Analysis of the Millennium Development Goals for Egypt

 “Using an Extended Economy Wide Simulation Model”

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*Internal Conference for Policy Modeling*

 *(EcoMod2010)*

*July 7-10, 2010, Istanbul, Turkey*

**Abstract:**

The purposes of this paper are; (i) to use an extended issue oriented economy wide modeling framework to project the medium term performance of the millennium development indicators for Egypt, and (ii) to assess the impact of alternative policy measures and strategies to achieve the millennium development Goals (MDG) for Egypt in 2015. The paper depends on the results of a regional research project directed to evaluate development strategies to achieve the MDGs in the Arab Countries, which has been coordinated and sponsored by UNDP Regional Bureau of Arab States, the United Nations Department of Economic and Social Affairs (UN-DESA) and the World Bank. The analytical part of the paper relies on a model for economy-wide, country-level analysis of medium and long-term development policies, including strategies for –indirectly- reducing poverty and –directly- achieving the other MDGs. The model is developed by Hans Lofgren and has the abbreviated title of “Maquette for Millennium Development Goal Simulations or simply MAMS”.

To achieve the purposes of the paper, MAMS model was tailored to the Egyptian case and used to test alternative development strategies to achieve the millennium development goals. The accounting structure of the Egyptian model is based on an issue-specific social accounting matrix (SAM) which is constructed to capture the interactions within the Egyptian economy with special reference to the socioeconomic data relevant to the millennium development goals. In a first step, the model was used to generate the reference path run or the business-as-usual (BAU) scenario. The reference path is mainly directed to project the medium-term economy-wide indicators of Egypt up to 2015, assuming that the government is continuing to rely on policy measures and strategic trends applied in the 1990s and the beginning of the twenty one century. In this respect, two economic growth scenarios were tested; (i) an optimistic scenario based on the official government projections which assume that Egypt will speed up the elimination of the effects of the recent global financial crises and achieve a 5.7% average growth rate of real GDP during 2008-2015 and (ii) a moderate economic growth scenario which assumes that the Egyptian economy will take more time to overcome the effects of the financial crises with a 4.9% average annual growth rate of real GDP during the same projection period.

In light of the performance of the reference path and given the structural features of the Egyptian Economy as well as its adopted development policies, two policy measures to finance the MDGs are experimented. The first policy assumes that the Egyptian government would further rely on domestic borrowing to ensure the financing of the cost related to the MDG achievement. The second policy assumes that the Egyptian government would have access to foreign grants (or transfers) directed to reach the aspired MDG indicators. The above two selected policy measures are compatible with the decision of the Egyptian government to minimize the reliance on foreign borrowings. For comparative purposes, however, the use of tax policy and foreign borrowing to finance the achievement of the MDGs is also considered. Finally, two additional specific MDG policies measures are considered. The first is directed to achieve universal primary education via higher primary completion rates (MDG2) and the thrust of the second one is to achieve appropriate access to improved sanitation (MDG7b). In fact, the selection of these two last specific scenarios stemmed from the fact that the performance of both MDG2 and MDG7b was less satisfactory than other MDG indicators in the reference path.

The main finding of the reference path scenario is that in both the optimistic and moderate economic growth scenarios would most of MDGs be generally achieved, or even overachieved in some instances. This is excluding the poverty goal (MDG1) and, to some extent, the goals of access to improved sanitation (MDG7a) and the attainment of primary education (MDG2). Under the reference path assumptions, reducing child mortality (MDG4), reducing maternal mortality (MDG5) and access to safe water (MDG7a) are all achieved and MDGs 2 and 7b are not, although they are not far of the targeted value in 2015. This outcome is primarily attributed to the continuous efforts of the successive Egyptian governments to adopt appropriate policies for achieving these goals. It can be argued also that the improved growth performance of the Egyptian economy has positively contributed to achieving this positive performance.

To sum up**,** it can be concluded that the analysis of the Millennium Development Goals (MDG) in Egypt based on MAMS has generally confirmed that it is possible to achieve most of the MDGs on the aggregate socioeconomic level in 2015. It should be noted nevertheless that the same indicators on the regional or governorate level reflected a clear duality between urban and rural areas with respect to the achievement of the MDGs. Unfortunately, MAMS is not disaggregated enough to zoom on certain regions and groups which are likely need policy interventions.

**I. Introduction**

On September 2000, the United Nations Millennium Summit approved a wide-ranging agenda for reducing poverty and improving quality of lives. That agenda was embedded in the framework of the Millennium Development Goals (MDGs). Most of these development goals need to be achieved by 2015, using 1990 as the starting benchmark. For each of these goals more specific targets and indicators have been defined. In trying to achieve those goals, developing countries have very different starting points, both initial conditions and historical experience. Also, the advance towards these goals since the 1990 benchmark and the 2000 Summit has been very uneven.

This paper aims primarily at assessing development strategies to achieve the Millennium Development Goals (MDGs) in Egypt. The paper adopts a macro analytical approach to assess the impact of alternative MDG development strategies. In the core of this macro analysis lays the Maquette for Millennium Development Goal Simulations (MAMS) which is an extended issue-oriented dynamic economy-wide model capable of analyzing strategies to achieve the MDGs (Lofgren and Diaz-Bonilla, 2007). It represents an analytical tool for economy-wide, country-level analysis of medium and long-term development policies, including strategies for –indirectly- reducing poverty and –directly- achieving the MDGs. The database of MAMS is dependent on a consistent and comprehensive economy-wide accounting framework based on the social accounting matrix principles. A social accounting matrix (or simply a SAM) is designed to identify the interactions among economic subsystems, and capture the complete cycle of income flows within the economy, at a specific point of time (generally one year).

After this introductory part, section II provides a brief exposition of the Egyptian economy and focusing on its recent reforms and macroeconomic policies as well as its future prospects. Section III, introduces the current status of MDG goals and whether or not Egypt is on the road to achieve these goals by 2015. The purpose is to come out with realistic estimates of the factors affecting the achievement of the MDGs. This section addresses also the government of Egypt efforts to achieve these development objectives up to 2015.

In sections IV and V, the MAMS model was tailored to the Egyptian case and used to test alternative development strategies to achieve the millennium development goals. In order to achieve this analytical purpose, the following tasks have been accomplished; a) construct a social accounting matrix (SAM) and other relevant socioeconomic indicators for Egypt to form a consistent and comprehensive accounting framework for MAMS, b) estimate the parameters and technical coefficients needed to run MAMS and calibrate its base run results, c) validate the results of MAMS based on the recent economic performance of the Egyptian Economy reflected in its national income accounting system and finally d) carryout simulation runs to generate the reference path (or the base scenario) and assess the impact of alternative strategies for achieving the MDG goals in the Egyptian context. Finally, the last section of this report provides a summary and conclusion of the obtained results and sums up the experience gained from the whole analytical exercise.

**II. Macroeconomic Stance**

 Egypt’s macroeconomic stance – during the first decade of the current century - looked very promising with the exception of inflation. It seemed that the set of reforms introduced by the new cabinet at the end of 2004 had paved the way for a major transformation and structural adjustment in the Egyptian economy, driven by upbeat investment and a surplus generated by the external sector (in form of current and capital account surplus), all of which has pushed economic growth to record high levels. Nevertheless, this buoyant stride was halted with the onset of the recent global financial crisis by the end of 2008. This crisis has changed the economic stance in all countries, and Egypt has not been an exception. Egypt was not directly affected by the subprime crisis, though, but increasing uncertainty and negative expectations of consumers and producers as well as the adverse shock in Egypt’s external sector has forced the government of Egypt (GOE) to adopt a number of stabilization policies aiming at easing the effect of the crisis on the Egyptian economy.

**III. MDG Trends**

Egypt was one of the 188 countries which embraced the MDGs and agreed to strive to meet these goals by 2015. In June 2002, the United Nations unveiled the first report on Egypt’s progress towards meeting the MDGs, which was followed by the second and third reports in 2004 and 2005, respectively.

In terms of GOE efforts in the area of MDGs, reports on the progress of Egypt toward the achievement of MDGs show that the GOE continued to give attention to critical areas of development, such as health, education, access to water and sanitation as well as improving the livelihoods of the most deprived segments of the population. However, the pace of progress varies among the goals: it is fast and sustained in some areas (child and maternal mortality, water and sanitation), acceptable in others (education and poverty reduction), and somewhat slow in some others (women empowerment and environmental protection). In addition, Egypt will have to increase its efforts and investments in order to keep the current rate of progress with respect to some specific indicators (in the area of poverty, mortality rates, and combating major diseases).

Egypt's population growth is one of the main challenges to achieve the MDGs. Egypt ranks as the 16th most populous country in the world and the annual population growth rate is around 2 percent. If this population growth rate persists, Egypt's population is expected to reach 83 million by 2015, thus putting a considerable strain on the country's ability to sustain progress towards achieving the MDGs.

Because of the relatively advanced stance of Egypt in most of the MDGs, Egypt is unlikely to face major problems toward the achievement of its MDGs targets nationally. However, on a regional level and across genders given the stark disparities between different governorates and gender, a number of MDGs are very difficult to achieve on a regional level and across gender. For example, by 2015 poverty is expected to disappear from the rural governorates of Lower Egypt (Northern part of Egypt) but increasing to 38 percent in Upper Egypt (Southern part of Egypt). Also, poverty is concentrated among female-headed households which count for 20 percent of total households. Lower Egypt frontiers governorates will not be able to achieve MDG 2 for girls and Upper Egypt will not be able to achieve it neither for boys nor for girls at the current rate of progress. In terms of sanitation, the governorates of Alexandria, Assiut, and New Valley experienced a setback that would make it impossible for these governorates to achieve the MDG target for sanitation in this trend continues.

**IV. Methodology and Policy Formulation**

**An Overview**

In order to evaluate alternative policy measures and strategies for achieving the MDGs in 2015, several activities have been accomplished. **First**, an issue-specific social accounting matrix (SAM) - based on the most recent available socioeconomic data – was constructed to form a consistent and comprehensive analytical framework for policy analysis via the extended economy-wide model (MAMS). The SAM was designed to capture the particular structural features and interactions within the Egyptian economy with special reference to the socioeconomic data relevant to the millennium development goals. **Second**, a comprehensive set of non-SAM socioeconomic indicators such as labor force and population size in thousands were collected and organized, among others. **Third**, the constructed accounting framework, collected information and similar studies on Egypt were used to determine the structural parameters and technical coefficients needed to calibrate and run the MAMS model and generate output results. **Fourth**, recent economic performance of the Egyptian economy was used to validate the results of the MAMS model. **Finally**, a number of scenarios were simulated to generate a reference path (or usiness as usual -BAU) for the Egyptian economy and, based upon changes on this path, assess the impact of alternative strategies for achieving the MDGs.

**Construction of SAM for MAMS**

A SAM is a consistent and comprehensive accounting framework that captures the interactions among economic subsystems, and estimates the complete cycle of income flows within the economy, at a specific point of time (generally one year). The basic accounts of any SAM are factors of production, current accounts of domestic institutions, a consolidated capital account, activities, commodities and the outside world. In a SAM, the income (expenditure) of an economic agent can be traced via the figures appearing in the cells of its row (column). For consistency purposes, total spending of an economic actor should equal to its total collected revenues. Most economy-wide models- and particularly CGE models- rely explicitly (or implicitly) on a consistent accounting structure dependent on the SAM principles and the selected economic rationale.

The SAM might be developed to properly analyze a specific area of interest or study a particular development goal. The SAM of this paper can be viewed as an analytical tool (or an accounting structure) which is mainly developed to calibrate a model that can be efficiently used to assess the impact of MDG-related strategies and policies.

Beside its important role as a consistent database for economy-wide modeling, the SAM provides substantial support to the model building process. **First**, a SAM is generally constructed to achieve a specific analytical objective. Since the SAM structure and level of disaggregation is highly dependent on this analytical purpose, the constructed SAM can be viewed then as a consistent base that helps the modeler in understanding the structural features and behavioral relations governing the functioning of the economic system as well as the interactions among its sectors. **Second,** the construction process of a SAM is characterized by the confrontation of data collected from different sources, or estimated via alternative statistical estimation methods, and faces conditions of data shortage and fragmentation. This provides the model builder with invaluable practical information that supports the model building process. **Third**, the SAM is generally used to estimate the structural parameters of the economy-wide model and this estimation process can be automated as part of the model MAMS used in this study. **Fourth**, because the non-empty cells of a SAM can be viewed as payment from one economic actor (a column) to another (a row), the specification of this payment relation (or value of transaction) for all cells of a SAM provides a consistent approach for economy-wide modeling.

The SAM estimation process is based on multiple sources of the Egyptian socioeconomic data producers and different statistical computational methods. As such, a detailed description of these methods would be an extremely complex process that goes beyond the purpose of this paper. In this section we provide only the specific features of its cells with special reference to the requirements for MAMS. A detailed description of the SAM construction and assembly processes can be found in Soheir Aboul-Einein and Motaz Khorshid (2009).

MAMS can be viewed as an issue-oriented CGE model which is particularly extended to enable the analysis of the development strategies for achieving the MDG at the country level. It has its routes in the standard CGE model developed at the International Food Policy Research Institute (IFPRI) by H. Lofgren, R. Harris and S. Robinson in 2002. MAMS is significantly extended to consider explicitly a time dimension by including recursive inter-period dynamic relations and the addition of an MDG module that treats MDG and education outcomes as endogenous variables. For more information about MAMS and its implementation, see Lofgren and Diaz-Bonilla (2007) and Lofgren (2008a and b).

The particular structural features of the SAM and how this relates to MAMS are summarized in what follows. The calibration of MAMS for Egypt is then introduced and commented.

**Structural Features of SAM and MAMS**

Two considerations have significantly affected the process of constructing the SAM and implementing the Egyptian version of MAMS:

* The main technical features needed to make the SAM and MAMS an appropriate analytical tool for handling the interaction among the economy-wide performance and the achievement of the MDG in Egypt.
* The particular behavioral features and the specific structural characteristics of the Egyptian economy needed to be explicitly embodied in the model structure and economic rationale.

The Egyptian SAM for MAMS is constructed to identify and explain various socioeconomic features related to the strategies for achieving the MDGs. The newly constructed SAM for Egypt and its MAMS implementation included the following structural characteristics:

**First,** the educational goals of the MDG are captured using the following mechanisms:

1. Labor – as a factor of production - is broken down into three types with the following educational achievements; (i) completed tertiary, (ii) completed secondary but not completed tertiary, and (iii) less than completed secondary. This disaggregation level can be used to analyze the demand for labor services and the prevailing wage rate structure by education status. It further permits to assess the impact of alternative MDG strategies on the structure of the labor market. It finally allows us to perform a one-to-one mapping between educational sectors and labor categories.
2. The education activities (and commodities) in the SAM include both government services and private activities with each of them broken down by the three basic educational cycles: primary, secondary and tertiary. This level of detail permits MAMS to trace the demand for educational services broken down by learning status and the level of the adopted MDG-related measures, in addition to estimate the enrollment and completion rates for primary education (that is, the indicator for MDG2).
3. The interaction between public and private education activities and the three labor categories in the factors of production provides very useful means to analyze the human resource development policies and in particular those related to the educational MDG indicators.
4. Labor intensive activities are identified and isolated from other production sectors to allow for assessing the impact of MDG-related policies on the demand for factors of production in both labor intensive and capital intensive activities. Labor intensive activities in the Egyptian SAM include; spinning and waving, cloth, non metallic industries, engineering and machinery and other manufacturing sectors.

**Second,** the interests on domestic and foreign loans and other sort of borrowing instruments have separate accounts in the SAM. The accumulation of the stock of government domestic loans, foreign borrowing and grants can be properly adjusted through time using these interest accounts coupled with the inter-period dynamic module of MAMS.

**Third,** the saving-investment balance -within the SAM- is ensured via a capital account which is broken down by type of domestic and foreign institution as well as a disaggregated investment accounts. The institutional capital accounts are broken down into households, general government and the outside world. Note here that the households account groups three economic actors; household sector, private companies and public enterprises that are in principle not directly associated with the MDGs. The institutional capital accounts isolate investment spending (or the gross capital formation) from other inter-institutional capital transfers (sales/purchases of physical and financial assets/liabilities). This breakdown of the institutional capital account is required by MAMS to enable a more realistic inter-period adjustment mechanism within the model.

**Fourth,** the Egyptian SAM for MAMS includes investment accounts by both sectors of origin (the usual treatment) and destination (the unusual one). Investments by destination are detailed only with respect to general government activities, whereas other non-government sectors have an aggregate account. The breakdown of government investments is made mainly for the MDG-related services (public education, health services, water and sanitation services and government infrastructure). As usual, the investment by sectors of origin are concentrated in construction, machinery and equipments and some productive services sectors such as transportation and storage.

**Fifth,** to satisfy the requirements of the MDG modeling exercise, the treatment of government final consumption spending is somewhat unique in the analytical SAM for MAMS. The column of government institution includes only consumption of the services produced by the general government. Purchases by the general government of non-government commodities appear in the intermediate-consumption sub-matrix of the SAM, that is, in the intersection between governmental services (column-wise) and non-government commodities (row-wise). As a result, government final consumption expenditure would amount to only 2.7 percentage of GDP at market prices. In the principal aggregates of the national accounts – produced by the Ministry of Economic Development –, government final consumption in 2006/07 represented 11.5 percentage of GDP at market prices.

**Sixth,** since increased tax income can represent one of the options for financing the MDG achieving strategies, the SAM sets detailed accounts for taxes, including direct and personal taxes, import duties and other indirect taxes. Direct taxes are broken down by type of domestic institution, and indirect and import taxes are divided by type of domestic and foreign commodities.

**Seventh,** non-government services in the SAM are broken down into sectors serving the production process within the economy and other social services. To satisfy the analytical purposes of this study, social services are broken down into three education categories (primary, secondary and tertiary), health services and other social services.

**Eight,** the SAM for Egypt has been built for the fiscal year 2006/07. This year provides the most recent and complete information on disaggregated national income accounting data and other socioeconomic indicators. Furthermore, the recording of socioeconomic data in Egypt adopts the fiscal year convention. Given that MAMS is adopting the calendar year convention, it is assume that the fiscal year 2006/2007 is represented by the 2007 as the base year of the modeling exercise in MAMS. The projection period of MAMS includes the period from 2007 to 2015, the target year of achieving the MDGs.

**Ninth,** as customary in CGE modeling, most of the structural parameters of MAMS – such as the input output coefficients and base year tax rates - are estimated from the SAM data. In fact, this process is automated through GAMS/Excel version of MAMS used in the project. Other behavior parameters of the MAMS version for Egypt are based on; i) similar economic studies for Egypt or estimates available for similar developing economies, ii) guesstimates supported by economic rationale and some econometric evidences, and iii) assessments of the parameters used for other models for Egypt (such as the Energy Economy Interaction Model for Egypt developed by Motaz Khorshid in 2008 and the Food Subsidy Economy-wide Model developed by Hans Lofgren in 2004). It is worthwhile noting, however, that a considerable part of these parameters is adjusted and fine-tuned during the validation of the MAMS version for Egypt. During the validation experiments, the output results of the model is compared with the published socioeconomic aggregates up to 2009 and results obtained for other economy-wide models for Egypt from 2009 to 2015.

**Market Closure Rules for Egypt**

The assessment of the economic performance of a country – via a CGE model – depends to a great extend on the selected closure rules. These rules explain the clearing mechanisms for factor and commodities markets as well as key macroeconomic balances including the balance of payments, government income and expenditure balance and investment-saving equilibrium. The Closure rules can then reflect various demand management and supply oriented decisions as well as the macroeconomic adjustment programs. In this vein, they can be viewed as part of the set of instruments used by economic decision maker to achieve the planned development objectives of a country.

One of the principal closure rules included in an economy-wide model is the **government clearing mechanism**. In MAMS, three categories of closure rules are embedded in its structure. The first one is used to close the gap between income and spending accounts of the government budget. The second closure is related to the allocation of government final consumption spending. The third closure addresses alternative means used to determine the income of government institution.

In light of the options included in the structure of MAMS system, the level of **domestic borrowing** is selected as the initial clearing variable. This choice is based on Egypt’s current government policy to rely mainly on domestic government borrowing in financing the government budget deficit. The reliance on foreign borrowings or tax rates is not currently part of Egypt’s policy measures. Based on the recent economic and financial indicators, foreign loans have been reduced to a minimum level and the government of Egypt has adopted - since 2005 – a tax reduction policy directed to revitalize the domestic markets and enhance the growth prospects of the economy. Although the Egyptian economy has witnessed a considerable increase in the flow of direct foreign investments, their largest part are used in financing the private and joint sectors.

**Government final consumption** is assumed to be fixed in real terms and follows an exogenous growth rate. In the Egyptian context, government spending is not pro-cyclical and it does not generally dependent on the economic growth. It is used in principle to affect the quantity and pattern of demand for commodities and then the level of output. With respect to alternative rules for government receipts, income from direct and indirect taxes are generated using fixed tax rates. Government borrowings of domestic bonds and foreign debt are computed using fixed value shares of GDP. Finally, the transfers from the rest of the world and borrowing from the monetary system are determined as a fixed share of GDP. It worth noting, however, that both current transfers and borrowing from the rest of the world are assumed to be fixed in foreign currency.

A flexible real exchange rate clears the **foreign exchange market**. Based on the document “MAMS – A Guide for Users” developed by Hans Lofgren in 2008, this choice is justified by the fact that “ Experience from MAMS simulations in different countries and contexts indicates that other rules are not useful, especially in medium – to long run setting”. On the other hand, MAMS can use two factor-market closure rules; i) exogenous unemployment rate (greater than or equal to zero) and ii) endogenous unemployment rate (Greater than or equal to a minimum rate). In the case of Egypt and consistent with most previous MAMS simulations, the first rule is applied to non labor factors whereas the second rule is typically used for labor factors. This means that the unemployment rate is a function of the policies affecting the demand for (and the supply of) labor. This rule is consistent with the labor market functioning in the Egyptian context.

The investment and saving accounts are computed for households, government and the rest of the world. Given that the saving and investment accounts for both the government and the outside world are determined by other rules within MAMS, the **investment-saving balance** on the macroeconomic level is cleared by either household savings or household investment. In the application of MAMS for Egypt, household investment spending is determined as an exogenous share of GDP and saving clears the market. This closure assumes that the government of Egypt will adopt a policy directed to accumulate national savings with the objective of ensuring a level of investment consistent with a selected share of GDP.

**Policy Formulation**

Based on the expected performance of the reference path scenario, six alternative policy scenarios have been formulated to evaluate what would be the most convenient strategy for Egypt’s government to achieve the MDGs. The set of policy measures or strategies vary depending on two determinants: a) the financing mechanism of public spending and b) the selected development goal or combination of goals to be attained. Specifically, the following six policy measures or scenarios have been generated:

1. **mdg-db**: domestic borrowing is used to target both MDG2 and MDG7b.
2. **mdg-ft:** foreign transfers and grants to the government sector are increased to finance the achievement of MDG2 and MDG7b.
3. **mdg-tax:** income taxes are raised as a policy to finance the achievement of MDG2 and MDG7b**.**
4. **mdg-fb:** the government relies on foreign borrowing to achieve MDG2 and MDG7a**.**
5. **mdg2-db:** domestic borrowing is used to achieve MDG2**.**
6. **mdg7b-db:** domestic borrowing is used to achieve MDG7b**.**

In light of the currently adopted public finance policy in Egypt, domestic borrowing represents the major source of financing the government resorts to. After the Gulf War of the 1990s, the reliance on foreign debt has been reduced to its minimum level. Based on the base year SAM of 2006/07, for example, foreign borrowing represented around 0.5% of GDP whereas the share of domestic borrowing was 8.7% of GDP. Reliance on income-tax revenue is not high either. The government of Egypt has actually recently issued a new tax law including a reduction in both personal and import taxes in order to revitalize the economy and enhance its future growth prospects. Using current transfers from the rest of the world in the form of grants or other current payments to the government may however be considered as a second valid choice to finance MDG-related spending, pending on the success of the Egyptian government to attract these foreign inflows. Based on the above rationale, it can be concluded that domestic borrowing and foreign transfers represent policy options which the government can think of in consistency with the current economic trends in Egypt. Scenarios that consider the other two financing options are discussed here for analytical purposes only. The last two scenarios listed above target the achievement of MDG2 or MDG7b separately using domestic borrowing in order to determine how much it would cost to achieve each of them. The six MDG financing scenarios and their main economy-wide repercussions, including the effects for the MDGs are addressed in what follows.

**V. Assessing Strategies for Achieving MDG for Egypt**

**Introduction**

Alternative strategies for achieving the MDGs in Egypt are assessed in this section, using the MAMS computing framework. The model is first used to generate a reference path for 2007-2015, which is also indifferently regarded as a business-as-usual (BAU) scenario. This BAU run is mainly directed to project the medium-term economy-wide indicators up to 2015, assuming that the government continues to rely on various policy measures and strategic trends applied in the 1990 decade and the beginning of the twenty one century. Based on the results of this BAU scenario - with respect to the achievement of the MDG - the selected policy measures can be tested. The outcome from the adopted MDG strategies is affected then by the results of the BAU reference path.

Furthermore, the adopted strategies to achieve the MDG for Egypt are analyzed in the context of two different economic growth scenarios that reflect alternative future paths of the Egyptian economy under the BAU case. Firstly, an **optimistic scenario** based on government expectation as reflected in the follow-up reports of the five year plan produced by the Ministry of Economic Development (MOED) and other official government documents. This scenario assumes that Egypt will gradually overcome the effects of the recent world-wide financial crises and will achieve real GDP growth rates of 4% in 2010, 5% in 2011 and 6.5% per annum thereafter until 2015. The average growth rate of real GDP at factor cost in this scenario will be 5.7% during 2008-2015. Secondly, a **moderate growth scenario** which assumes that the Egyptian economy will take more time to overcome the effects of the financial crises with real GDP at factor cost growing annually by 4.9% in 2008-2015.

The results of the two reference paths are briefly discussed in what follows. Alternative financing options to achieve the MDGs are then assessed taking into consideration the performance of the Egyptian economy and the resulting MDG indicators.

**Assumptions of the Reference Path**

The BAU reference path scenario assumes that real government consumption spending follows an exogenous growth rate. The choice of this closure rule is explained by the fact that government final consumption is considered as part of the demand management policies directed to enhance the growth prospects of the economy. According to the optimistic growth scenario, real government consumption expenditures are assumed to grow on average by 4.5 percent per annum up to 2015. For the fiscal year 2009/10, however, real government spending is expected to grow by 5.6 percent. This higher growth rate reflects the government policy to increase both current and developmental expenditures in order to overshadow the negative impact of the current international financial crises. With respect to the moderate growth scenario, on the other hand, the same government expenditure trend is adopted but with slightly less growth to reflect the difficulty to finance government spending policy under the conditions of moderate GDP growth rates.

Based on the Central Bank database, government domestic borrowing – including treasury bills and loans from the monetary system – are expected to grow by 2 percent a year up to 2015. Current transfers between domestic institutions are assumed to increase annually by 4 to 5 percent in nominal terms given current government welfare policies. Government and households transfers to the outside world are assumed to grow annually by 4 and 2 percent respectively, based on the Ministry of Finance (MOF) data and the results of the recent household income and expenditure surveys. Annual growth rates of imports and exports price indices relied mainly on scenarios developed as part of the global economic prospects of the IMF and the WB. These general trends are adjusted by additional information from the CBE and the Ministry of Commerce and Industry.

In addition to the socioeconomic behavior parameters, which are many in MAMS, the model includes elasticities that measure by how much the different MDG indicators would change in response to their determinants. These elasticities are based on other countries comparative measures, background studies on the performance of the MDG indicators as well as socioeconomic rationale. It is expected, for example, that reducing the child and maternal mortality rates (MDGs 4 and 5) would be affected by spending on health services, government accumulated stock of infrastructure and per capital household final spending. Furthermore, we can reasonably assume that the improvements in the provision of clean water and sanitation services to the Egyptian population (MDG7a and b) would also affect the performance of the child and maternal mortality rates (MDG 4 and 5). In light of the elasticities of Egypt used with MAMS, the government spending on health commodity represents the main determinant of the indicators of MDG 4 and5. With respect to improving the provision of clean water and appropriate sanitation infrastructure (MDG7a and MDG7a), government spending on water and sanitation services is the main determinant for achieving the desired development goals. Determinants of achieving universal primary education (MDG2) and its associated elasticities depend in MAMS on students’ behavioral characteristics, education quality parameters, under five child mortality rate, government other infrastructure, per-capita household consumption spending and wage premium. The education quality – measured by government spending on education in MAMS – represents also a significant factor in achieving MDG2 and improving the educational process in all cycles. It should be noted finally that both the improved child mortality rate (MDG4) and the other government capital infrastructure have a sensible impact on the students educational characteristics and then on MDG2.

The base-year level of employment by factor and activity (mainly applied to the three labor categories in thousand of persons) is based on adjusted data from the population census and the labor survey of CAPMAS as well as the published information by the MOED as part of the plan documents. Similarly, the labor participation rate out of population at labor force age per year was computed from the population data produced by CAPMAS. The increase in the labor participation rate changes from 4.96 percent in 2007 to 5.06 percent in 2015 and then to 5.15 percent in 2020. This gradual increase in the labor participation rate reflects government policy in this respect. The unemployment rate by labor category – in the base year - is computed from the 2006 labor survey conducted by the population council in Egypt. Finally, estimates of total population data in thousands are from the population census and reports of the MOED where the population size is expected to reach 92.6 million in 2015. The model also needs information of a particular population groups such as; i) population in the age cohort that enters grade 1, ii) population in the age cohort that enters the labor force (often 15 years) and iii) population at labor force age (often 15-64). These estimates are again based on the population census produced by CAMPAS and other surveys carried out by the population council.

**Results of the reference path**

Most of the MDG indicators are generally achieved – or even over-achieved – with respect to both the optimistic and moderate reference path growth scenarios. This is excluding, to some extent, the goals of access to improved sanitation (MDG7b) and universal primary education (MDG2).

This outcome is primarily attributed to the continuous efforts of the successive Egyptian governments to adopt appropriate policies for achieving these goals. It can be argued also that the improved growth performance of the Egyptian economy during the first decade of the twenty first century has positively contributed to this situation.

Tables (1) and (2) provide a summary of the MDG indicators in the years 1990, 2007 and the target year 2015 for the reference path respectively under alternative economic growth scenarios - as well as for the MDG scenarios that will be introduced below. The performance of all the MDG indicators is quite satisfactory. With respect to the child and maternal mortality rates (mdg4 and mdg5, respectively) the aspired targets are achieved. Improved health care services, extended health insurance coverage and building more physical infrastructures – particularly in the rural areas - are the main determinants of this positive performance of the mdg4 and mdg5 indicators. The goal of improving access to safe water (MDG7a) has been achieved before 2007. According to the MAMS results, 99% of the population would have access in 2015 under business-as-usual policies. As for access to improved sanitation (MDG7b), coverage goes up to 80% by 2015, which is a satisfactory result, but the target set for 2015 is not fully reached. The primary completion rate (mdg2) goes up to 92% against the goal of nearly 100%. It should be noted however that the full primary completion rate (MDG2) is targeted indirectly in MAMS. This means that the completion rate of the students in the primary education cycle – which consists of 6 academic years – relies on the entering and passing behavior of these students. The computed target of MDG2 depends then on the passing and entry targets which – if selected as 99% - would lead to goal of 93.2 percent. Given this computational rationale, the performance of the reference path scenario, with respect to MDG2 can be considered a satisfactory result in spite of not fully reaching the declared target.

It should nevertheless be noted that, according to the collected statistics on MDG performance in Egypt, the same indicators reflect a clear duality between urban and rural areas with respect to the achievement of the MDGs. This disaggregated level of analysis cannot however be handled by MAMS but based on the modeling results one could conclude that achievement under business-as-usual policies would be more likely to happen for the urban areas and less likely for the rural areas.

**Impact of Alternative MDG Strategies**

Based on the outcomes of the reference path scenarios, MDGs 4, 5 and 7a would be within reach under business-as-usual policies whereas MDGs 2 and 7b would not, though the latter would not be far from being achieved by 2015. From a policy point of view, then, Egypt would have to target those MDGs that cannot be achieved under the reference path. Accordingly, financing strategies to scale up public spending aiming at achieving MDG2 and MDG7b are analyzed in what follows.

At the aggregate level, all the simulated alternative strategies contribute to speeding up the targeting of MDG2 and MDG7b during 2008-2015, in addition to those who were already achieved under the reference path scenario, with some specific differences between these strategies to be delineated as follows:

1. The performance of the MDG indicators during the projection period (2008-2015) is generally better in case of the optimistic growth reference path scenario. This is particularly apparent for MDG1, MDG4 and MDG5. The results of MDG strategies for Egypt - based on MAMS - show that the real annual growth rate of private final consumption spending, private investments and exports have increased during 2008-2015 from 6.5, 5.7 and 3.5 percent in the moderate growth to 7.5, 6.1 and 4 percent in the optimum growth scenario. Furthermore, government needs for domestic borrowing decreased in case of the optimum growth scenario. Given this improved growth prospects of the Egyptian economy, it is expected that the per-capita household consumption spending and the per-capita expenditure on health services would witness similar growth. Because these two economic indicators are part of the determinants of MDG 1, 4 and 5, these MDGs are more affected by the growth of the economy than other development goals. It can generally be concluded then that a more favorable growth prospects for the economy would result in more progress towards the achievement of the MDGs.
2. Some development goals are overachieved when the MDG strategies are adopted. This is particularly true with respect to the child and maternal mortality goals (MDG4 and 5) and the access to safe water (MDG7a), as shown in tables (1) and (2). This finding is the outcome of several factors; a) the Egyptian development indicators confirm that the goal of access to clean water (MDG7a) has been achieved in 2007 (with around 98 percent of population benefiting from access to clean water), b) similarly, the indicator of reducing child mortality rate (MDG4) was 33 percent in 2007 against the specified goal in 2015 which is 30.3 percent. Given that this goal is not targeted by alternative MDG strategies, the optimum growth reference path scenario has overachieved the selected goal with an indicator of 29.1 percent, c) although the goal of the maternal mortality rate (MDG5) is 4.4 percent, the business-as-usual indicators in 2015 reached 2.1 percent under the moderate growth scenario and 1.9 percent under the optimum growth scenario, and d) based on the analysis of the MDG determinants, both MDG4 and 5 are affected by the improvement in MDG7a and b. The observed overachievement in MDG4 and 5 is then partially explained by synergies as reaching MDG7a and b has a positive effect on their performance.
3. The students primary completion rate (MDG2) improves compared with the reference path results. Tables 1 and 2 show that this indicator increases on average from 91.8% in the reference path to 93.6% under the selected development strategy. It should be noted however that the full primary completion rate (MDG2) is targeted indirectly in MAMS. This means that the completion rate of the students in the primary education cycle – which consists of 6 academic years – relies on the entering and passing behavior of these students. The computed target of MDG2 depends then on the passing and entry targets which – if selected as 99% - would lead to a goal of 93.3 percent. Given this computational rationale, the performance of the MDG strategies with respect to MDG2 – using MAMS – is satisfying the computed goal in spite of not fully reaching the ultimate target of 100%. The only exception to this outcome is the strategy targeting only – or concentrating only on - the MDG7b and not MDG2. The average performance of MDG2 indicator under this scenario is similar to the reference path projected indicator in 2015.
4. Table (3) shows the impact of the moderate growth reference path scenario as well as alternative MDG achievement strategies on the educational composition of the labor force in Egypt. The results of the reference path scenario – which have shown an improvement in MDG2 and MDG7b - reflect a change in the educational structure in favor of labor that has not completed their secondary education during 2008-2015. This trend continued with the application of alternative MDG strategies. For all the scenarios, the share of these “unskilled labor” in the total labor force increases from 34.5 percent in the base year (2007) to around 41.5 percent in 2015. This result may be attributed on the one hand, to the young structure of the Egyptian population and on the other hand, to the MDG policies supporting the achievement of universal primary education.
5. The yearly progress of the MDG indicators in response to alternative MDG strategies – based on the goal seeking process implemented in MAMS – is shown in table (4). In spite of the existence of several goal seeking routines that determine the progression of the generated indicator towards the desired target, most of these MDG indicators in MAMS record a gradual progression between years from 2007 to 2015. For example, the on-time completion rate of universal primary education (MDG2) – in case of the domestic borrowing financing scenario – increases from 75.1 percent in 2007 to 82.4 percent in 2010 and then to 93.6 percent in 2015. Similarly, the improved access to sanitation (MDG7b) – under the same MDG financing policy – gradually rises from 66 percent in 2007 to 73.8 percent in 2010 and then to 83.3 percent in 2015. The goal of access to safe water (MDG7a) is achieved in 2009 and shows no further improvement thereafter. Furthermore, the goal of reducing maternal mortality rate (MDG5) is over achieved in the reference path scenario. The maternal mortality rate in the reference path is 2.8 per 100,000 live births in 2015 which is less than the targeted value of 4.4 percent. When the domestic borrowing strategy is adopted, MDG5 reaches 2.6 in 2015.

**VI. Summary and Conclusion**

In order to evaluate alternative policy measures and strategies for achieving the MDGs in 2015, the authors have accomplished the following activities. **First**, an issue-specific social accounting matrix (SAM) for Egypt was constructed to form a consistent and comprehensive analytical framework for policy analysis. The SAM was designed to capture the particular structural features and interactions within the Egyptian economy with special reference to the socioeconomic data relevant to the millennium development goals. **Second**, the constructed accounting framework and the available time series data for Egypt were used to determine the structural parameters and technical coefficients needed to calibrate and run the MAMS model. **Third**, recent economic performance of the Egyptian economy was used to validate the results of the MAMS model. **Finally**, a number of scenarios were simulated to generate a reference path (or baseline) for the Egyptian economy as well as to assess the impact of alternative strategies for achieving the MDGs.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | **1990** | **goal2015** | **2007** | **base** | **mdg-ftr** | **mdg-tax** | **mdg-fb** | **mdg-db** | **mdg2-db** | **mdg7b-db** |
| **mdg1** | 24.3 | 10.8 | 19.6 | 10.5 | 10.5 | 10.4 | 10.5 | 10.4 | 10.3 | 10.5 |
| **mdg2** | 90.6 | 100.0 | 75.1 | 91.8 | 93.6 | 93.6 | 93.6 | 93.6 | 93.6 | 91.8 |
| **mdg4** | 91.0 | 30.3 | 33.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| **mdg5** | 17.4 | 4.4 | 8.4 | 2.8 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 |
| **mdg7a** | 94.0 | 98.0 | 98.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg7b** | 50.0 | 83.3 | 66.0 | 79.8 | 83.3 | 83.3 | 83.3 | 83.3 | 80.0 | 83.3 |
| **Table (1): MDG indicators -- summary - Moderate Growth Scenario** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | **1990** | **goal2015** | **2007** | **base** | **mdg-ftr** | **mdg-tax** | **mdg-fb** | **mdg-db** | **mdg2-db** | **mdg7b-db** |
| mdg1 | 24.3 | 10.8 | 19.6 | 8.5 | 8.5 | 8.3 | 8.5 | 8.2 | 8.2 | 8.5 |
| mdg2 | 90.6 | 100.0 | 75.1 | 91.9 | 93.6 | 93.6 | 93.6 | 93.6 | 93.6 | 91.9 |
| mdg4 | 91.0 | 30.3 | 33.0 | 29.9 | 29.9 | 29.9 | 29.9 | 29.9 | 29.9 | 29.9 |
| mdg5 | 17.4 | 4.4 | 8.4 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| mdg7a | 94.0 | 98.0 | 98.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| mdg7b | 50.0 | 83.3 | 66.0 | 80.9 | 83.3 | 83.3 | 83.3 | 83.3 | 81.1 | 83.3 |
| **Table (2): MDG indicators -- summary - Optimistic Growth scenario** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | **2007** | **base** | **mdg-ftr** | **mdg-tax** | **mdg-fb** | **mdg-db** | **mdg2-db** | **mdg7b-db** |
| **f-labn** | 34.5 | 41.5 | 41.4 | 41.4 | 41.4 | 41.4 | 41.4 | 41.5 |
| **f-labs** | 37.2 | 32.6 | 32.7 | 32.7 | 32.7 | 32.7 | 32.7 | 32.6 |
| **f-labt** | 28.3 | 25.9 | 25.9 | 25.9 | 25.9 | 25.9 | 25.9 | 25.9 |
| **Total** | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **Table (6.3): Educational composition of the labor force – shares in base year and final year (%)Moderate Growth Scenario** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| **Base** | **mdg2** | 75.1 | 76.5 | 78.4 | 80.6 | 83.1 | 85.8 | 89.0 | 90.8 | 91.8 |
| **Base** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **Base** | **mdg5** | 8.4 | 7.8 | 7.3 | 6.8 | 6.3 | 5.6 | 4.7 | 3.7 | 2.8 |
| **Base** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **Base** | **mdg7b** | 66.0 | 69.1 | 70.8 | 72.2 | 73.6 | 75.1 | 76.7 | 78.3 | 79.8 |
| **mdg-ftr** | **mdg2** | 75.1 | 77.4 | 79.9 | 82.5 | 85.1 | 87.8 | 92.1 | 93.2 | 93.6 |
| **mdg-ftr** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg-ftr** | **mdg5** | 8.4 | 7.8 | 7.3 | 6.9 | 6.2 | 5.5 | 4.6 | 3.5 | 2.6 |
| **mdg-ftr** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg-ftr** | **mdg7b** | 66.0 | 68.7 | 71.4 | 73.8 | 76.1 | 78.2 | 80.1 | 81.8 | 83.3 |
| **mdg-tax** | **mdg2** | 75.1 | 77.4 | 79.9 | 82.5 | 85.1 | 87.8 | 92.1 | 93.2 | 93.6 |
| **mdg-tax** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg-tax** | **mdg5** | 8.4 | 7.8 | 7.4 | 7.1 | 6.3 | 5.6 | 4.6 | 3.5 | 2.6 |
| **mdg-tax** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg-tax** | **mdg7b** | 66.0 | 68.7 | 71.4 | 73.8 | 76.1 | 78.2 | 80.1 | 81.8 | 83.3 |
| **mdg-fb** | **mdg2** | 75.1 | 77.4 | 79.9 | 82.5 | 85.1 | 87.8 | 92.1 | 93.2 | 93.6 |
| **mdg-fb** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg-fb** | **mdg5** | 8.4 | 7.8 | 7.3 | 6.9 | 6.2 | 5.5 | 4.6 | 3.5 | 2.6 |
| **mdg-fb** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg-fb** | **mdg7b** | 66.0 | 68.7 | 71.4 | 73.8 | 76.1 | 78.2 | 80.1 | 81.8 | 83.3 |
| **mdg-db** | **mdg2** | 75.1 | 77.4 | 79.9 | 82.5 | 85.1 | 87.8 | 92.1 | 93.2 | 93.6 |
| **mdg-db** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg-db** | **mdg5** | 8.4 | 7.8 | 7.4 | 7.1 | 6.3 | 5.5 | 4.6 | 3.5 | 2.6 |
| **mdg-db** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg-db** | **mdg7b** | 66.0 | 68.7 | 71.4 | 73.8 | 76.1 | 78.2 | 80.1 | 81.8 | 83.3 |
| **mdg2-db** | **mdg2** | 75.1 | 77.4 | 79.9 | 82.5 | 85.1 | 87.8 | 92.1 | 93.2 | 93.6 |
| **mdg2-db** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg2-db** | **mdg5** | 8.4 | 7.8 | 7.4 | 7.1 | 6.3 | 5.6 | 4.6 | 3.6 | 2.6 |
| **mdg2-db** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg2-db** | **mdg7b** | 66.0 | 69.0 | 70.6 | 71.9 | 73.6 | 75.2 | 76.9 | 78.5 | 80.0 |
| **mdg7b-ftr** | **mdg2** | 75.1 | 76.5 | 78.4 | 80.6 | 83.1 | 85.8 | 89.0 | 90.8 | 91.9 |
| **mdg7b-ftr** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg7b-ftr** | **mdg5** | 8.4 | 7.8 | 7.3 | 6.8 | 6.2 | 5.5 | 4.6 | 3.6 | 2.7 |
| **mdg7b-ftr** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg7b-ftr** | **mdg7b** | 66.0 | 68.7 | 71.4 | 73.8 | 76.1 | 78.2 | 80.1 | 81.8 | 83.3 |
| **mdg7-db** | **mdg2** | 75.1 | 76.5 | 78.4 | 80.6 | 83.1 | 85.8 | 89.0 | 90.8 | 91.8 |
| **mdg7-db** | **mdg4** | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 |
| **mdg7-db** | **mdg5** | 8.4 | 7.8 | 7.3 | 6.8 | 6.2 | 5.5 | 4.6 | 3.6 | 2.7 |
| **mdg7-db** | **mdg7a** | 98.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| **mdg7-db** | **mdg7b** | 66.0 | 68.7 | 71.4 | 73.8 | 76.1 | 78.2 | 80.1 | 81.8 | 83.3 |
| **Table (4): MDG indicators – year-by-year - Moderate Growth Scenario** |

The reference path run is mainly directed to project the medium-term economy-wide indicators of Egypt up to 2015, assuming that the government is continuing to rely on the policy measures and strategic trends applied in the 1990s and the beginning of the twenty one century. Based on the results of this reference path scenario with respect to the achievement of the MDGs, alternative policy measures were formulated and tested.

In light of the current performance and structural features of the Egyptian economy as well as the adopted development policies and directions, three policy measures to finance the MDG objectives were experimented. The **first policy** assumes that the Egyptian government would continue to rely on domestic borrowing – in the form of treasury bills and other government domestic financing instruments –to ensure the financing of the cost related to the achievement of MDG2 (universal primary education) and MDG7b (basic sanitation coverage) as these two goals would not be achieved under business-as-usual assumptions of the reference path run. The **second policy** assumes that the Egyptian government would have access to foreign grants (or transfers) directed to reach the aspired MDG indicators. Finally, the **third policy** measure adjusts the direct tax rate so as to achieve the required MDGs. Of these three selected policy measures only the first one would be compatible with the decision of the Egyptian government and the central bank (CBE) to minimize the reliance on foreign borrowings and to finance of government deficit mainly by domestic borrowing means. Furthermore, **two specific MDG strategies** have been added to separately target the universal primary education (MDG2) and the improved access to sanitation facilities (MDG7b). The Different combinations of these financing options with achieving MDG2 or MDG7b separately, or in tandem with all other MDGs (but MDG 1) were generated.

In addition to the specific MDG achieving policy, MAMS was used to test alternative **economic growth scenarios** and their impact on MDG indicators. In this respect, two economic growth scenarios were tested, for which all the aforementioned policy scenarios were generated.

The **main finding** of the reference path scenario with respect to the MDG indicators is that in both the optimistic and moderate economic growth scenarios most MDGs would be achieved, or even overachieved in some instances. This is excluding the poverty goal (MDG1) - which need special analysis that goes beyond the scope of this paper - and, to some extent, the goals of access to improved sanitation (MDG7b) and the attainment of universal primary education (MDG2) as defined by the on-time primary completion rate.

This outcome is primarily attributed to the continuous efforts of the successive Egyptian governments to adopt appropriate policies for achieving these goals. It can be argued also that the improved growth performance of the Egyptian economy during the first decade of the twenty first century has positively contributed to achieving this positive performance.

The primary completion rate (MDG2) under the reference path leveled at 92%. With respect to the child and maternal mortality rates (MDGs 4 and 5) the aspired targets are achieved. Improved health care services, extended health insurance coverage and building more physical infrastructures – particularly in the rural areas - are the main determinants of this positive performance in terms of child and maternal mortality rates. The objective of improving access to safe water (MDG7a) has been achieved way in advance of 2007. According to MAMS results, 99% of the population would have access in 2015. As for access to improved sanitation (MDG7b), coverage goes up to 80% by 2015 under a continuation of current policies, which is a satisfactory result.

At the aggregate level, all the adopted alternative strategies that were simulated do contributed to speeding up the achievement of the MDGs by 2015, with some specific differences between policies attributed to the sensitivity of the MDGs and the Egyptian economy to these policy measures.

**To sum up,** It can be concluded that the analysis of the Millennium Development Goals (MDG) in Egypt based on MAMS has generally confirmed that it is possible to achieve most of the MDGs on the aggregate socioeconomic level in 2015. The business as usual (BAU) or the reference path scenario has succeeded to generate satisfactory results on the macro-level via achieving the MDGs 4, 5 and 7a. It is recommended then to direct any additional MDG financing policies to achieve MDG2 and MDG7b. The economy-wide analysis using MAMS suggested also that the MDG indicators are not too sensitive to changes in alternative strategies to finance the achievement of the MDGs.

The general policy orientation – derived from this exercise - is that the decision maker in Egypt is advised to target all the unrealized MDGs (which are MDG2 and MDG7b in the Egyptian case) and avoid concentrating on achieving - or delaying the targeting of - one of them - with the objective of reducing the associated financing cost. This finding is justified by two arguments; a) the success to achieve all the targeted MDGs as a group with the positive impact of this achievement on the socioeconomic performance and the satisfaction of the Egyptian citizens and b) the moderate – or even the low – additional financing cost needed to achieve the MDGs as measured by government consumption and investment spending as well as the incremental increase in foreign borrowing.

It should be noted nevertheless that the same indicators on the regional or governorate level reflected a clear duality between urban and rural areas with respect to the achievement of the MDGs. Unfortunately, MAMS is not disaggregated enough to zoom on certain regions and groups which are likely need policy interventions. In this respect, MAMS does not support any disaggregation between rural and urban, male and female nor between governorates. This limitation makes the model misses an important dimension in the MDG analysis for the Egyptian case.

**Acknowledgment**

The authors are indebted to Dr. Marco V. Sanchez-Cantillo for his valuable comments on an earlier report to assess strategies for achieving the MDGs for Egypt. They are also grateful to Dr Rob Vos, Martin Cicoweiz and other members of the regional project on “assessing Development Strategies to Achieve the MDGs in the Arab region” for their technical and training support. The regional project is financially and technically supported by UNDP-RBAS and UN-DESA/DPAD, New York as well as the World Bank, Washington D.C.

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