

Briones, Roehlano M. et al.

**Working Paper**

## Assessing Development Strategies to Achieve the MDGs in Asia: Philippines (Final Report)

PIDS Discussion Paper Series, No. 2011-03

**Provided in Cooperation with:**

Philippine Institute for Development Studies (PIDS), Philippines

*Suggested Citation:* Briones, Roehlano M. et al. (2011) : Assessing Development Strategies to Achieve the MDGs in Asia: Philippines (Final Report), PIDS Discussion Paper Series, No. 2011-03, Philippine Institute for Development Studies (PIDS), Makati City

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Philippine Institute for Development Studies  
*Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas*

## Assessing Development Strategies to Achieve the MDGs in Asia: Philippines (Final Report)

*Roehlano M. Briones et al.*

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February 2011

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# Assessing Development Strategies to Achieve the MDGs in Asia: Philippines<sup>1</sup>

## Final Report

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3 December 2010

### ABSTRACT

The Philippines is a developing country with strong commitment to the Millennium Development Goals (MDGs); however, it faces challenges in closing MDG gaps, owing to mediocre growth, macroeconomic instability, and financing constraints. Since the 1990s, increases in per capita incomes have been pulled down by tepid growth in productivity, rapid population growth, and macroeconomic instability. Since the mid-1980s, however, various reforms have been implemented to lay the foundation for sustained growth and poverty reduction.

The external imbalance was a concern in the 1980s and 1990s, as the country endured balance of payments crises and persistent trade deficits; however, recently capital inflows have soared, due mainly to rapid growth of overseas remittances. The fiscal balance remains a policy challenge; public finance through borrowing, whether domestic or foreign, is complicated by large and persistent debt stocks. ODA has shrunk, owing in part to institutional factors. Recently public finance through taxation has suffered from tentative revenue effort.

The country's record in the MDGs is mixed. Progress has been made in child health, potable water, and sanitation. However, inroads against extreme poverty are complicated by an anomalous relationship between poverty and growth. The responsiveness of education outcome to public spending is apparently low; goals for education and maternal health remain elusive.

While service delivery can be greatly improved, escalation of public expenditure for social programs remains essential. An economy-wide computable general equilibrium (CGE) model called MAMS, applied to the Philippines, examines economy-wide scenarios for attaining the MDGs through increase resource outlays. Application of the model finds the following: first, under a business-as-usual scenario, the country will likely fail to reach MDG goals for education and maternal health, while achieving only marginal reductions in poverty. Second, closing the MDG gaps will entail a massive increase in public spending. Financing such increases through domestic or foreign borrowing leads to unsustainable levels of debt stock. Financing via foreign transfers minimizes fiscal impacts but is infeasible owing to recent declining ODA trends. This leaves tax financing for achieving the MDGs. As for income poverty, under business as usual the projections indicate failure to achieve the first MDG goal. Apparently per capita income growth fails to translate into poverty reduction, as the economy fails to create higher paying jobs (for better educated workers) fast enough within the simulation period to 2015. Fortunately, poverty reduction is faster when government spending is directed towards closing MDG gaps, though insufficient to make appreciable headway in achieving MDG 1.

The study recommends attempting to close the MDG gaps using tax financing. This financing option is feasible in the sense that the required revenue effort has been achieved in previous decades. Admittedly, it entails a dramatic improvement in revenue effort compared to most recent (decadal) trends. This underscores the urgent, development-based rationale for raising tax collection efficiency, introducing new tax policies, in combination with public sector reforms for cost-effective service delivery.

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<sup>1</sup> The study was undertaken by the Philippine Institute for Development Studies in collaboration with the National Economic and Development Authority (National Planning and Policy Staff and the Social Development Staff), with financial and technical support from the United Nations – Department of Economic and Social Analysis (UNDESA), and financial support from the United Nations Development Programme (UNDP), through the UNDP Country Programme Action Plan (CPAP) 2005-2011 Programme on Poverty Reduction and Support for the MDGs, with NEDA-SDS as Implementing Partner. The paper presents the personal opinions of the authors and do not represent in any way the official views of the institutions to which they are affiliated. The authors alone are responsible for any errors and omissions made.

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## 1. INTRODUCTION

The Philippines has been progressing well in many of the Millennium Development Goals. Since 1990, considerable headway has been made towards eradication of extreme poverty, reduction in child mortality, as well as improvement in household potable water and sanitation. However the challenges remain formidable. In the 2000s there was an increase in poverty incidence, delaying the achievement of the goal for extreme poverty, and worsening prospects for significantly reducing moderate poverty. Likewise the goals for education, as well as maternal and reproductive health, remain elusive.

One obvious approach to meeting these challenges would be to increase public spending on social programs. For the Philippines, Manasan (2007) has estimated that the cost of achieving the MDGs over the period 2007-2015 may require additional spending in the order of 0.6 to 1.4% of GDP. While this range of cost appears modest, fiscal constraints confronting developing country governments should not be underestimated. The challenge of financing the MDGs must be met under the imperative of managing the fiscal deficit, considering various economy-wide impacts over time on human capital as well as public finance.

Policy evaluation that can balance human development goals with macroeconomic stability constraints is best supported by the application of quantitative tools, such as a suitable economy-wide CGE model. We explore the application of one such model, the Maquette for MDG Simulation or MAMS. Application of MAMS to a country-specific dataset and elasticities aims to assess alternative scenarios towards achieving the MDGs, in terms of resource requirement, fiscal balance, and economy-wide effects. It is part of a multi-country study entitled *Assessing Development Strategies to Achieve the MDGs in Asia*.

We find that business-as-usual policies would not be sufficient to close the MDG gaps by 2015, as education and maternal health MDGs remain far from target. Rather, closing the gap requires additional government consumption spending, to the tune of about 2.6% of GDP on average. Financing this additional spending by borrowing, whether domestic or foreign, leads to alarming levels of government debt. Similarly, financing through foreign borrowing implies dangerous levels of foreign debt of the government. Foreign transfer financing is more consistent with sustainability, but appears infeasible given trends in ODA financing. This leaves tax financing of MDG achievement. However it entails an increase in direct tax effort by about 3.2% of GDP – within range of past levels of tax effort, but a daunting challenge given trends over the past decade.

The rest of this paper is organized as follows: Sections 2 and 3 review the performance of the Philippine economy and human development indicators since 1990. Section 4 describes the methodology for the country version of the MAMS, and estimation of MDG determinants, particularly for education. Sections 5 and 6 present projections for 2006-2015. Section 7 concludes and states policy recommendations.

## **2. ECONOMIC PERFORMANCE AND POLICIES**

### **Overview of economic reforms and policies since the 1990s**

The basic statement of the country's development strategy is the Medium Term Development Plan, which covers an administration's six-year term. In 1990, the Aquino administration (1986 – 1992) was in the middle of its planning period. Political and civil society institutions were being strengthened after the restoration of democracy in 1986. Growth in real GDP had just recovered to a 5.2% average from 1985 to 1989, following an economic crisis in which the GDP shrank 2.3% annually from 1981 to 1984.

While price instability was a major concern in the early 1990s, monetary policy partially targeted nominal exchange rate stability. The country's independent Central Bank finally adopted inflation targeting in 2001 (Gochoco-Bautista and Canlas, 2003). This and other developments appeared to tame inflation, which averaged 5.3% over the period 2000-2009, after averaging 8.7% in the 1990s.

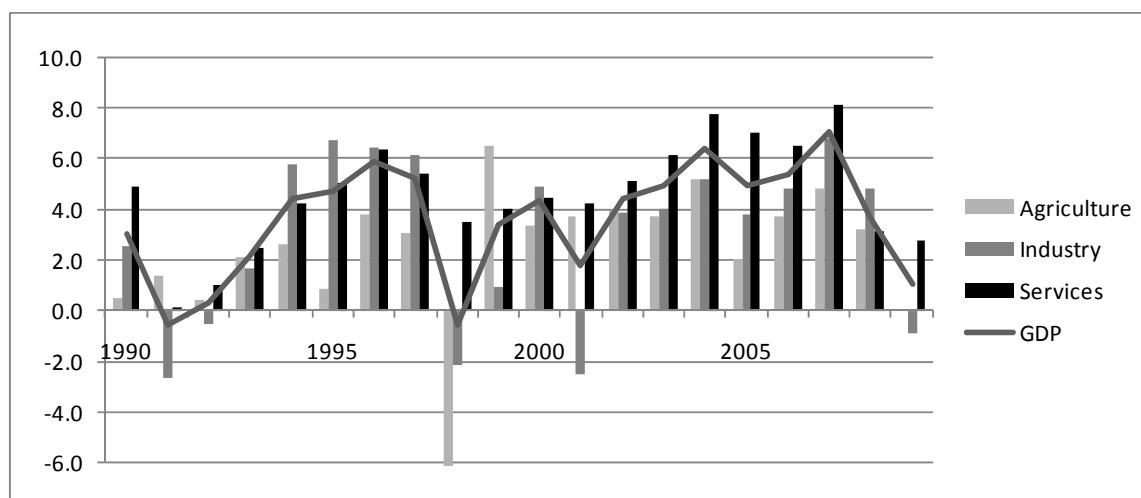
On the microeconomic side, the country's economy was initially riddled with policy distortions. Many were introduced under import substitution in the 1950s and 1960s, and dirigisme intensified in the 1970s under authoritarian rule (Balisacan and Hill, 2003). By the 1990s though, the country was in the middle of a wide-ranging market-oriented reform program. A series of Presidential instructions or Executive Orders cut tariffs and consolidated tariff lines. Importation (save for a few key sectors) was liberalized. By the end of the 1990s, the country's industrial sector could now be said to have a "reasonably clean and undistorted trade regime" (Hill 2003). The Ramos administration (1992 – 1998) also embarked on a program of liberalization for foreign direct investment and the service sector, along with privatization (Abrenica and Llanto 2003). A significant exception is agriculture, where distortions in sheltered sub-sectors (notably rice) amplified in the 1990s and completely reversed the policy bias against the sector (David, 2003).

### **Economic growth since 1990**

For nearly two decades since 1990, the Philippine economy grew modestly, averaging just 3.6% GDP growth from 1990 to 2009. Over the same period, population growth averaged 2.2%, implying a languid 1.4% growth of per capita income (Figure 1). Services tend to follow and even exceed overall growth: average growth of value added in services was 4.6% (compared to 3.5% for GDP as a whole). By 2006, services accounted for nearly half of GDP, and therefore the bulk of overall growth. Growth of both industry and agriculture were both lower than overall GDP, with industry having the edge over agriculture.

GDP fluctuations are fairly pronounced, owing to aggregate shocks to supply and demand. In the early 1990s the economy was buffeted natural disasters (a major earthquake in 1991, the eruption of Mt. Pinatubo), high oil prices caused by the Gulf War, and a balance of payments crisis. Incipient recovery in 1992 was aborted by crippling power shortages, which ended only in 1994. After the economy turned in decent growth from 1994 to 1997, it economy succumbed to the Asian financial crisis and a severe El Niño drought in 1997-98. Since 2000, economic recovery has been more consistent, peaking at 7.1% in 2007, until it was punctured by the global financial crisis.

**Figure 1: GDP growth, in constant 1985 prices, 1990 - 2009**



Source: NSCB. Available at: ADB Key Indicators 2009 – Philippines.

ADB (2007a) points out two important features that set the Philippine economy apart from its neighbors in the region (i.e. ASEAN and China). First is the share of industry in GDP: while industry generates 45 – 48% of GDP in the neighboring countries, in the Philippines it accounts for only 32%. Second is the share of consumption in GDP: while the Philippines generates 78% of GDP from consumption, neighboring countries generate at most 60% of GDP (Indonesia), with China dipping to only 36% of GDP; in the rest of the region, investment and net exports generate the bulk of GDP.

Long term growth fundamentals depend on the underlying growth in primary inputs (labor and capital), as well as total factor productivity (TFP). Labor force growth is driven by population growth, while the capital stock accumulates via investment. TFP measures the residual effects of unmeasured factors such as technological change and aggregate shocks. In the 1970s, growth of labor inputs was the main source of growth (Table 1). Capital played only a secondary role due to weak investment. TFP was an unreliable source of growth, in fact contributing negatively in the 1970s and 80s.

**Table 1: Contribution of factors of production to GDP growth (%)**

Period	Labor	Capital	TFP
1970 – 1980	4.57	1.38	0.06
1981 – 1990	2.05	1.37	-0.64
1991 – 2000	1.77	0.87	-1.62
2001 - 2006	1.12	1.24	0.25

Source: ADB (2007).

### External balance

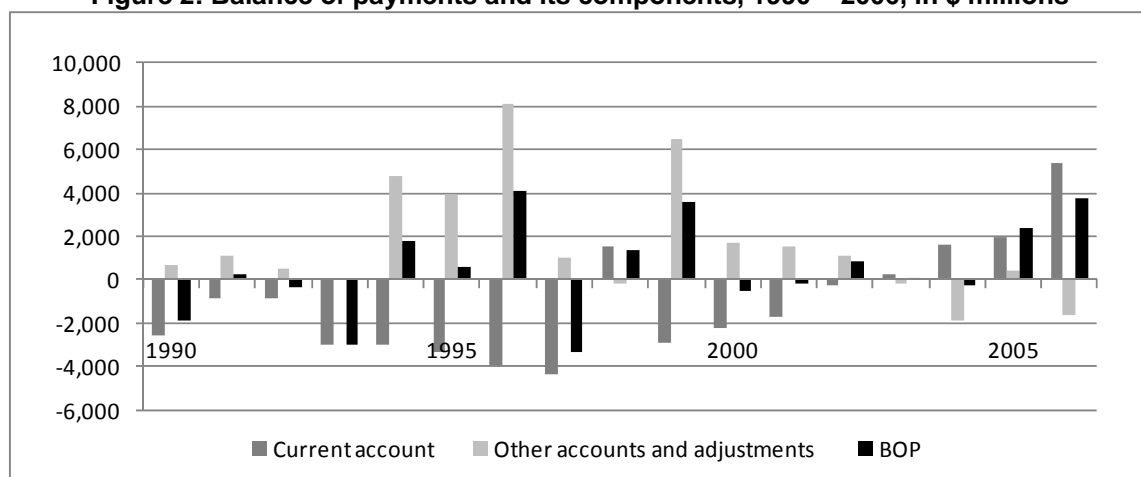
Macroeconomic policy is heavily pre-occupied with maintaining both external balance and fiscal balance. Regarding the former, in the early 1990s the country struggled with balance of payments difficulties (Figure 2), together with a slump in overall economic

activity. Throughout most of the 1990s the current account was persistently in deficit, leading to overall BOP gaps due to insufficient capital and financial inflows.

This is partially driven by policy: prior to the 1997 crisis, monetary authorities partially targeted exchange rate stability; together with fiscal imbalance and deficit monetization, exchange rate targeting ultimately led to a severe BOP crisis in 1983, and a lesser one in 1990. From 1992 onwards, foreign exchange liberalization inflows from liquid portfolio investments led to a sharp currency appreciation; this rendered the country vulnerable to the East Asia contagion and to another exchange rate collapse in 1997 (Gochoco-Bautista and Canlas, 2003).

A breakdown of the current account composition (Figure 3) shows the source of gaps and surpluses in BOP. Initially, net inflows on other goods, services, and transfers had fallen short of the trade deficit. Later, the surge in inflows led to a BOP surplus (starting in 2005), largely due unrequited transfers, of which by far the largest component is foreign worker remittances. Since 1991, net factor income from abroad has been growing at an astounding rate of 24% per year, accounting for 12% of GNP in 2009, up from just 2.3% in 1993. The extraordinary growth in remittances resulted both from increasing quantity of deployment, as well as rising skill profile of deployed workers.

**Figure 2: Balance of payments and its components, 1990 – 2006, in \$ millions**



Source: Bangko Sentral ng Pilipinas or BSP (Central Bank of the Philippines).

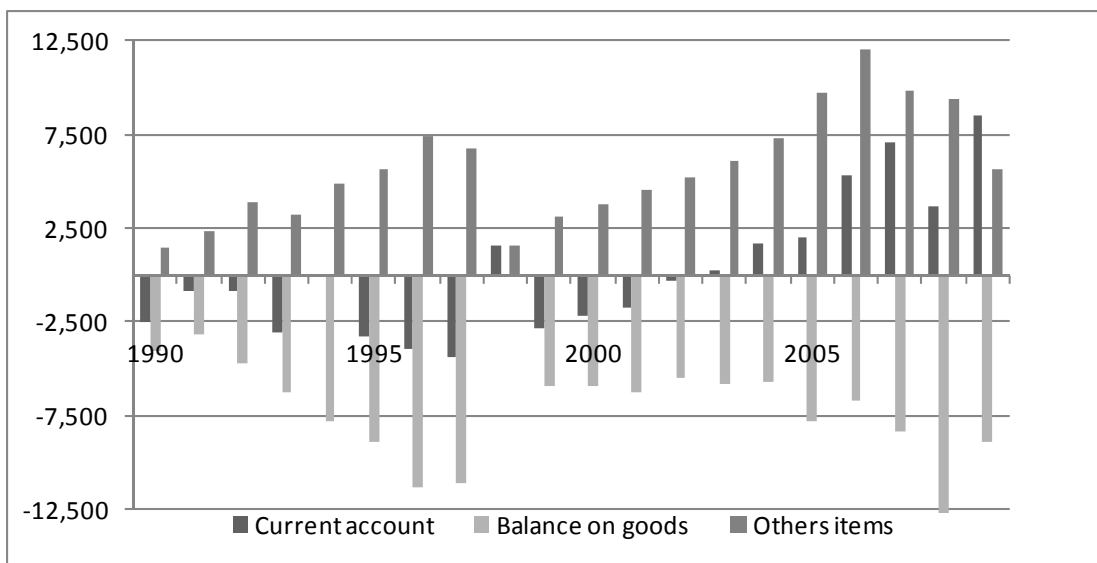
### Fiscal balance

The early 1990s witnessed the rapid escalation of government liabilities, both from external and foreign sources (Figure 4). This trend was clearly unsustainable; hence over the MDG period, the government prioritized a sound fiscal position. The fiscal surpluses in the mid-1990s, combined with higher economic growth, reduced the debt-to-GDP ratio; however debt reduction foundered after the Asian financial crisis. The debt-to-GDP ratio began to decline again only after the tax reforms of 2005.

Trends as well as levels of indebtedness are a cause of concern. A rule of thumb suggested by Manasse and Roubini (2009) is that the debt-to-GDP ratio should not exceed 49.7%. Clearly the country has breached this benchmark, though in 2009 it came into striking distance.

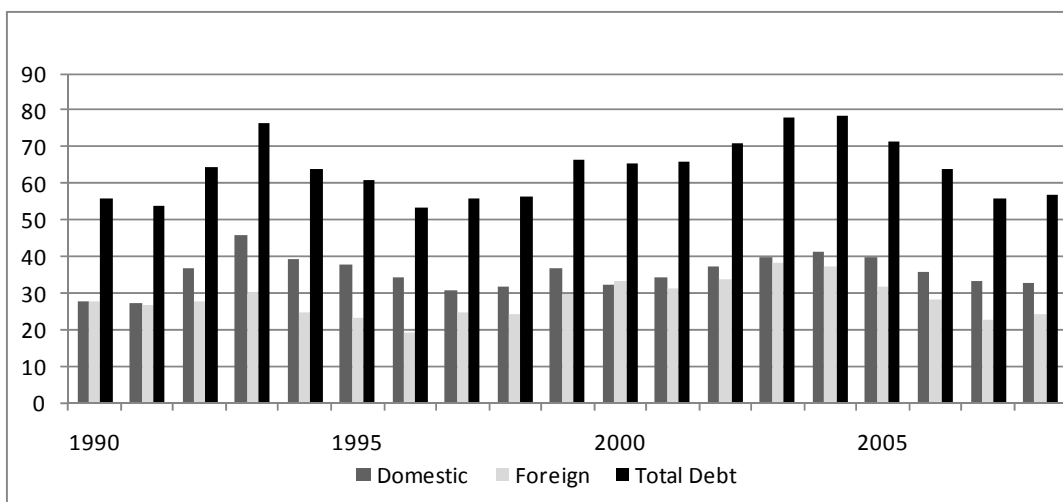


**Figure 3: Current account and its components, 1990 – 2006, in \$US million**



Source: BSP. Available at: ADB Key Indicators 2009 – Philippines.

**Figure 4: Domestic and foreign debt as a percentage of GDP**



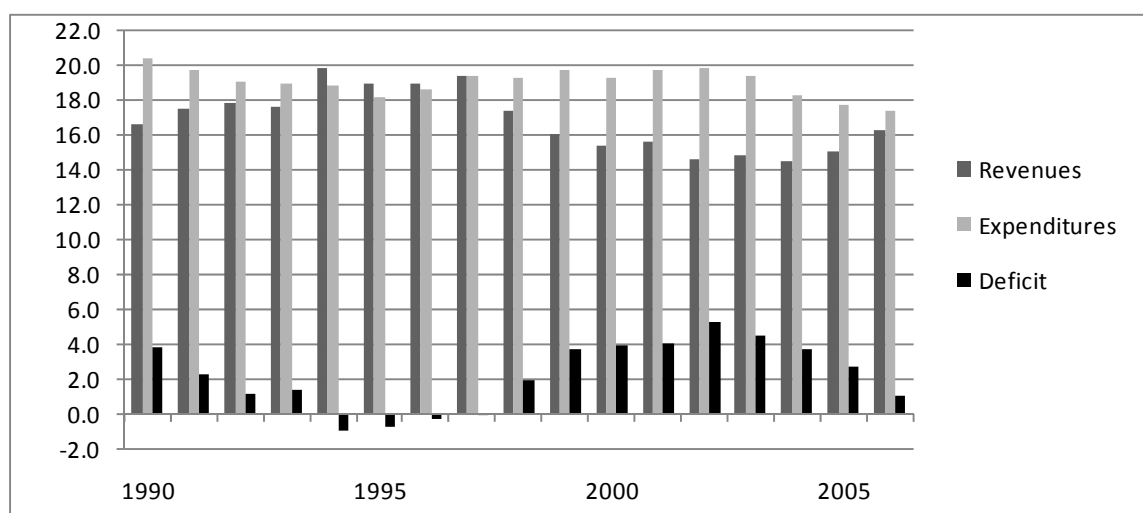
Source: Bureau of Treasury.

Debt is accumulated by running deficits. In the 1990s the country started with deficit-to-GDP ratio of 3.5% (Figure 5). The deficit was then contained by raising revenue effort and reducing the spending-to-GDP ratio. However, these revenue increases were temporary, arising from the sale of government assets. After the Asian financial crisis, the deficit worsened as revenue collection deteriorated. The decline in revenue effort has persisted despite subsequent recovery, leading to persistent deficits in the 2000s.

The fiscal deficit did begin to fall in 2003; this was however accomplished by reducing spending, as revenue effort did not improve substantially and even declined in 2004. In 2005, revenue effort began improve; continuing until 2007.

Table 2 shows the sources of deficit finance. The government has largely relied on domestic borrowing; over the last decade though foreign borrowings have assumed greater importance. Within domestic borrowing, from the early 1990s the government relied heavily on short-term debt (i.e. most from Treasury Bills), followed by long-term debt. From the mid-1990s the financing strategy switched to middle tenors; the share of medium term debt grew from 8% in 2005 to as much as 43% by 2003, before leveling off to about 35% in 2006. Meanwhile, in the early to mid-1990s the share of short-term liabilities in external debt was largest, falling no lower than 13%, and peaking at 23% in 1997 (based on Treasury data). In the aftermath of the Asian crisis, the country began to depend more heavily on long term issues, which now accounts for 90% of external debt (NSCB, 2009).

**Figure 5: National government spending and revenues as ratios to GDP (%)**



Source: Bureau of Treasury; NSCB. Available at: ADB Key Indicators 2009 – Philippines.

**Table 2: Share of sources of financing for the deficit (%)**

	1990-94	1995-1999	2000-2006
Domestic borrowing	175	160	79
Foreign borrowing	31	48	60
Reduction in cash balances	-106	-109	-39
Total deficit	100	100	100

Source: Bureau of Treasury. Available at: ADB Key Indicators 2009 – Philippines.

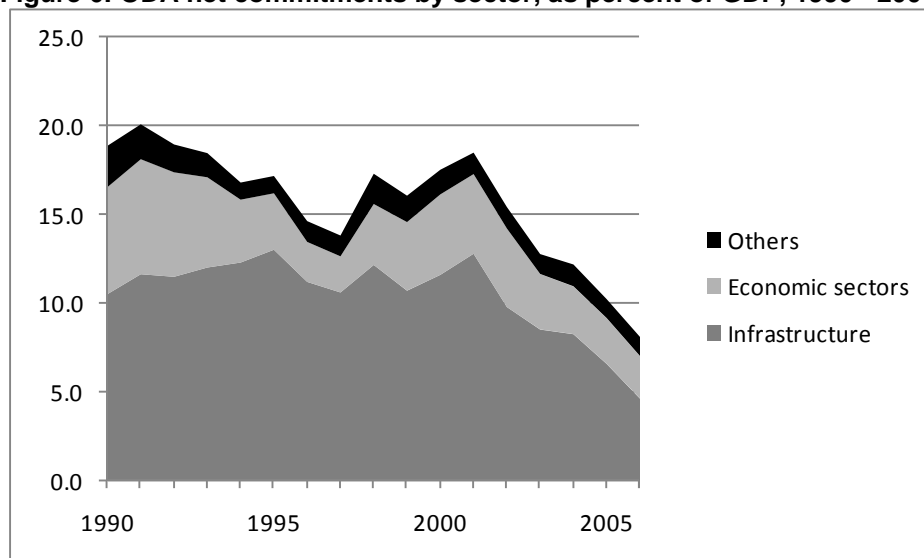
Aside from the balance of payments difficulties of 1991 and 1998, the country has generally maintained access to foreign capital. According to BSP data, over the period 1990 – 2006, foreign exchange reserves grew more than twenty-fold, approaching \$20 billion. As noted in the discussion above, the current account has turned in a surplus since 2004 and is probably not a binding constraint on foreign borrowings at present.

A major source of these foreign loans is official development assistance (ODA). Historically the country has been a major recipient of ODA (Figure 6), which grew

substantially in current dollars over the MDG period, peaking in 2002 at over \$13 billion; as a share of GDP it reached as high as one-fifth in the early 1990s. Since then ODA has been falling with no hint of reversing course or even stabilizing.

Kang (2010) attributes the decline to two factors: the diminishing need for ODA as a source of foreign exchange as it was superseded by foreign remittances; and diminishing absorptive capacity of the government. Over the period 2002-2008, the government was only able to spend 17% of committed ODA and 82% of programmed disbursement, primarily due to governance issues. Debt servicing takes a large bite out of the government budget, further weakening the public sector's appetite for loans (even at concessional rates).

**Figure 6: ODA net commitments by sector, as percent of GDP, 1990 - 2006**

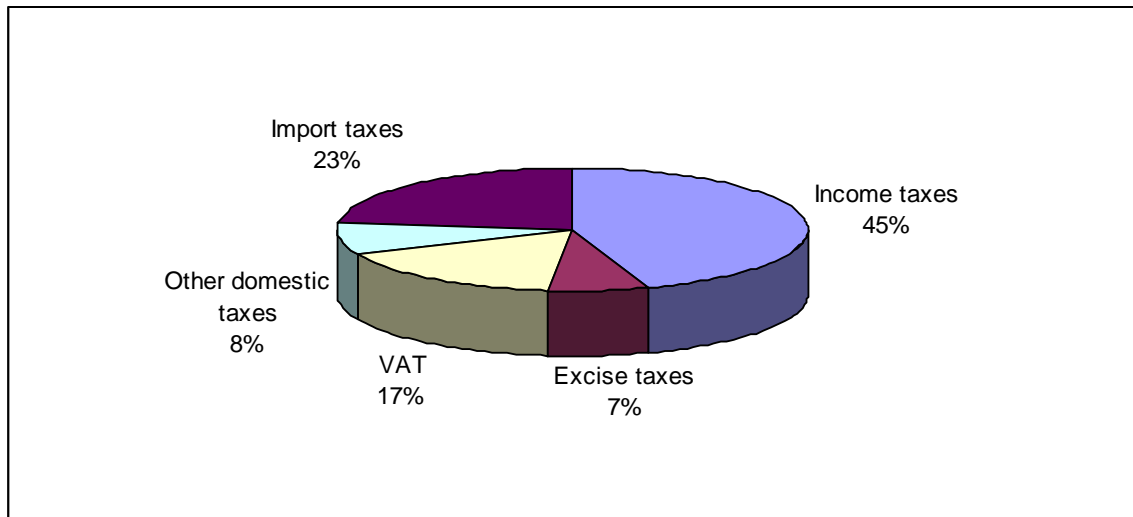


Source: NEDA.

The bulk of ODA went to infrastructure support (averaging 66% from 1990 – 2006). This is followed by the economic sectors; social spending and others, which more directly affect the MDGs, averaged only 9%. ODA remains an important, albeit limited, source of funding for infrastructure investment, and some of the more innovative types of social spending (such as conditional cash transfer program or community-driven development).

Tax revenue is another method to finance MDG programs. The country raises less than half of total revenues from direct taxes. Of the various indirect taxes, the largest share is still generated from taxes on imports, followed by the VAT (Figure 7). Manasan (2008) decomposes the increases in tax effort in 2005 – 2007 (relative to 2004) into changes due to tax policies (e.g. the VAT rate adjustment), changes in economic structure, and changes in collection efficiency. She finds that for each year after 2004, tax leakage reduced tax effort by about 0.22 to 0.78 percentage points. This provides some quantitative confirmation of the widespread notion of poor collection performance of the Bureau of Internal Revenue, making it more difficult to persuade Congress to enact new tax measures.

**Figure 7: Distribution of government tax revenues by type of tax, 2007**



Source: Bureau of Treasury; Manasan (2008).

There are nevertheless several proposals of new tax measures pending in Congress, seeking to increase revenues from direct and indirect taxes. Of these, Manasan (2004) recommends: indexation of excise taxes on sin and petroleum products; rationalization of fiscal incentives; an across-the-board import surcharge; and an excise tax on text messaging. It is possible to implement these new revenue measures, but probably after government demonstrates significant improvement in collection efficiency.

### 3. SOCIAL POLICY AND MDG ACHIEVEMENT

#### Social policy during the period 1990-2006

The restoration of democracy in 1986 led to the ratification of the 1987 Constitution, which is loaded with provisions pertaining to social justice and economic development. According to Section 9, “The State shall pursue a just and dynamic social order that will ensure the prosperity and independence of the nation and free the people from poverty through policies that provide adequate social services, promote full employment, a rising standard of living, and an improved quality of life for all.” It is convenient to divide the social policies into periods coinciding with the various post-1986 administrations, each of which framed their social policies according to Constitutional mandate.

The Aquino administration was generally preoccupied with the re-establishment of democratic institutions, the redress of social injustices, and economic recovery. The Medium Term Development Plan (MTPDP) made the first serious attempt to set poverty reduction targets.<sup>1</sup> Major directions of governance reform were decentralization (enacted by Local Government Code of 1991), partnerships with civil society in development, and the formation of local development councils, for which one-fourth of representation would originate from the private sector.<sup>2</sup>

Under the Ramos administration, the momentum for social justice matured into a “Social Reform Agenda”, which was institutionalized in a landmark piece of legislation, the Social Reform and Poverty Act (RA 8425) of 1997. The dimensions of the SRA are: social – providing access to basic services (education, health, housing etc); economic – involving asset reform and opening access to economic opportunities; ecological – ensuring effective and sustainable development of the resource base; and governance – democratizing decision-making and management processes.

Poverty is officially defined in terms of failure to meet minimum basic needs; targets for achieving minimum basic needs (MBNs), as well as for poverty incidence, were stated in the MTPDP. The banner program for poverty reduction is the Comprehensive and Integrated Delivery of Social Services (CIDSS). The CIDSS covered municipalities in the lowest revenue categories (5<sup>th</sup> and 6<sup>th</sup> class); beneficiary communities were identified using the MBN system. A major innovation of CIDSS is the strong emphasis on community organization and empowerment. A full-time CIDSS worker was assigned to target areas to facilitate community participation; funds were directly downloaded to the barangay; and project implementation was also done at the barangay level, together with financial and technical assistance from local government units or LGUs (Lanzona, Briones, and Turingan, 2003).

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<sup>1</sup> The poverty incidence target was targeted to reach 45.4% by 1992, down from 59% in 1985. In fact however poverty incidence was only 39.2% in 1991, but this was largely a matter of change in methodology of defining poverty.

<sup>2</sup> Currently the Philippines is composed of 80 provinces. These are further subdivided into cities or municipalities, and finally into villages or barangays. Each of these levels are governed by elected officials. The provinces are grouped into 17 administrative regions of the national government, with each region hosting a branch office of the national line agency. Only the Autonomous Region in Muslim Mindanao (ARMM) has an elected regional government.

Following the growth success of the Ramos administration, and the immediate challenge of recovery from the Asian financial crisis, the Estrada administration (1998-2000) adopted a vision of sustainable development and growth with social equity. Poverty targets were further refined to the regional level. The banner program of the administration was the *Lingap para sa Mahihirap*, which targeted the delivery of basic services, housing, and subsidies to the 100 poorest families of every province and city nationwide. However, political upheaval abruptly terminated the administration in January 2001, before the process of beneficiary identification was completed.

The two MTPDPs (2001–2004 and 2004–2010) of the Arroyo administration elevated poverty reduction as the central goal, with “prosperity for the greatest number” as the overarching strategy. The flagship program is the *Kalahi*, a convergence framework targeted at the basic sectors. The biggest and most well-known of the Kalahi programs is the Kalahi-CIDSS, an expanded and upgraded version of the earlier CIDSS.

Advocacy efforts for the MDGs have been very strong in the Philippines which led to the adoption of the MDGs as a key element in the MTPD framework. The Plan sets national targets for 2010 vis-à-vis MDG targets for 2015. The MTPDP highlights the provision of “essential services” such as potable water supply, power, education, health care, and shelter. The medium-term targets for these services include the following:

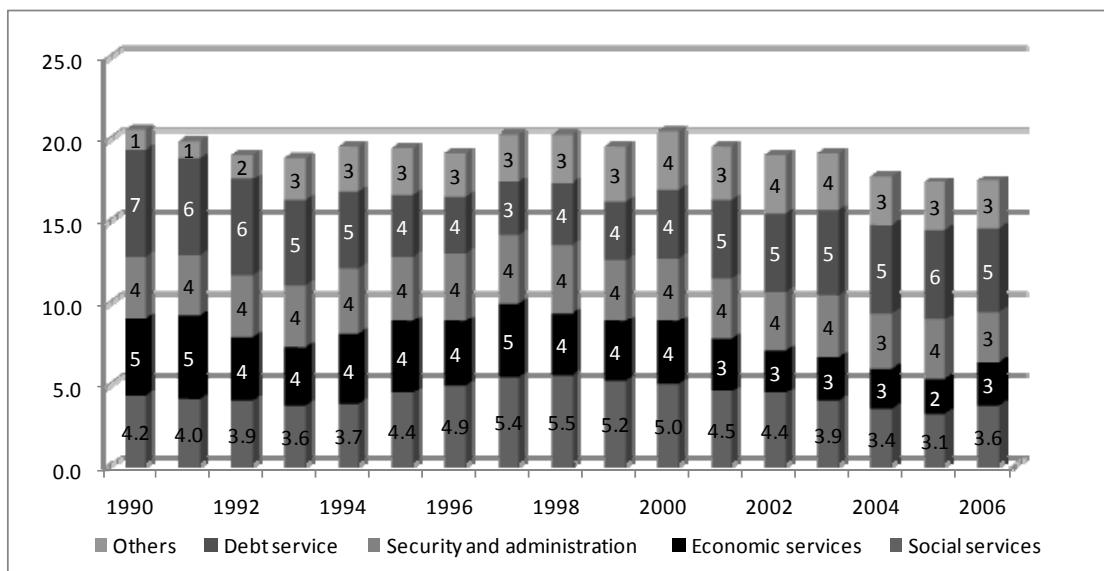
- Potable water and sanitation services for the whole country by 2010, prioritizing 200 waterless municipalities nationwide, and 200 waterless barangays in the NCR;
- Ensure universal primary education, raising net enrollment rate at the primary level to 93% (from 90% in 2002); raise the cohort survival rate to 78% (from 70% in 2002); raise the secondary school net enrollment rate to 84% (from 58% in 2002);
- Achieve the MDGs for health such as reductions of infant and under-5 mortality rates, maternal mortality rate, and incidence of malaria and TB; and as well as dissemination of modern reproductive health practices;
- Achieve the MDG target for hunger, i.e. reduce underweight prevalence among school children to 17%.

### **Evolution and structure of public spending**

Figure 8 shows trends in national government spending by sector, as a proportion of GDP. While spending on the social sector managed to increase from 4.2 to 5.5% of GDP over the 1990 to 1998 period, spending declined year-on-year to just 3.1% by 2004-2005, recovering to 3.6% by 2006. Social spending took the brunt of outlays on debt servicing, which rose from 3.2 to as high as 5.5% of GDP from 1997 to 2005. Spending on national defense, peace and order, and public administration were on the other hand fairly stable.

The item most readily sacrificed for other budget priorities is economic sector spending, which includes infrastructure. Treasury data show that capital outlays peaked at 17% of government expenditure in 1992; by 2000 however, the share had fallen to below one-tenth. The share continued to fall until a reversal came in 2006. In 2007, the national government managed to simultaneously increase the share of capital outlays (to 11% of total spending) while reducing the spending-to-GDP ratio.

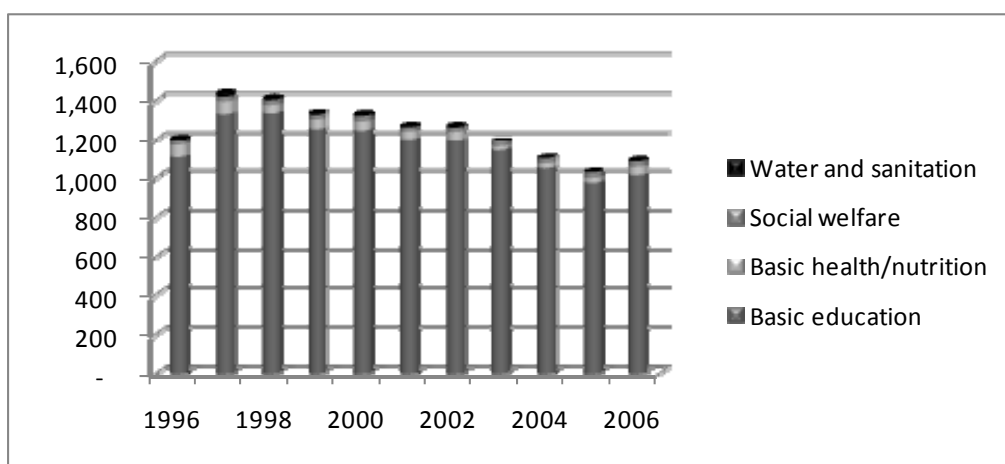
**Figure 8: National government spending as a proportion of GDP (%)**



Source: Manasan (2007).

Figure 9 reports Manasan's (2008) estimates of real per capita spending on basic services. Spending per capita peaked in 1998 at P1,482, just \$36 at the market exchange rate; even this was to decline steadily down to just about P1,000 in 2005, with a slight recovery the following year. The brunt of the decline was borne by basic education, whose share in the total is by far the largest; relative to the baseline though, the biggest reductions were observed for housing (10% per year), water and sanitation (7%), and health and nutrition (4%). As we shall see later, declining level of social spending – largely traceable to the overall fiscal bind – is one reason for the delay in achieving some of the MDGs.

**Figure 9: National government per capita spending, 1996-2006 (pesos in 2000 prices)**



Source: Manasan (2007)

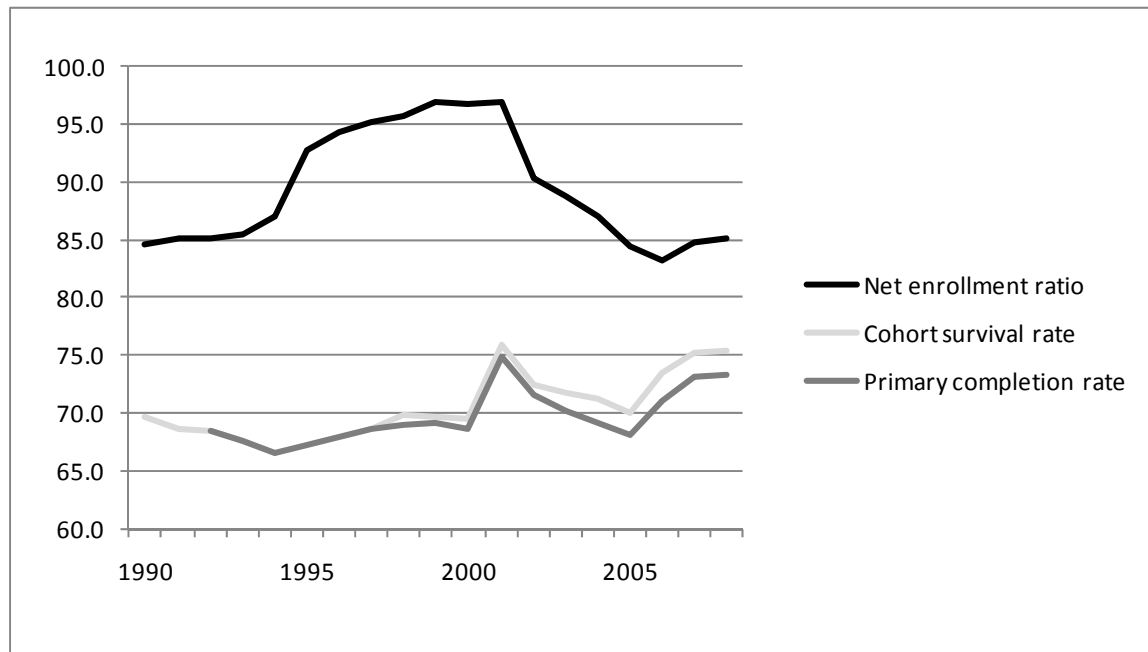
## Evolution of the MDGs

The MAMS permits projections related to MDG2 (education), MDG4 (child mortality), MDG5 (maternal mortality), MDG7a (household potable water), and MDG7b (household sanitation); in this paper these are collectively called *social MDGs*. A separate microsimulation model based on MAMS provides projections for income poverty and distribution, leading to estimates related to MDG 1.

### Social MDGs

**MDG 2 - Universal primary education:** The primary completion rate at the baseline was about 64%; in 2006 it was higher at 71%, although it peaked in 2003 at 75% (Figure 10). In 2008 the completion rate was 73%, still below the peak level. Likewise, the cohort survival rate at the primary level started out at 70% and was hardly changed at 73% by 2006, although this is below the 76% peak in 2001. The net enrollment rate, which is the indicator closest to “access” to basic education, started out at a high 85% in 1990. However it was even slightly lower by 2006, after suffering a decline from its maximum of 97% (near universal access) in 2001.

Figure 10: Indicators for MDG 2, 1990 – 2006 (%)



Source: NSCB; Economic Database, PIDS.

According to NEDA (2010), poverty, poor health, peace and order problems, and child labor all conspire to keep children out of school despite availability of free public education. At the same time under-spending remains a problem despite the large allocation for education in the government budget.

**MDG 4 - Reduced child mortality:** Clear gains have also been made in the area of child mortality (Table 3). Both the infant mortality rate and the aged-5-and-under mortality rate have fallen at rates consistent with the MDG targets; the targets may even be exceeded with expanded coverage of child health programs, particularly immunization.



**MDG 5 - Improved maternal health:** Table 3 also reports maternal health indicators. Unfortunately progress in reducing the maternal mortality rate has been very slow, making it unlikely that the 2015 MDG target would be met. One reason is the slow increase in the percentage of all births attended by trained professionals, now at 64%, up only five percentage points from the MDG base year. In many remote areas, childbirth is still assisted only by traditional birth attendants. Access to reproductive health care of married women aged 15-49 reached about half (50.6%) in 2006, which is far off the target of 80% by 2015. NEDA (2010) has noted that resource inadequacy is a major bottleneck, and underscores the need to find alternative financing sources aside from the regular public health budget.

**MDG 7 - Ensure environmental sustainability:** On the MDG target for water and sanitation, the country has already achieved and surpassed the 2015 target of 83.8 % on access to sanitary toilet facility as early as 2004, while the 2015 target of 86.5 % on access to safe drinking water is likely to be achieved. In terms of access to safe drinking water, data from the 2004 Annual Poverty Indicators Survey show that there is a slight improvement from 80.0 % in 2002 to 80.2 % in 2004

**Table 3: Indicators for MDG 4 and 5, 1990 – 2006**

	Infant mortality rate (per 1,000 live births)	Under-5 mortality rate (Per 1,000 live births)	Maternal mortality rate (per 100,000 births)	Births attended by trained professionals (%)
1990	57	80	209	58.8
1991			203	59.7
1992			197	59.4
1993	34	54	191	60.0
1994			186	60.9
1995			180	62.7
1996			-	64.1
1997			-	65.0
1998	35	48	172	69.2
1999			-	69.5
2000			-	69.0
2001			-	69.1
2002			-	67.0
2003	29	40	-	60.0
2004			-	63.0
2005			-	63.7
2006			162	-
2007			-	-
2008	25	34	-	-

Source: NSCB.

### ***Eradicating extreme poverty***

Official statistics on income and expenditure are available only every three years starting from 1991 (Table 4). Based on the official headcount ratio, the magnitude of the poor started out at close to half the population in 1991; poverty subsequently dropped to below a third in 2006, a trend that matches rising the growth of per capita incomes. Based on the subsistence threshold, food poverty has dropped even faster, from 24.3 to just 14.6%; this measure of poverty more closely approximates the “extreme poverty”

indicator of MDG 1. The final column refers to the more internationally comparable PPP-adjusted US\$1.25/day line: likewise this has fallen, though only about as fast as the official poverty headcount. Hence the country expects to meet MDG 1.

Income poverty closely (but not entirely) tracks overall economic growth. One interesting anomaly is that the poverty incidence across measures registered an increase from 2003-2006, during an episode of fast growth. Hence, the response of poverty to growth is not straightforward; averaging across periods, the responsiveness of poverty to growth is weak. Based on provincial level analysis, Balisacan (2007) finds that the growth elasticity of poverty reduction is only about 1.5, in contrast to figures derived at the national level from developing countries, which are in the range of 2.5 and above. In general, for the Philippines poverty does respond to growth, but less so compared to its neighbors.

**Table 4: Poverty incidence of the population, 1991 – 2006, by poverty line (%)**

Poverty incidence of population, by type of poverty line			
Year	Official poverty line	Official food poverty line	PPP-adjusted \$1.25/day
1991	45.3	24.3	30.7
1994	40.6	-	28.1
1997	33.0	17.0	21.6
2000	33.0	15.8	22.5
2003	30.4	13.5	22.0
2006	32.9	14.6	22.6

Sources:

1. Official poverty line and food line: NSCB (2009). [www.nscb.gov.ph/MDGs/index.asp](http://www.nscb.gov.ph/MDGs/index.asp). Accessed September 15, 2009.
2. \$1.25/day line: <http://unstats.un.org/unsd/mdg/default.aspx>. Accessed September 15, 2009.

In a recent paper, Habito (2009) re-examines poverty elasticity of growth within the period 2000-2006, using alternative income and multidimensional measures of poverty (Table 5). The Philippines traces out a perverse relationship between poverty and growth, based on the income measure of poverty. In terms of poverty elasticity, the Philippines ranks near the bottom, while Indonesia, Pakistan, and China rank at the top.

However, when poverty is measured using a broader set of indicators, the poverty elasticity increases for the Philippines. In general, multi-dimensional poverty and income poverty measures are only weakly correlated. Habito attributes it to the respective country's commitment to the delivery of basic services, which can be sustained despite the vagaries of income growth, unless slashed by a financial crunch.

To summarize (Table 6): the country is expected to meet most of its MDG targets, except for primary education (MDG 2) and maternal health (MDG 5). Moreover to achieve further, significant progress against extreme and moderate poverty, policymakers and other stakeholders would probably favor a much more ambitious target for income poverty, than simply halving food poverty compared to 1990.

**Table 5: Poverty elasticity of growth estimates (2000 – 2006)**

	Income measure		Multidimensional measure	
	Elasticity	Rank	Elasticity	Rank
Indonesia	-1.652	1	-0.284	12
Pakistan	-1.636	2	-0.547	8
China	-1.306	3	-0.791	6
Malaysia	-0.806	4	-1.464	1
Thailand	-0.755	5	-1.190	2
Viet Nam	-0.643	6	-1.181	3
Sri Lanka	-0.586	7	-0.130	13
Nepal	-0.515	8	-1.021	4
Bangladesh	-0.469	9	-0.373	10
Cambodia	-0.158	10	-0.583	7
India	-0.157	11	-0.322	11
Philippines	0.154	12	-0.489	9
Mongolia	1.855	13	-0.901	5

Source: Habito (2009).

### **What needs to be done to achieve the MDGs?**

NEDA (2007; 2010) argues for adopting more cost-effective delivery of basic services, together with increasing resource outlays for meeting the MDG targets. We return to the issue of quantity of resources for the MDGs in Sections 4 and 5; we conclude this section by considering quality issues in service delivery for the MDGs, especially to benefit the poor.

According to ADB (2007), education has steadily become more expensive for the poor. Access to health (measured by proportion of the sick who sought treatment in health facilities) was close to half for the top 40% of the population, but only a little over 30% for the bottom quintile. Access to health services declined during 1998-2004, and the decline for the bottom group far exceeded that of the top. Only 5% of people from lower income groups went to private health facilities; rather, the poorer groups patronize mostly public health facilities. A major issue facing social programs is to improve targeting of the poor (see e.g. Balisacan and Edillon, 2005).

Other major cross-cutting issues are as follows:

- *Addressing wide disparities across regions* - Regions with poverty incidence rates above the national average must receive more than a proportionate share of the resources allocated to overcome the problem.
- *Curbing the high population growth rate* - Family planning education and services should be scaled up and innovative and acceptable mechanisms for promoting contraception (both natural and artificial) must be in place, towards the full implementation of the contraceptive self-reliance strategy.
- *Improving performance of the agriculture sector* - The government's anti-poverty strategy must focus on agriculture and rural development through asset reforms and (agrarian reform, urban land reform and ancestral domain reform) and investments in productivity improvements and supporting infrastructure, particularly for agriculture.

**Table 6: Philippines MDG Rate of Progress at the National Level**

<b>MDG Goals and Targets</b>	<b>Value at 2006 or nearest year</b>	<b>Target by 2015</b>	<b>Likelihood of reaching target</b>
<b>1. Eradicate extreme poverty and hunger</b>			
Subsistence incidence	14.6	12.2	<b>High</b>
Prevalence of malnutrition, aged 0-5	26.2	17.2	<b>High</b>
Households with inadequate kcal intake (%)	56.9	34.7	<b>High</b>
<b>2. Achieve universal primary education</b>			
Elementary completion rate	73.3	81.0	<b>Low</b>
<b>3. Promote gender equality</b>			<b>Achieved</b>
<b>4. Reduce child mortality</b>			
Under 5-mortality rate (per 1,000 live births)	34.0	26.7	<b>High</b>
Infant mortality rate (per 1,000 live births)	25.0	19.0	<b>High</b>
<b>5. Improve maternal health</b>			
Maternal mortality ratio	162	52.2	<b>Low</b>
Couples practicing responsible parenthood (%)	51.0	80.0	<b>Low</b>
<b>6. Combat HIV/AIDS, and other diseases</b>			
HIV prevalence	below 1%	Below 1%	<b>High</b>
Malaria morbidity rate (per 100,000 population)	55.0	24.0	<b>High</b>
<b>7. Ensure environmental sustainability</b>			
Households with access to safe drinking water (%)	80.4 (2004) <sup>1/</sup>	86.8	<b>Medium</b>
Households with sanitary toilet (%)	86.2 (2004) <sup>1/</sup>	83.8	<b>Achieved</b>

- *Accelerating the implementation of basic education and health reforms* - Two (2) major reform packages, for health and education remain to be completed. For health the reform agenda is expressed in the Formula 1, which covers financing, regulation, service delivery, and governance, along with Basic Education Sector Reform Agenda, which covers community action, effective school-based management, and the alternative learning towards universal adult functional literacy.
- *Law enforcement* - laws supporting the MDG targets, particularly those that protect and promote the welfare of women and children, should be enforced and continuously monitored.
- *Strengthening the capacity of LGUs to deliver basic services and manage programs and projects* - Government has to invest in improving capacities of LGUs through: problem-solving, involving local participation, managerial know-how, and transparent mechanisms. Resources would need to be shifted from the center to the local

governments to help them overcome financial constraints, especially in fourth- and fifth-class municipalities.

- *Ensuring transparency and accountability in government transactions* - Graft and corruption must be addressed and accountability and transparency in every branch of government from national down to the local levels.
- *Addressing peace and security issues* –Conflict-affected areas, which are concentrated in Mindanao, should be prioritized. Provision of basic services and other assistance should be viewed in the context of peace and development.
- *Creating public-private partnerships* - Civil society has shown that it can effectively monitor government institutions and performance of officials. It is also a powerful advocate for the MDGs. Meanwhile, the private sector is the main provider of jobs and livelihood and has also proven to be a strong partner in social development and the protection of the environment.
- *Improving targeting, data base and monitoring* - The unavailability of timely and accurate information for MDG indicators and the lack of updated and/or disaggregated data make the design and targeting of appropriate interventions difficult. Enhancement of data collection and quality has to be given attention including surveillance activities, e.g., for hunger and disease outbreak. The current institutional arrangement at the sub-national level also needs to be strengthened and operationalized.

#### **4. METHODOLOGY**

This sub-section provides only a general overview of MAMS; a detailed technical description is in Lofgren and Diaz-Bonilla (2006). The MAMS contains a core computable general equilibrium model and an MDG module. For this study, a microsimulation method that takes MAMS' labor market outcomes and imputes these into a micro dataset has also been implemented following the methodology spelled out in Vos and Sanchez (2010).

##### **Core CGE model**

The basic structure and interactions of the economy are captured in a core CGE model. The economy consists of a production and trade block, a domestic institutions block, an investment block, a price block, and systems constraints and macro block. The MAMS allows flexible specification of goods produced, production activities, and primary inputs.

Production activities are divided into two levels: at the lower level, gross output is determined by a combination of value added (a constant elasticity of substitution or CES aggregation of primary inputs), and intermediate inputs (a Leontieff aggregation). Activity outputs are then combined into the economy's goods by way of a CES function. Production is then transformed into domestic sales and exports using a constant elasticity of transformation function (a simpler formulation is used if the product is not an exportable). Producer behavior is conditional on competitive price-taking and profit-maximization. On the other side of trade, domestic demand is a CES composite of domestic purchases and imports.

Institutions are composed of households, government, and the rest of the world. Each institution receives and transfers income, makes purchases, and saves (or borrows). Households receive factor incomes, and make consumption purchases to maximize utility according to a linear expenditure system. Meanwhile the investment transforms savings into capital accumulation.

Closure rules are defined in the systems and macro block. At equilibrium, factor prices clear at the equality of institutional endowments of factors with the factor demands; alternative closure rules allow for unemployment. For commodities, total supply equals equal to total demand. A balance of payments constraint imposes equality between sources and uses of foreign exchange.

The core CGE is specified as a one-period module (containing the static model), together with a between-period module. The latter updates household populations, institutional stocks of assets and liabilities, and total factor productivity. A new equilibrium is computed at each period, thus representing the dynamics of the economy.

##### **MDG module**

The MDG module contains equations that determine the MDG indicators. The core CGE influences the MDG indicators through household consumption, provision of MDG-related services, wages, and infrastructure stocks. The MDG module in turn affects the core CGE by its effect on the size and composition of the labor force.

For the education MDG, the MAMS determines an indicator for each educational cycle, i.e. primary, secondary, and tertiary. The indicator selected is the net completion ratio, which is the ratio of on-time completers to the original batch of enrollees entering the

cycle. To compute the net completion ratio, the model determines, within each cycle and for each year, the following ratios:

- Share of the enrolled that: graduate from their current grade to the next grade or cycle (*grd*); repeat the grade (*rep*); or fail to continue schooling (*dropout*). Note that  $grd + rep + dropout = 1$ .
- Of the share that graduate from their grade: share which graduate from the cycle (*grdcont*); the share which continue in the cycle (*contcyc*). Note that  $grd = contcyc + grdcont$ .
- The share of the cohort expected to enter primary school (in the Philippines this is the age of six) who do enroll in the first grade (*g1entry*).

The explanatory variables are: education quality (proxied by spending per student); wage premiums between completers of a higher cycle over non-completers eligible for that cycle; the value of the health indicator (MDG4); infrastructure; and per capita household consumption.

### **Microsimulation**

The microsimulation module for MAMS is based on Vos and Sanchez (2010). Core CGE projections are translated into changes in the size distribution of income by way of the labor market. A sample survey of workers with their respective incomes is associated with labor market categories and variables in the core CGE model of MAMS. Changes in labor market participation, employment status, and sector of employment, are randomly assigned (based on a uniform distribution) to the survey workers. Together with changes in wages, the resulting adjustments in labor incomes are used to update the sample survey incomes, and therefore the resulting changes in poverty and income distribution. Due to the random assignment of outcomes, a Monte Carlo simulation is conducted to generate confidence intervals for the indicators of poverty and inequality that are computed.

Note that the method does not incorporate for changes in income distribution due to other income sources; nor does it incorporate demographic change such as population growth or life cycle effects. In particular it does not account for the burgeoning sector of migrant workers, many of whom received large human capital investment outlays from their respective families with the goal of overseas deployment. Despite these limitations it does provide an intuitively appealing approach to mapping CGE calculations to poverty and income distribution changes. Moreover according to Vos and Sanchez, the framework can be readily extended to cover a richer set of labor market interactions, such as provision of remittances from overseas.

### **Application of MAMS to the Philippines**

The Social Accounting Matrix (SAM) of the Philippines for the MAMS country model is based on the following breakdown of sectors:

- i. Agriculture (Agric)
- ii. Industry (Indust)
- iii. Water and sanitation (Wtsn)
- iv. Construction (Const)

- v. Other infrastructure (Oinf)
- vi. Education services –primary – private (Edupng)
- vii. Education services – secondary- private (Edusng)
- viii. Education services – tertiary – private (Edutng)
- ix. Education services – primary – public (Edup)
- x. Education services – secondary- public (Edus)
- xi. Education services – tertiary – public (Edut)
- xii. Health services – private (Hlthng)
- xiii. Health services – public (Hlth)
- xiv. Other government services (Ogov)
- xv. Other services (Othsvc)

The breakdown reflects the major economic sectors (Agriculture, Industry, and Services), with Services disaggregated most as required by the MAMS model. MAMS incorporates functions that aggregate public and private provision of education and health, in order to define the overall supply of these services.

The SAM is constructed for 2006, based on several sources. The main source is the official input-output table, of which the most recent version is for the year 2000, with a maximum disaggregation of 240 sectors. The first major step is the aggregation of the national I-O into 11 sectors (the breakdown into educational cycles is omitted). The 11-sector I-O also has only two factors, namely labor and capital (the latter of which receives the residual income).

The next step is to construct an I-O with the breakdown in education cycles, both for the education services (leading to a 15-sector table), as well as the labor account. For the sector accounts, we use the shares of public education allocated to the various cycles, based on government budget allocation (for 2006). The same shares are assumed to hold for private education service. For the labor account, we obtain the share of compensation income by education cycle from the 2006 Labor Force Survey, and apportion accordingly.

The next step is to update the 2000 data in the I-O to 2006. To do this we impose some restrictions on the 2006 I-O:

- Total Gross Value Added computed in from the I-O should equal GDP of 2006;
- Gross value added of the major sectors must equal sector GDP data for 2006;
- The share of major primary inputs (labor and capital) in total gross value added should equal their GDP shares in 2006;
- The implicit technical coefficients of the 2000 I-O provide the initial estimate of the accounts for the 2006 I-O.

Further balancing of the I-O is performed using the RAS method (implemented in GAMS). From the constructed I-O, we are now able to build the SAM, together with data from the National Accounts of the Philippines (2006), drawing mostly from the Consolidated Accounts as well as the Income and Outlay Accounts. Data for public investment is obtained from the Budget Expenditure and Sources of Financing (BESF) of



the Department of Budget and Management. Some supplementary information for foreign sector accounts is obtained from the Philippine Statistical Yearbook (2008 edition).

To calibrate the MAMS-Philippines, the country study obtained elasticities and/or parameters from: other country models; imputation based on the literature; smaller calibration exercise (particularly for the linear expenditure system); growth accounting (for TFP measurement); and regression analysis (for estimating some of the TFP elasticities). Calibration of the MDG module is taken up in the following section.

### **Determinants of the MDG indicators**

The MAMS projections are highly sensitive to the parameters of the MDG module. We have opted to concentrate research effort on the MDG indicators in which the Philippines is judged to have a low probability of achieving, under a business-as-usual scenario, namely the education and maternal health MDGs.

### **Public expenditure and the MDGs**

From a policy perspective the most important set of determinants of the MDGs are public expenditures. Manasan (2007) provides estimates of the cost of achieving the various MDGs.<sup>3</sup> Note that calculations imply a simple linear relationship between changes in an MDG indicator and changes in public expenditure. While almost certainly the true relationship should be nonlinear owing to diminishing returns, not enough data is available to parametrize this nonlinearity or even to gauge the inflection point.

**Table 7: Cost estimates, for attaining education and health MDGs, in millions of pesos**

MDG	Cost level	Item	2007	2015
Education	Low	Classrooms	14,179	17,690
		All other expenses	156,396	333,681
	High	Classrooms	17,724	22,113
		All other expenses	158,515	345,690
Health	Low		8,961	14,650
	High		10,448	17,521

Source: Manasan (2007)

Her baseline estimate pertains to a *status quo* in terms of service delivery, called a “high cost” assumption. Efficiencies can be realized by improvements in service delivery or quality, which leads to a set of estimates under a “low cost” assumption. The cost estimates are given in Table 7.

In the case of education, MTPDP physical targets are stated for the following items: number of teachers (aiming at 1:40 teacher-student ratio by 2015); classrooms (1:45 classroom-student ratio by 2015); textbooks (5:1 and 6:1 textbook-student ratios in primary and secondary cycles, respectively by 2015); and other costs. Greater efficiencies can be obtained by proper assignment of teachers by location (i.e. moving some from surplus to deficit areas); classrooms can also be built at lower costs by improved procurement and M&E systems.

<sup>3</sup> The ratios between 2015 and 2007 figures are one basis for calibration of MDG scenarios of MAMS.

Meanwhile for basic health, spending would aim at: increasing the proportion of infants immunized against target diseases; expanded vitamin A supplementation of children as well as pregnant and lactating women; iodine supplementation for women; and reduction of TB, malaria, and schistosomiasis cases. Meanwhile, efficiencies can be gained from micronutrient fortification through passage of the food fortification law; reduced wastage in the distribution of antigens for the immunization program is also possible by compliance with logistical guidelines issued by the Department of Health.

The foregoing analysis relies on a strong assumption about the effect of government spending on the MDGs. Ideally any hypothesized relationship should be confronted with the data. Given availability of data and importance of the indicator for the country, we opt to prioritize the education MDG for this type of empirical analysis. We devote the next sub-section (which draws heavily from Quimba, 2010) to the determinants of the education MDG.

### ***Determination of net completion rates***

To estimate the elasticities of MDG2 determination, we follow the method used in Kaldewai (2010), among others. Our approach uses data from the Multiple Indicator cluster survey were used to estimate the elasticities for each dependent variable. The Multiple Indicator Cluster Survey (MICS) dataset is applicable to the MDG2 estimation for the following reasons:

- Data for education is at the individual level, hence individual and household characteristics can then be incorporated as control variables for the estimation.
- It contains information on current and previous year's level of education; hence, each household member who is of school-going age can then be identified as someone who passed the previous grade level or someone who is a repeater.

At the individual level, each of the dependent variables in the MDG2 equation (see Section 4) are dichotomous, hence a binary response model is used. The independent variables were selected based on the MAMS framework.

*Expenditure on elementary education* is one of the policy variables identified by MAMS. Assuming that education spending of the municipalities per student is allocated efficiently to each student, then the relationship between school participation and per capita government expenditure on education is expected to be positive. The data are not readily available from the MICS but have to be derived from the Bureau of Local Government Finance which lists (in broad aggregates) the expenditure of the local governments according to General Services, Education, Health, Housing, Economic Services and others. To get approximates of spending for elementary and secondary, the total spending is apportioned using ratios of the number of students for elementary and secondary to the total number of students.

Another variable that is explicitly mentioned as a determinant in education participation in the MAMS is the *per capita household consumption*. Unfortunately, this information is not available in the MICS (nor is it available from other health-related surveys); hence a proxy variable is introduced in the form of a wealth index at the provincial level, computed from a household income and expenditure survey.

In order to assess the effect of *other public infrastructure* as specified by MAMS, two variables were used in the regression model: an infrastructure index and length of local roads. The infrastructure index is a combination of indicators of public roads, bridges, telephone and electrification. However, this index of combined indicators may have diluted the effect of public infrastructure on education performance. Another option would be to posit a positive and significant relationship between roads and education participation (e.g. Deolalikar, 1997). Thus, the data on roads for each province would be taken as a proxy for other public infrastructure.

Assuming that the expected wage is indeed an incentive for investment in education, the *wage premium* is expected to be positively related to education participation. The data for the wage premium are not available from the MICS. It has to be derived from the Labor Force Survey for 2007. The average wage premium is calculated at the regional level.

*Under-5 mortality rate* is included to proxy for child health. The data for under 5 mortality rate is not reported by province in the Philippines but instead as a regional average.

In addition to the MAMS variables, the other factors are necessary to improve the explanatory power of the model by incorporating a number of controls, as follows:

*Cities* are assumed to have larger incomes and therefore greater education spending. Hence, a city dummy is included as a control.

*Teacher-pupil ratio* has often been included as a proxy for education quality. Deolalikar(1997) found that teacher-pupil ratio is a positive and significant determinant of enrolment. Another characteristic is child participation in *work outside the home*, captured by a dummy variable (not working outside the home omitted). A priori, work outside home would have a negative effect as it introduces a competing use for the child's time; physically the child may also be too tired to study.

Larger *household size* is have a negative effect, particularly at the secondary level, as those that have finished secondary education would rather work for income than study. Similarly, at the secondary level, *age* of student may have a negative effect, though there are perhaps nonlinearities involved.

*Household wealth* may affect education participation. Based on standard methodology we construct wealth indices and provincial quintiles for use in the econometric model. *Education of household head* may also contribute positively to educational participation or achievement of students, as better educated parent(s) may be better equipped to support their children in starting and sustaining schooling.

*Gender* is also an important determinant. David et al. (2010) observes that male completion rates are 10 percent lower at the elementary school level, and 16 percent lower at the secondary level.

## **Results**

Results of the probit estimation are presented in detail in the Annex. Table 8 summarizes elasticities (based on marginal probabilities) for MDG 2 determinants for

MAMS.<sup>4</sup> Parameter estimates are all significant except for wage premium for determining the likelihood of passing within primary school. What is remarkable about the estimates is how low they are; the highest is only 0.21, for the infrastructure proxy on passing within primary school. The low elasticity is like due in a large part to measurement error; that is, we have used probably inaccurate proxy variables to measure effects on educational outcomes, ultimately traceable to insufficient or fragmentary data. At face value however the low elasticities are likely capturing either: a) weak *contemporaneous* effects from public expenditure and investments on education outcomes; b) weak causation in general owing to poor quality of past service and infrastructure provision.

**Table 8: Elasticity estimates for MDG 2 determinants**

	Elasticity estimate	
	Passing	Transition to secondary
Public spending	0.03	0.00
Household purchasing power	0.16	0.03
Infrastructure index	0.21	0.01
Wage premium	<b>-0.00</b>	0.00
Under-5 mortality rate	0.06	0.04

<sup>4</sup> These elasticities are partially the basis for calibrating MDG equations from MAMS. Additional guidance was obtained from the literature, such as Orbeta et al (1999).

## 5. MAMS SCENARIO ANALYSIS – SOCIAL MDGS

### Baseline scenario

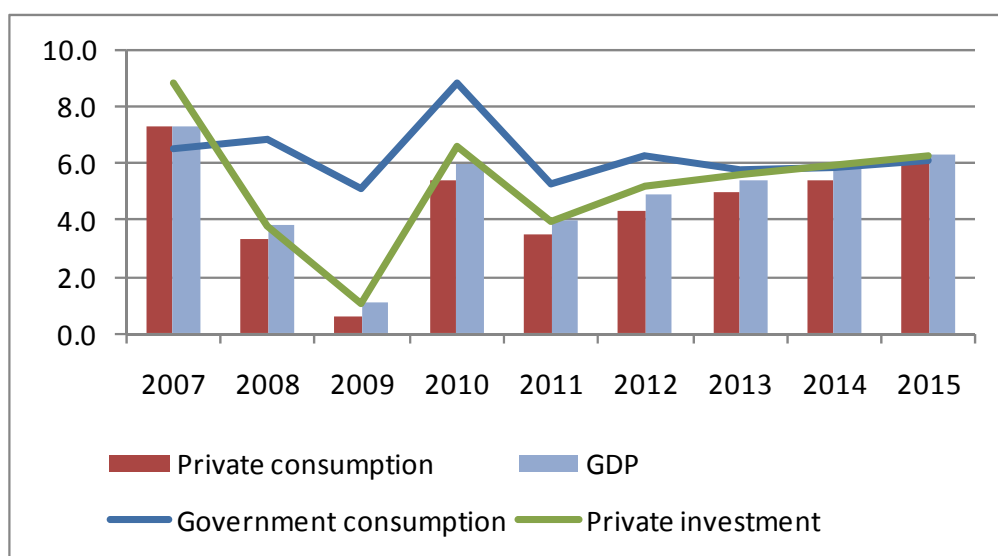
Projections for the *baseline* incorporate the assumption of business-as-usual, to check whether MDG attainment is plausible under the same set of trends and policies as in the recent period.

Closure rules for each period are as follows:

- Balance of payments is at equilibrium via adjustment of the exchange rate;
- Fiscal gaps are closed by domestic borrowing;
- Government consumption spending by sector remains a constant share of GDP;
- Government taxes remain a constant rate (e.g. import taxes remain a constant share of import value);
- Government transfers and borrowing from abroad remain a constant share of GDP;
- Government budget clears by domestic borrowing;
- Investment remains a given share of GDP, while savings equals investment at equilibrium by way of a uniform rate point change of household savings;
- In the factor markets, wages are rigid and equilibrium coexists with some level of unemployment.

Figure 11 show growth of GDP and major components over the projection period under the baseline scenario. GDP growth averages 5.0%; it takes a deep dip in 2009 owing to the global financial crisis, but follows the projection of a robust recovery from 2010 onwards. Government consumption tends to grows more rapidly than GDP. Private consumption generally follows GDP growth, as does private investment. (Government investment, which is not shown, grows at an even slower rate of about 4.2% p.a.)

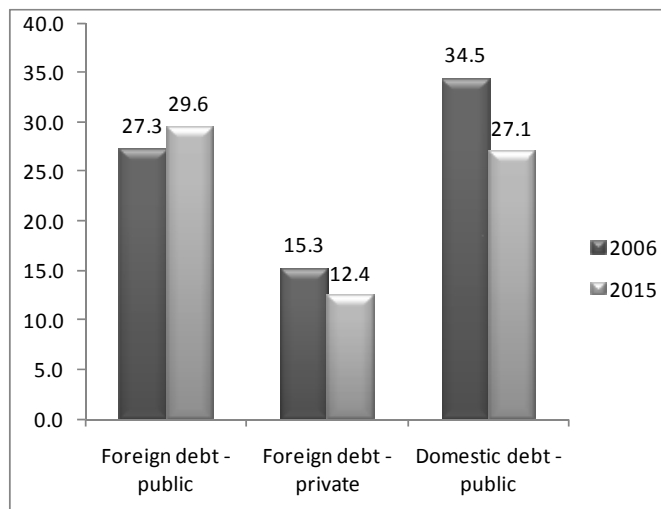
**Figure 11: Annual growth of macro variables (2007-2015), baseline scenario (%)**



Debt-to-GDP ratios are show in Figure 12. The domestic debt-to-GDP ratio declines by nearly 8 percentage points. The foreign debt-to-GDP ratio rises slightly over the MDG period. This is consistent with the data which show a shift from domestic to foreign

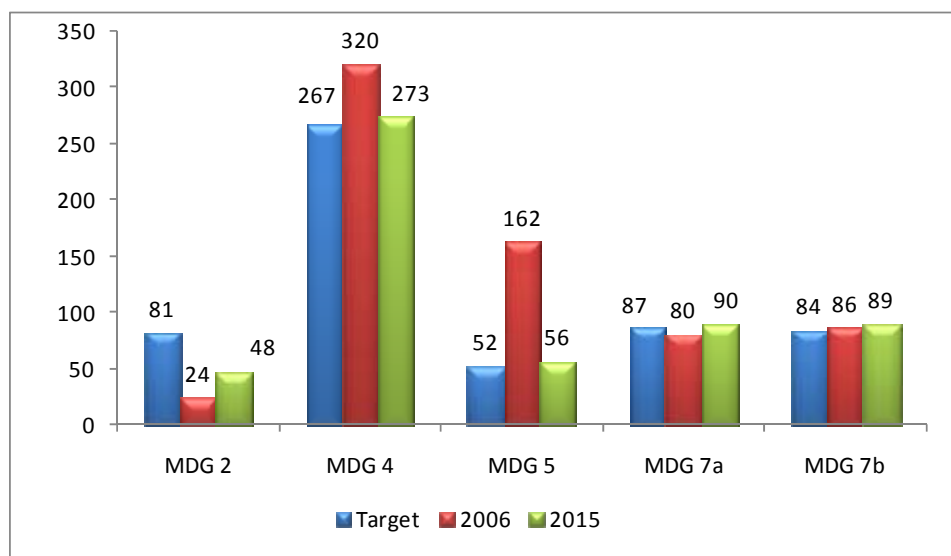
borrowing, as well as declining debt-to-GDP ratio (36 to 32 percent from 2006 to 2009). Overall debt-to-GDP ratio drops slightly from 61.8 to 56.7 - still exceeding the 50% benchmark, but at more sustainable debt levels compared to the present.

**Figure 12: Debt stock as share in GDP, base year and 2015, baseline scenario**



The baseline scenario for the MDGs is shown in Figure 13. By 2015, the target is met for MDG 7, but falls short for the other MDGs, with the biggest gap in MDG 2, followed by MDG 5; the gap for MDG 4 however appears manageable by 2015.

**Figure 13: Values for MDG indicators, baseline scenario**



Notes:

1. Figures for MDG 2 pertain to net primary school enrollment in %.
2. Figures for MDG 4 pertain to child under-5 deaths per 1,000 live births.
3. Figures for MDG 5 pertain to maternal deaths per 100,000 births.
4. Figures for MDG 7a pertain to share of households with access to sanitary toilet, in %.
5. Figures for MDG 7b pertain to share of households with access to potable water, in %.

## MDG scenarios

In the following we focus on two sets of MDG scenarios: the first set targets only the MDG gap for education where the gap to target is biggest; the second set targets achieving all relevant social MDGs (namely MDGs 2, 4, and 5). Within each set four financing options are presented, namely: *foreign transfers*; *domestic taxes*; *domestic borrowing*; and *foreign borrowing*.

Changes in public spending (in absolute terms) are shown in Table 9 (government investment is omitted as changes across scenarios are minimal). In the baseline scenario, consumption spending grows by 260 billion pesos p.a. To achieve MDG 2 under tax financing, consumption must expand by close to double this amount by 2015. Domestic borrowing requires the least increase of government consumption over the baseline; however this is accomplished by crowding out of private investment, suppressing household savings and therefore raising household consumption.

**Table 9: Projected government consumption in billions of pesos, in nominal terms**

Scenario:	2006	2010	2015	Change (2015 vs 2010)
Baseline	606	693	865	260
MDG 2 – tax	606	937	1,096	490
MDG 2 - foreign transfers	606	911	1,068	462
MDG 2 - foreign borrowing	606	911	1,068	462
MDG 2 - domestic borrowing	606	883	947	341
MDG all – tax	606	965	1,151	545
MDG all - foreign transfers	606	924	1,106	500
MDG all - foreign borrowing	606	924	1,106	500
MDG all - domestic borrowing	606	902	1,020	414

The analysis shows that closing all (social) MDG gaps is feasible; however, as summarized in , this would require dramatic increases in government consumption spending, particularly on education. (The table omits water and sanitation figures due to their miniscule size when converted to shares of GDP, under any scenario).

Financing through domestic borrowing leads to alarming levels of domestic government debt. Similarly, under foreign borrowing, achieving the MDGs imply dangerous levels of foreign debt of the government.

Comparison between baseline growth for government consumption and GDP (Table 11) shows only small differences in GDP growth rate between baseline and MDG scenarios, with the exception of domestic borrowing. GDP growth under this financing option grows much slower than at the baseline owing to suppressed capital formation due to crowding out, whether we consider targeting MDG 2, or all the MDGs. Differences from the baseline are much sharper for government consumption growth, which must grow faster by 2.4% instead of 1.9% when targeting MDG 2, and by 2.9% instead than 2.5% when targeting all the MDGs.

**Table 10: Required change in government spending to close social MDG gaps, as share of GDP (%)**

	(a) 2010 - 2015				(b) 2007 - 2009				(c) = (b) + (a) = 2010 - 2015			
	<i>ftr</i>	<i>tax</i>	<i>fb</i>	<i>db</i>	<i>ftr</i>	<i>tax</i>	<i>fb</i>	<i>db</i>	<i>ftr</i>	<i>tax</i>	<i>fb</i>	<i>db</i>
<b>Healthcare</b>	<b>0.51</b>	<b>0.79</b>	<b>0.51</b>	<b>1.09</b>	<b>0.31</b>	<b>0.64</b>	<b>0.31</b>	<b>0.33</b>	<b>0.82</b>	<b>1.42</b>	<b>0.82</b>	<b>1.42</b>
- current	0.50	0.78	0.50	1.04	0.30	0.61	0.30	0.33	0.80	1.39	0.80	1.37
- investment	0.02	0.01	0.02	0.04	0.00	0.03	0.00	0.01	0.02	0.04	0.02	0.05
<b>Education</b>	<b>2.43</b>	<b>2.67</b>	<b>2.43</b>	<b>2.66</b>	<b>3.05</b>	<b>3.32</b>	<b>3.05</b>	<b>3.09</b>	<b>5.48</b>	<b>5.99</b>	<b>5.48</b>	<b>5.75</b>
- current	2.33	2.55	2.33	2.55	2.46	2.68	2.46	2.49	4.79	5.23	4.79	5.04
- investment	0.10	0.12	0.10	0.11	0.59	0.64	0.59	0.60	0.69	0.75	0.69	0.72
<b>Total</b>	<b>2.94</b>	<b>3.46</b>	<b>2.94</b>	<b>3.75</b>	<b>3.35</b>	<b>3.96</b>	<b>3.35</b>	<b>3.43</b>	<b>6.30</b>	<b>7.41</b>	<b>6.30</b>	<b>7.17</b>
- current	2.83	3.33	2.83	3.59	2.76	3.29	2.76	2.82	5.59	6.62	5.59	6.41
- investment	0.12	0.13	0.12	0.16	0.59	0.66	0.59	0.61	0.71	0.79	0.71	0.76

Note: *ftr* – foreign transfer financing; *tax* – tax financing; *fb* – financing by foreign borrowing; *db* – financing by domestic borrowing.

**Table 11: Difference in average growth from baseline, for scenarios achieving MDG2 and all MDGs**

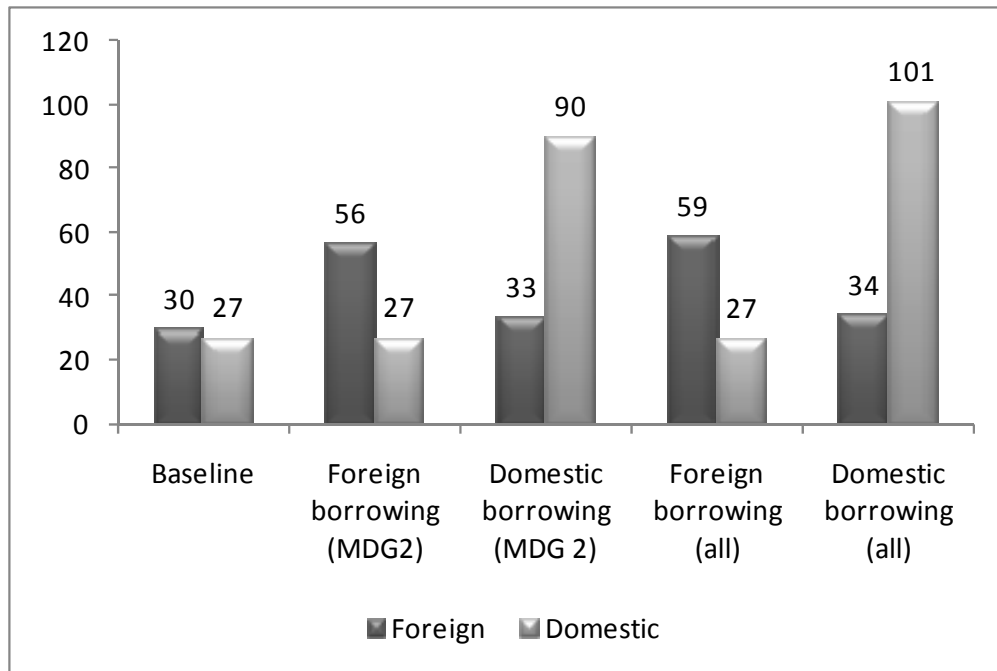
Growth in:	Difference in percentage points			
	Tax	Transfer	Foreign borrowing	Domestic borrowing
<b>Achieving MDG 2</b>				
Government consumption	2.36	2.16	2.16	1.94
GDP	0.10	0.02	0.02	-0.60
<b>Achieving all MDGs</b>				
Government consumption	2.51	2.87	2.51	2.74
GDP	0.10	0.02	0.02	-1.6

**Under debt financing options, the feasibility of the MDG scenarios can be evaluated by the the debt-to-GDP ratios by 2015 (**

Figure 14). We have not shown the tax and transfer options as the ending debt-to-GDP ratios are virtually identical to the baseline. Consider foreign borrowing. To close the MDG 2 gap the debt stock has to grow an additional 26% of GDP, and up to 29% of GDP more to close all the MDG gaps. The overall debt stock climbs up from 83 to 86%, higher than the 57% projected at the baseline and likely to raise alarms about an impending debt crisis.



**Figure 14: Debt-to-GDP ratios for MDG scenarios (%)**

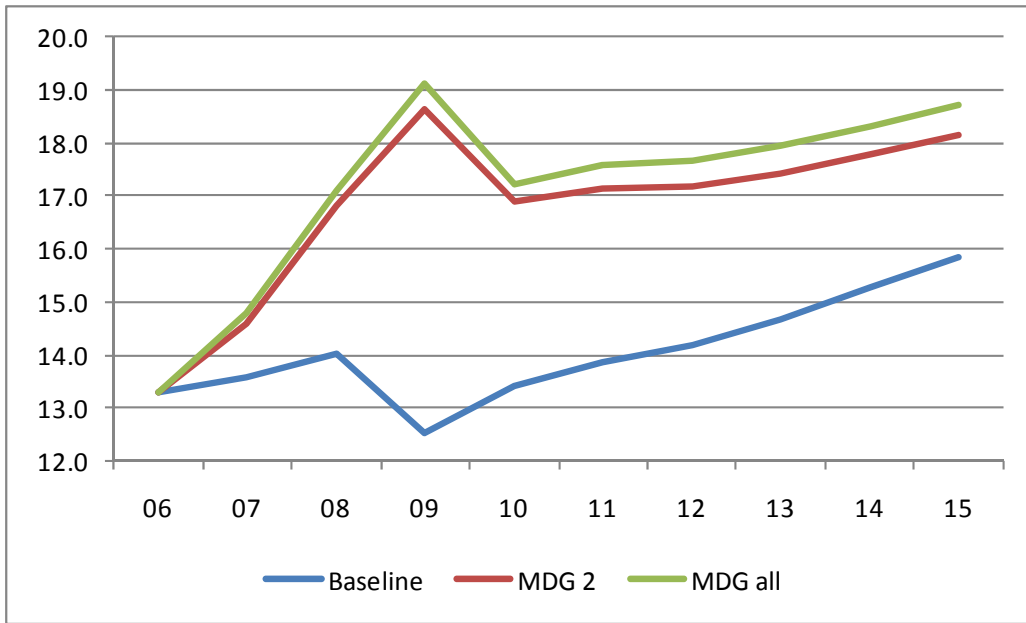


The increase in debt is even greater for domestic borrowing, given dynamic interactions between domestic borrowing, interest rates, and accumulation of the debt stock. From 27% of GDP at the baseline scenario, the domestic debt stock must rise to 90% of GDP to close the MDG 2 gap, and about the size of GDP to close all the gaps. (The foreign debt-to-GDP ratio must also rise but at smaller increments.) The resulting levels of total debt stock are unsustainable (between 113 and 135% of GDP).

Revenues as a share of GDP are shown in Figure 15. (We only show the baseline, and tax financing options as the ratios for the other financing options are nearly identical to the baseline). For the baseline, tax effort rises from about 13 to about 15% of GDP over the projection period. However the increase in tax effort is faster for the MDG 2 target, rising over 18% of GDP by 2015; moreover the projected increase in tax effort up to 2009 is fairly sharp (owing to the weak GDP growth from 2006-2009). As this is nowhere near the actual tax collections over the period 2006-2009, we may regard this as a missed opportunity for MDG 2 financing. Trends are nearly the same for the target of all the MDGs, except the required tax effort is slightly higher. On average the tax effort for the baseline is 14.1% of GDP, compared 16.8% for the MDG 2 target, and 17.2% for the all-MDGs target.

Under the closure rule adopted, the brunt of the adjustment is absorbed by the direct tax rate. The average revenue effort for direct tax is 6.4%; under the MDG 2 target the ratio rises to an average of 9.2%; and still higher at 9.6% for the all MDGs target.

Figure 15: Revenues as a share of GDP by MDG scenario (%)

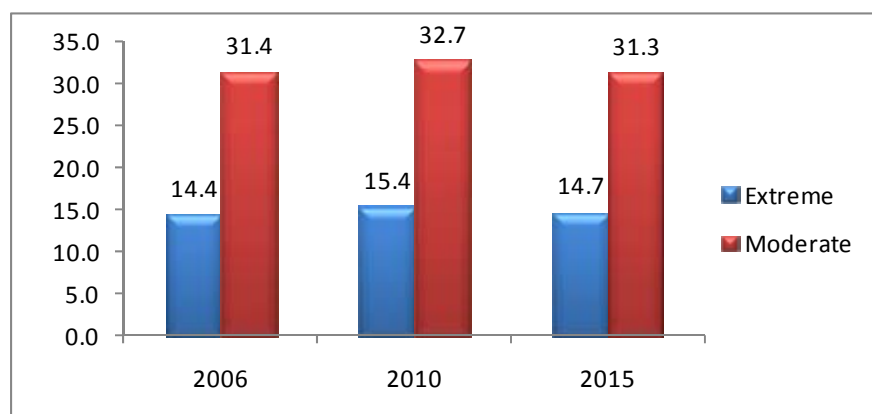


## 6. MICROSIMULATION ANALYSIS

### Baseline scenario

The last set of projections pertains to income poverty or MDG1. The MDG 1 target for extreme poverty (based on the subsistence poverty) is 12.2%; our projections based on microsimulation under baseline scenario (Figure 16) suggest that this target would not be reached, despite the close proximity of subsistence poverty in 2006 (at 14.4%) to the target. The reason is simply that subsistence poverty is projected to rise slightly to 14.7% by 2015. This represents a continuation of the negative elasticity of poverty observed in 2003-2006. While there is no corresponding target for moderate poverty, moderate poverty is still an important policy concern in the Philippines in relation to MDG 1. As with subsistence poverty, moderate poverty is projected to rise over the same period.

**Figure 16: Extreme and moderate poverty for the baseline, 2006, 2010, and 2015 (%)**



The projected trends in official poverty are also observed in other poverty measures (Table 12). Poverty incidence based on \$1.25/day line (PPP-adjusted) rises from 18 to 19%, before declining back to nearly the base year headcount ratio. Poverty incidence based on the \$2.00/day line (PPP-adjusted) also rises up to the middle of the projection period, then holds steady (and even declines very slightly). Likewise, income inequality, whether measured by the Gini ratio or the Theil index, worsens over time.

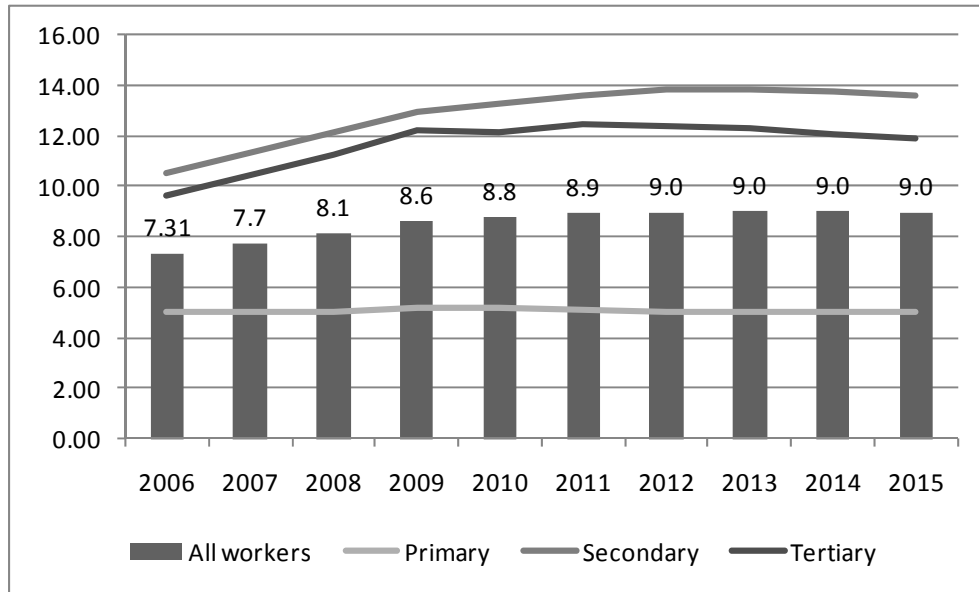
**Table 12: Projections for other poverty and inequality measures for the baseline**

	\$1.25/day line	\$2.00/day line	Gini ratio	Theil index
2006	17.9	48.7	0.496	0.479
2010	19.0	49.9	0.498	0.483
2015	18.1	48.6	0.500	0.485

The explanation for rising inequality and the increase in poverty (despite income growth) would have to be found in the labor market. First we examine projections for the unemployment rate by type of worker, categorized by level of school attainment (Figure

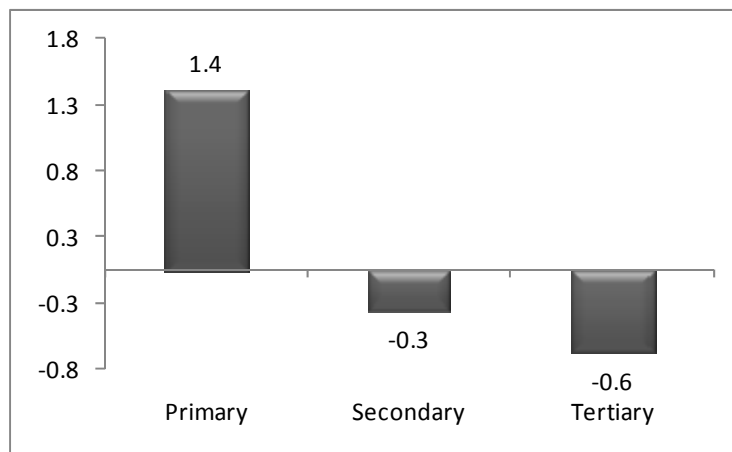
17). Unemployment holds steady for primary school attainers at 5.0% (same as in the base year), but rises dramatically for both secondary school attainers and tertiary school completers, lifting up unemployment for all workers from 7.7% in 2006, to 9.0% in 2015.

**Figure 17: Unemployment by category of worker, baseline scenario**



This is consistent with the microsimulation projections for real wages under the baseline scenario (Figure 18). Note that although wages grow for the primary school worker, there is a decline in wages for secondary and tertiary school workers, with a bigger decline in the latter. This is consistent with unemployment rising for these worker categories; this is a sign of excess supply, which exerts a downward pressure on wages.

**Figure 18: Average growth rate of wages (2006 – 2015), baseline scenario**



In turn, the influx of better educated workers is driven by the combination of rapid population growth and ultimately in a rising population of secondary and tertiary graduates. The microsimulation method may be subject to some important limitations,

such as demographic adjustment. In particular, overseas migration may be a significant outlet for educated workers. The projection nevertheless trains a spotlight on the economy's failure to create jobs requiring more human capital. This confirms a tendency reported in the Asian Development Outlook (ADB, 2007b) about "overeducation" in the Philippine labor market, i.e. declining returns to secondary and tertiary education, combined with the tendency for educational qualifications of workers in the same job and skill set to rise over time.

### MDG scenarios

We now examine the implications of closing the MDG gaps on income poverty (Table 13). Worsening of poverty (consistent with the baseline scenario) is observed for financing options based on domestic borrowing. The increase in moderate poverty is sharper than for extreme poverty. For the other options, poverty declines. The biggest decline is for moderate poverty under Tax financing option, which falls by 2.2 percentage points; there is also a noticeable percentage point drop in extreme poverty.

**Table 13: Changes in extreme and moderate poverty, by MDG scenario (%)**

MDG target	Financing option	Poverty definition	2006	2010	2015
Achieving MDG2	Tax	Extreme	14.4	14.1	13.7
		Moderate	31.4	30.5	29.5
	Domestic borrowing	Extreme	14.4	15.1	16.5
		Moderate	31.4	31.7	33.7
	Foreign transfer	Extreme	14.4	14.2	13.7
		Moderate	31.4	30.5	29.6
	Foreign borrowing	Extreme	14.4	14.2	13.7
		Moderate	31.4	30.5	29.6
Achieving all MDGs	Tax	Extreme	14.4	14.1	13.5
		Moderate	31.4	30.3	29.2
	Domestic borrowing	Extreme	14.4	15.1	16.7
		Moderate	31.4	31.6	33.8
	Foreign transfer	Extreme	14.4	14.1	13.6
		Moderate	31.4	30.5	29.4
	Foreign borrowing	Extreme	14.4	14.1	13.6
		Moderate	31.4	30.5	29.4

Inequality still deteriorates under the MDG scenarios, regardless of the MDG target, financing option, or inequality indicator (Table 14). Inequality is even worse than under the baseline scenario. Nevertheless, the worsening distribution was more than offset by the overall growth in labor incomes, inasmuch as poverty is projected to fall under the MDG scenarios.

To understand why poverty moves differently under the MDG scenarios (compared to the baseline), we look at unemployment projections (Table 15), presented as differences from the baseline scenario. For most financing options, closing MDG gaps improves employment prospects overall, with the biggest reduction in unemployment for tertiary schooling workers.

**Table 14: Projections for inequality measures for the MDG scenarios (%)**

Financing option	Inequality definition	2006	2010	2015
Targeting MDG 2				
Tax	Gini	0.496	0.502	0.505
	Theil	0.479	0.487	0.491
Domestic borrowing	Gini	0.496	0.502	0.504
	Theil	0.479	0.489	0.494
Foreign transfer	Gini	0.496	0.502	0.504
	Theil	0.479	0.486	0.490
Foreign borrowing	Gini	0.496	0.502	0.504
	Theil	0.479	0.486	0.490
Targeting all MDGs				
Tax	Gini	0.496	0.502	0.504
	Theil	0.479	0.486	0.490
Domestic borrowing	Gini	0.496	0.502	0.505
	Theil	0.479	0.487	0.492
Foreign transfer	Gini	0.496	0.502	0.504
	Theil	0.479	0.486	0.491
Foreign borrowing	Gini	0.496	0.502	0.504
	Theil	0.479	0.486	0.491

**Table 15: Unemployment rate difference from baseline, percentage points**

	Tax	Foreign transfer	Foreign borrowing	Domestic borrowing
Targeting MDG 2				
All workers	-0.2	-0.2	-0.2	0.9
Primary	0.0	0.0	0.0	0.7
Secondary	0.5	0.4	0.4	2.0
Tertiary	-3.3	-3.0	-3.0	-1.8
Targeting all MDGs				
All workers	-0.3	-0.3	-0.3	1.0
Primary	0.0	0.0	0.0	0.9
Secondary	0.3	0.3	0.3	2.1
Tertiary	-3.6	-3.2	-3.2	-2.0

Whether the target is MDG 2 only or all the social MDGs, unemployment prospects are somewhat dimmer under domestic borrowing, with secondary schooling workers taking the biggest hit.

The unemployment outcomes are consistent with projections for wage rates (Table 16). Wage growth is consistently greater than under the baseline scenario, under MDG targeting; the fastest wage growth is achieved under tax financing. Under domestic borrowing however wage growth is *slower* than in the baseline, in keeping with higher average unemployment under this financing option.

**Table 16: Average growth of wages (2006-2015), baseline and MDG scenarios**

	Baseline	Tax financing	Targeting MDG 2		
			Foreign transfer	Domestic borrowing	Foreign borrowing
			Targeting MDG 2		
All workers	1.4	2.8	2.7	-0.2	2.7
Primary	-0.3	-0.6	-0.6	-2.6	-0.6
Secondary	-0.6	0.9	0.6	-0.5	0.6
Tertiary	1.4	2.8	2.7	-0.2	2.7
			Targeting all MDGs		
All workers	1.4	2.8	2.7	-0.5	2.7
Primary	-0.3	-0.5	-0.5	-2.6	-0.5
Secondary	-0.6	1.0	0.7	-0.4	0.7
Tertiary	1.4	2.8	2.7	-0.5	2.7

## 7. CONCLUSION

The Philippines has committed itself to a development strategy geared towards attaining the MDGs. However, based on official and largely qualitative assessments, prospects for MDG achievement of the Philippines are mixed. Environment MDGs, as well as MDGs for child mortality and extreme poverty, are deemed likely to be achieved. However gaps with respect to MDGs for moderate poverty, education, and maternal mortality loom large and are unlikely to be closed by 2015.

The development and policy literature has dealt extensively with the reforms in policy, investment, institutions, and governance, which are essential for more effective translation of MDG expenditure into achievement. Even with these reforms, however, a basic requirement for closing the MDG gaps is still a straightforward (and possibly massive) increase in public spending for the MDGs. Hence, a more quantitative assessment of the financing requirements and fiscal implications of expanded MDG programs, while accounting for second-order and dynamic effects, is a critical element in medium-term development planning.

We conduct such a quantitative assessment of MDG achievement using a policy modeling tool called MAMS, which is applied to Philippine data and elasticities. Under the baseline or business-as-usual scenario, macroeconomic trends persist over the duration of the projection period. The fiscal situation is worrisome, but not dire. Under this scenario, the environment MDGs are attained, while the health MDGs are within grasp; however, poverty and education MDGs remain elusive.

Our MDG scenarios suggest that closing the MDG gaps for social indicators would require dramatic increases in government spending, particularly for education services. Among the financing options, Debt financing either by domestic or foreign borrowing would likely lead to unsustainable levels of public debt. foreign transfer financing is more consistent with sustainability, but appears infeasible given trends in ODA. This leads to tax financing of MDG achievement, which is also consistent with sustainable debt trends. However it entails an increase in direct tax effort by about 3-4% of GDP – well within the range of past levels of tax effort, but a considerable challenge given tax collection patterns over the past decade. The current administration's emphasis on tax collection effort is a laudable step in this direction, though it should remain open to a selected set of new tax measures.

As for income poverty, under business as usual the projections indicate failure to achieve the first MDG goal. Apparently per capita income growth fails to translate into poverty reduction, as the economy fails to create higher paying (for better educated workers) fast enough. Fortunately poverty reduction is faster when government spending is directed towards closing MDG gaps.

The study recommends attempting to close the MDG gaps using tax financing. This financing option is feasible in the sense that the required revenue effort has been achieved before. Admittedly, it entails a dramatic improvement in revenue effort, compared to most recent trends over the past decade. This underscores the urgent, developmental rationale for raising collection efficiency, introducing new tax policies, in combination with public sector reforms for cost-effective service delivery.



## ANNEX: DETAILS OF THE MDG 2 ESTIMATION

A probit model is used to calculate the elasticity of the dependent variables. In the following tables, elasticities are estimated based on marginal probabilities at the mean.

For primary participation rate, the variable of interest would be limited to those household members of age 6 to 11 who were in school. The dependent variable is the intake indicator) which takes on 1 if entered into first grade at age 6 or 7 and 0 otherwise. Marginal effects were calculated at the mean after the estimation. The estimated marginal effects are presented in Table A1.

**Table A1: Results of the Probit Estimation for Intake Rate at the first grade level**

Variable	Coefficient	Elasticity	Std. Error
Municipal Expenditure on Elementary Education	0.0000363	0.0211	0.0012
Wealth index by province	0.0218204	0.0585	0.0027
Educational Attainment of HH	0.0044957	0.0973	0.0026
Worked outside of the home	-0.0632182	-0.1588	0.0054
Size of the household	-0.0284432	-0.1682	0.0034
Sex (1=males)	-0.1006557	-0.0477	0.0012
Length of local roads	0.013862	0.0208	0.0013
Wage Premium of primary education	0.0170111	0.0323	0.0027
Teacher-pupil ratio	7.884713	0.2077	0.0086**
Under 5 mortality rate	-0.0002477	-0.0081	0.0034
Dummy for city (1=city)	-0.0353353	-0.0115	0.0015
Constant	-0.2420493		0.0135

\*\* Significant at 5% level; all others are all significant at 1% level

The results for the intake rate show that most of the identified independent variables exhibit the expected signs. The positive elasticities are noticeable in size for the teacher-pupil ratio, but fairly weak for the other variables; in particular public expenditure, though statistically significant, has a negligible marginal impact. The observed low response of education variables to public spending is likely due to measurement error from the proxy variables used; unfortunately this type of error is difficult to avoid given data constraints. The negative effects are also disconcerting, i.e. children who have engaged in work outside the home, as well as children in larger households.

For the passing rate in primary school, the results of probit estimation are presented in Table A2. Of the positively affecting variables, wealth and education of household head exert the strongest effects, followed by teacher-pupil ratio. Public expenditure and infrastructure still exhibit negligible effects.

The variable for working outside home has a positive effect, contrary to expectation. A possible explanation is that students with paid work have more income to pay for schooling. Also unexpected is the positive sign of Under-5 mortality rate; again, this indicator may be a poor proxy of student health. Lastly, the estimated coefficients for age of student confirm a U-shaped relationship between likelihood of passing and student age.

**Table A2: Results of Estimation for Passing at the Primary level**

Variable	Coefficient	Elasticity	Std. Error
Municipal Expenditure	0.000061	0.0253	0.0004
Wealth index by province	0.080607	0.1588	0.0014
Educational Attainment of HH	0.013465	0.2100	0.0014
Worked outside of the home	0.055374	0.0987	0.0023
Size of the household	-0.0458	-0.2008	0.0017
Sex (1=males)	-0.20785	-0.0717	0.0006
Length of local roads	0.026278	0.0285	0.0007
Wage Premium of Primary education	<b>-0.0012</b>	<b>-0.0017</b>	<b>0.0014</b>
Elementary school teacher-pupil ratio	7.152337	0.1379	0.0043
Under 5 mortality rate	0.002556	0.0613	0.0017
Age of student	4.785395	29.0114	0.0484
The square of the age of student	-0.23609	-13.4701	0.0233
Constant	-23.428		0.0296

All variables are significant at the 1% level except in bold face which is not significant

### ***Transition from primary to secondary school***

Results of a probit estimation for continuing from sixth grade elementary to first-year secondary school are shown in Table A3. The signs of the coefficients conform to expectation, except for under-5 mortality rate. However, only teacher-student ratio and the age of student are of any quantitative significance in the estimated model

**Table A3: Results of Estimation for Student Graduating from Primary to Secondary School**

Variable	Coefficient	Elasticity	Std. Error
Municipal Expenditure	0.00004	0.0038	0.0004
Wealth index by province	0.093138	0.0341	0.0009
Educational Attainment of HH	0.014705	0.0412	0.0009
Size of the household	-0.01409	-0.0105	0.0010
Sex (1=males)	-0.193	-0.0110	0.0004
Length of local roads	0.074662	0.0139	0.0004
Wage Premium of secondary education	0.006134	0.0012	0.0018
Teacher-pupil ratio	42.60202	0.1336	0.0031
Under 5 mortality rate	0.009443	0.0379	0.0012
Age of student	0.130614	0.2079	0.0221
Age of student squared	-0.0108	-0.2402	0.0098
Constant	-0.2212		0.1133

All observations are significant at the 1% level

### ***Passing rate in secondary school***

Results for the probit regression for passing one's current year level in secondary school are shown in Table A4. Expenditure of municipalities on secondary education is positively associated with the passing rate of students in secondary schools. The wealth

index by province is associated with a positive and significant relationship with the probability that a secondary student passes their current year level and would continue to the next year level at the secondary level.

**Table A4: Results of Estimation for Probability of passing the current secondary year level**

Variable	Coefficient	Elasticity	Std. Error
Expenditure on Secondary Education	0.00002	0.0147	0.0008
Wealth index by province	0.10466	0.3970	0.0025
Educational Attainment of HH	0.01214	0.3496	0.0023
Size of the household	-0.04107	-0.3291	0.0030
Sex (1=males)	-0.24772	-0.1526	0.0011
Length of local roads	0.02989	0.0584	0.0012
Wage Premium of secondary education	-0.03032	-0.0621	0.0054
Teacher-pupil ratio	11.32322	0.3758	0.0072
Under 5 mortality rate	0.00386	0.1685	0.0030
Age of student	8.54058	152.6700	0.2944
Age of student squared	-0.28306	-74.3637	0.1443
Constant	-64.78953		0.0982

All variables are significant at the 1% level

Probability of passing rates are higher for students with better educated household heads. Size of the household has a negative effect. Male secondary students are less likely to pass; however a bigger local road share raises the probability. Wage differential (secondary education versus primary ) has a negative and significant effect, contrary to human capital theory. The teacher-pupil ratio for secondary school as an indicator of school quality is positively associated with the probability of secondary students to pass. The estimated coefficient for Under-5 mortality rate which is a proxy for student health again reflects an unexpected sign, i.e. higher under-5 mortality rate is associated with lower probability of passing in secondary school.

The inverted-U relationship between age and the probability of passing from one year level to another for those in secondary education is reflected in the estimated coefficients of age and age-squared. At the initial level, age would be positively related to passing from one year level to another for those in secondary education but after a certain point, the probability would start to decrease which could imply that drop-outs would start increasing because of the incentive to just go to work.

#### ***Transition from secondary to tertiary school***

Results of a probit regression for continuing to tertiary education after graduating from secondary education are shown in Table A5. Again, under-5 mortality exhibits the counter-intuitive sign. Unlike in previous regressions, older students are more likely to make the transition from secondary to tertiary school, though at a diminishing rate. Also unlike previous regressions, males have a greater likelihood of continuing to college, although the quantitative effect is miniscule. The other quantitatively significant effects (both positive) come from education of household head, and household wealth.

**Table A5: Results of the Probit Estimation for continuing to the tertiary year level**

Variable	Coefficient	Elasticity	Std. Error
Expenditure on tertiary education	.0000269	0.02326	0.00057
Wealth index by province	0.147274	0.10706	0.00183
Educational Attainment of HH	0.029083	0.16994	0.00194
Size of the household	-0.03179	-0.03879	0.00156
Sex (1=males)	0.110829	0.00961	0.00054
Length of local roads	0.006461	0.00226	0.00076
Wage Premium of tertiary education	0.112118	0.06723	0.00274
Age of student	-16.4189	-57.75382	0.27830
Age of student squared	0.454636	28.37490	0.13710
Under 5 mortality rate	0.00268	0.01826	0.00295
Constant	146.7271		1.1433

All variables are significant at the 1% level

### ***Passing rate in college***

Results of a probit model for successfully continuing to the next year in one's college education are shown in Table A6. Expenditures on tertiary education were estimated from data from the General Appropriations Act allocated to state Universities and Colleges disaggregated by region; note that this excludes private colleges and universities. Patterns are similar to the previous regression on transitioning from high school to college; except however, the age effect shows the inverted-U relationship; furthermore the positive effects of wealth and schooling of household head are more pronounced.

**Table A6: Results Estimation for Probability of passing the current tertiary year level**

Variable	Coefficient	Elasticity	Std. Error
Expenditure on tertiary education	0.00000034	0.0282	0.0013
Wealth index by province	0.1870075	1.1406	0.0047
Educational Attainment of HH	0.0235328	1.1024	0.0036
Size of the household	-0.0357757	-0.4239	0.0045
Sex (1=males)	-0.0738871	-0.0694	0.0017
Length of local roads	0.017262	0.0526	0.0020
Wage Premium of tertiary education	0.0344173	0.2047	0.0071
Under 5 mortality rate	0.004044	0.2701	0.0081
Age of student	3.645232	137.3078	0.3431
Age of student squared	-0.0917079	-69.6692	0.1735
Constant	-38.27585		0.0799

All variables are significant at the 1% level

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