the ability of the education sector to scale up for MDG achievement across the two countries. In Honduras, where the demographic distribution is heavily skewed towards younger age groups—almost 45 percent of the total population is 16 years old or younger—the

16 The Ghana and Honduras applications discussed in this paper do not allow for changes in labor force participation rates. As unskilled wages rise (because unskilled labor is relatively scarcer) more unskilled workers may choose to enter the labor force. However, this effect could be mitigated by difficulties in finding employment, which could include formal barriers to labor mobility (such as prohibitive hiring costs), specificity of human capital required for certain tasks, and location challenges (e.g. moving from remote rural areas to cities).
secondary school system is unlikely to be able to absorb the large quantities of primary graduates without a significant scale up in financing. Since our simulations keep the growth in secondary and tertiary education financing the same as in the baseline, the quality of education in secondary schools deteriorates, discouraging primary graduates to continue their education. As a result, the growth rate of unskilled labor supply actually rises relative to baseline, and unskilled wages grow slower. In Ghana, the secondary school system is relatively well-positioned to absorb the higher quantities of primary school graduates (the result of reaching the MDG 2) without a significant deterioration in the quality of education. Therefore, large amounts of unskilled workers exit the labor force (the annual growth rate of unskilled labor declines from 4.2 percent per year in the baseline to 3.3 percent in the MDG scenario) and gradually return as skilled workers. As a result, unskilled labor becomes relatively scarcer and unskilled wage rise relative to baseline. On the other hand, although growth in skilled wages accelerates relative to baseline, the acceleration is muted to an increase in the supply of these workers. 

The rising demand for skills and faster growth of skilled wages have important consequences for the distribution of income and poverty reduction. Growing wage differentials increase income inequality, which means that the bulk of the economy-wide gains are likely to accrue to individuals already earning incomes above the poverty lines (e.g., individuals with a tertiary education). This is one of the reasons why the MDG achievement scenarios fail to deliver more impressive poverty reduction. In Honduras, the headcount index declines by only 1 percent relative to the baseline, despite the 0.4 percent per year acceleration in consumption growth. This occurs because inequality also rises over the course of the same period, with the Gini coefficient increasing by 1.3 percentage points to 62.2, and the Theil index rising by 4.7 percentage points. It is important to acknowledge that these results do not imply a “worsening” of income inequality because they are underpinned by rising premiums for education, which in the long term will encourage more children to attend school and potentially raise economy-wide productivity levels. At the same time, the results highlight the potential need for public safety nets to assist poor workers who are likely to gain the least under these policies.

**Figure 7 The pursuit of MDGs raises demand for skilled workers**

The difference in annual wage growth between baseline and MDG achievement scenario (percentage points)
4 Conclusions

The MAMS model is the first framework to explicitly take into account the general equilibrium consequences of scaling up for the achievement of MDGs. The MAMS approach consolidates the partial equilibrium assessments of the experts on education, health, infrastructure, and water; links the pursuit of MDGs to the labor markets, fiscal sustainability, and international competitiveness; and provides a consistent set of prices and volumes that can be used in a micro-simulation analysis of poverty and income distribution effects of MDG strategies. In this paper, we have illustrated the main features of MAMS and the policy lessons that could be learned from the model using two recent MAMS applications to Ghana and Honduras.

Our discussion draws attention to a number of potential areas for attention by policymakers. Our results show that the costs of reaching the MDGs in low-income countries such as Ghana and Honduras are likely to be large, reaching 10 and 12 percent of GDP in 2015, respectively. The choice of financing mechanisms for the MDG strategies has important consequences for the macroeconomic variables: foreign aid financing is likely to result in losses in international competitiveness and reduced export growth, while domestic financing is likely to crowd out private investment and slow the progress on poverty reduction. We show that while the overall growth environment is a key determinant of the total cost of reaching the MDGs, there are important public policy trade-offs between investing in growth-enhancing infrastructure or human development-intensive activities. Taking account of the low reported efficiency of public service provision in Ghana and Honduras, our simulations point to significant cost savings that could be achieved through improvements in productivity. Finally, the pursuit of MDGs is likely to increase demand for skilled workers faster than the education system is able to produce new graduates; although in the long term this will encourage more people to attend and remain in school through higher skill premiums, in the short term this policy could lead to increased income inequality and a lower poverty elasticity of growth.

5 References

(to be revised and completed)


Comisión Económica para América Latina y el Caribe (CEPAL), Instituto de Investigación Económica Aplicada (IPEA) “Hacia el objetivo del milenio de reducir la pobreza en América Latina y el Caribe”.


Morales Anaya, Rolando, “Reflexiones sobre las Diferentes Maneras de Concebir y Usar las Estadísticas sobre Empleo” INE 2005

Objetivos de Desarrollo del Milenio: una Mirada desde américa Latina y el Caribe “La lucha contra la pobreza y el hambre” 2004.

Programa de Apoyo a La Sostenibilidad de la ERP “Cuaderno de Transición Metas de la ERP y Objetivos de Desarrollo del Milenio”

Programa de Apoyo a La Sostenibilidad de la ERP “Cuaderno de Transición Metas de la Sostenibilidad de la Deuda”.


