

Realizing the Millennium Development Goals through socially inclusive
macroeconomic policies

Country Study

Assessing Development Strategies to Achieve the MDGs in

The Republic of Yemen

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The overall objective of the project was to strengthen the capacity of policymakers to formulate and evaluate socially-inclusive macroeconomic policies aimed at facilitating the achievement of the MDGs through the adaptation of an integrated modelling framework to country-specific conditions. The methodological framework is based on the adaptation of the economy-wide model system, known as *Maquette* for **MDGs Simulation** (MAMS) – a dynamic computable general equilibrium (CGE) model that includes a special module for the “production” of services associated with the Millennium Development Goals (MDGs). It also comprises methodologies at the micro level to identify determinants of MDG achievement, on the one hand, and to quantify effects on poverty and inequality, on the other.

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1. Introduction

Yemen is one of the poorest countries in the Arab region with a per capita GDP of US\$1160 for 2008 (WDI, 2010) and faces a wide range of developmental challenges, in 2011 amplified by deepened domestic conflict. According to the HDI (Human Development Index), the country was ranked 140 out of 182 in 2007 (UNDP 2009). Ever since reunification in 1990 Yemen's relative position on the HDI index has remained more or less unchanged, with very slow progress towards attaining the Millennium Development Goals (MDGs). At 3 percent, the country has one of the highest population growth rates globally, with the population expected to double in 23 years to around 40 million. This increases the demand for educational and health services, drinking water and employment opportunities. Yemen faces a severe water shortage, with available ground water being depleted at an alarming rate. The Yemeni economy is caught in a jobless slow growth cycle leading to stagnant per capita incomes and rising levels of unemployment, particularly amongst the youth.

Social development indicators, such as child malnutrition, maternal mortality, and education attainment remain discouraging. The Household Budget Survey of 2005/2006 indicates that about 35 percent of the population lives below the national poverty line, with poverty more widespread and persistent in rural areas. However, given persistent increases in consumer prices, notably food prices, the rate of poverty has increased to 42% in 2009 (see DPPR 2011). There are large gender disparities, with significant gaps in women's access to economic, social and political opportunities. Yemen's first and second Millennium Development Goal (MDG) Reports of 2003 and 2010 concluded that Yemen was off track with respect to meeting the MDGs, with the possible exception of universal primary education and under-five mortality rate (see MOPIC 2003 and MOPIC 2010).

Given this record, Yemen remains far from achieving the MDG targets that the international community agreed to pursue at the UN Millennium Summit of 2000. Nevertheless, Yemen's government views accelerated MDG progress and, if possible, full achievement of the MDG targets as a high priority. To this end, it has issued two documents that report on the country's progress on the MDGs (MOPIC 2003 and MOPIC 2010) as well as one Needs Assessment (NA) (MOPIC 2005) that, using a bottom-up approach, attempts to specify the requirements for full MDG achievements in terms of spending and service delivery for the different sectors that are directly linked to the MDGs, most importantly health, education, and water-sanitation. In terms of what is required in terms of service expansion and other changes to achieve the MDGs covered in this paper, the analysis of this paper takes the information in the 2005 NA as its point of departure. It goes beyond the NA by situating the pursuit of an ambitious MDG strategy in the context of Yemen's economy, simulating its impact on a wide range of economic indicators. In addition to key MDG indicators (related to poverty, health, primary education, and water and sanitation), the analysis covers the impact of the strategy on national account aggregates, major macroeconomic balances (including the government budget and the balance of payments), the size of the government relative to the rest of the economy, as well as production and trade in different sectors. One key aspect of the analysis is that it considers the repercussions of relying on different sources (foreign or domestic) for required additional government financing.

In terms of method, our analysis uses MAMS (Maquette for MDG Simulation), a model developed at the World Bank for MDG and development strategy analysis, combined with a microsimulation model that relies on household survey data to assess effects on poverty and inequality.

More specifically, the simulations, which cover the period 2004-2015, address the pursuit of full achievement of education, health and water-sanitation MDG targets, both individually and jointly, for four alternative sources of required additional financing, two domestic (direct taxes and borrowing) and two foreign (grants and borrowing).

The main finding of the simulation analysis is sobering but not surprising considering the magnitude of the MDG challenge. Given the requirements identified in the NA, which feed into our model-based analysis, full, on-time MDG achievement does not appear a realistic objective. The required financing is unlikely to be available and, if it were, it would be extremely challenging for the government to bring about the required increases in real service delivery without strong sacrifices in efficiency. This suggests that, in its pursuit to reduce poverty and improve human development, instead of relying on international targets, the government should set targets that, while remaining ambitious, are grounded in Yemen's reality and priorities.

In light of this main finding, a second set of simulations was designed to be grounded in what may be feasible given Yemen's current situation. In these simulations, exogenous increases are introduced for foreign aid, government allocative efficiency, or total factor productivity in the production of government services. The government makes use of the resulting addition to fiscal space to expand spending and service delivery in infrastructure and human development (HD). The results suggest that substantial improvements could be achieved if, as a result of one (or more) of these exogenous changes, fiscal space would increase. The simulated effects differ depending on the size of the simulated exogenous shock and on how the government uses the additional resources. For the simulations that involve increased access to foreign aid, the gains are more substantial, including reduction in the poverty rate, reductions in the under-five mortality rate, as well as a significant improvement in on-time completion of primary schooling. In general, emphasis on infrastructure leads to more rapid growth for GDP and absorption but has less significant improvements for the MDG indicators.

Overall, these results suggest that, in order to get the strongest possible positive impact of available government resources, it would be crucial to strive to improve government efficiency, and allocate more spending, both existing and additional, to areas with the strongest payoffs in terms of growth and human development. In addition to this overall finding, our analysis confirms the importance of considering synergies and economy-wide constraints and repercussions in the analysis of major government policy changes such as an MDG strategy.

The rest of the paper is organized in four sections. Section 2 provides background on the general economy and MDGs since 1990. Section 3 presents the methodology and data for both MAMS and the microsimulation model. Section 4 discusses the first set of simulations and results; those that impose the full achievement of the MDGs. Section 5 contains an additional set of simulations that explore the economic impact of different options for creating and using fiscal space, while Section 6 concludes and provides some policy recommendations.

2. Economic Performance and MDG Trends

2.1. Main reforms, macroeconomic policy, economic performance and vulnerabilities

2.1.1. Evolution of the economy since 1990

The birth of the unified country in 1990 was marred by the impact of the Iraqi invasion of Kuwait on Yemenis living and working in Gulf Cooperation Council (GCC) countries as the return of up to one million Yemenis deprived the country of a large annual inflow of remittances and added substantially to the numbers of persons who needed jobs, schooling, health and other basic social services. The country also had to absorb the costs of integrating two different civil service structures and economic systems. The decision made at the time to keep all civil servants serving for the pre-existing two governments and of applying the higher pay scale prevalent in the North to the unified civil service led to a substantial increase in the public sector wage bill. Despite all the disruptions associated with unification and the civil war of 1994 and external shocks, official data show positive (albeit highly variable) growth averaging 5.5 percent over the period 1990 to 1999. Since 1999, growth has been more stable but significantly lower, at around 4 percent. As will be seen below, the rapid growth period of the 1990s coincided with rapid expansion for the oil sector which, during most of the period since 2000, has been more stable in nominal terms while shrinking in terms of real output. The decline in GDP growth in per capita terms has been mitigated by a decline in the population growth rate from 4 percent in the early 1990s to less than 3 percent since 1999. Still, current per-capita growth rates are not sufficient to permit a sustained reduction in poverty.

The initial period of Yemen as a unified country was marked by an increase in fiscal imbalances, related to high costs of unification, and leading to increasing rates of inflation. The government responded by introducing direct restrictions on imports, investments and movements of the exchange and interest rates. In 1995, it embarked on market-oriented reforms, focused on price stabilization and trade liberalization, fiscal adjustments and the exchange rate regime. The more liberal regime has continued, including a gradual reduction of subsidies on major items including petroleum products. Apparently, these efforts helped to stabilize the economy. However, in conjunction with other factors influencing Yemen's economy (including the halt to oil expansion), these policy changes were not able to maintain growth at the rates witnessed in the first half of the 1990s. As a consequence, total spending has been constrained to stay within the limits of available resources.

Since 2003, government policy has been guided by a PRSP (Poverty Reduction Strategy Paper) that aims at reducing poverty by means of increased allocations to basic social services and the fostering of more rapid, broad-based growth. However, PRSP progress reports demonstrate a lack of success in achieving the stated objectives of the PRSP, with stagnant government spending shares allocated to basic social services (most importantly health and education).

The structure of the economy underwent fundamental changes over the period from 1990 to 2009, with the share of key sectors at current prices changing substantially over the period –

Figures 2.1a and 2.1b show GDP shares by sector at current and constant prices, respectively. At current prices, services and oil (and gas) have increased, with strong fluctuations for oil, in part related to changing world prices. Manufacturing and qat have declined strongly while (other) agriculture is relatively unchanged. Figure 2.1b in turn indicates that, compared to the evolution at current prices, at constant prices, the importance of the oil sector has shrunk sharply while the decline for qat is less drastic; for other sectors, the changes under constant and current prices are quite similar. In addition to its increased relative importance, the nature of the service sector has changed from being mostly involved in supporting agriculture and manufacturing in 1990 toward responding to demands fueled by oil revenues. Figure 2.2 looks at sectors from a different angle, in terms of the real level of its output over time: all sectors have increased with the strongest increase for services; although oil output is higher in 2009 than in 1990, changes in recent years indicate a strong decline.

Figure 2.1a: GDP Share by Sector at Current Prices, 1990-2009
(percent)

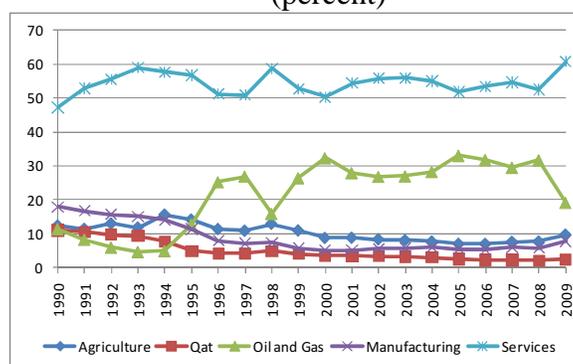
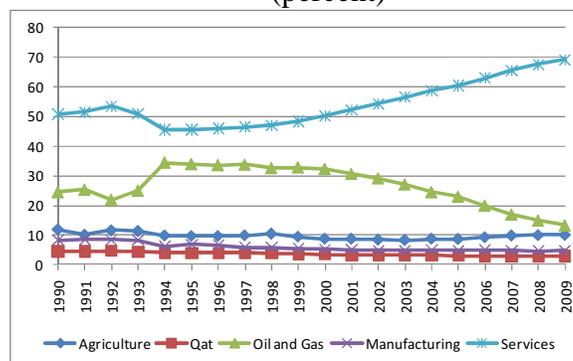


Figure 2.1b: GDP Share by Sector at Constant Prices, 1990-2009
(percent)

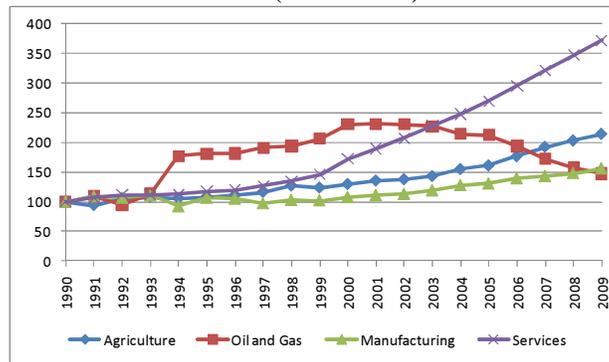


Source: Authors' calculations based on Central Statistical Organization.

As implied by the increased GDP share of oil at current prices, the sector has been a prime driver of economic growth, especially in the 1990s, inter alia making a dramatically increased contribution to the public treasury, allowing the state to support an over-staffed bureaucracy and to spend in areas that have positive effects on social and economic development, including investments in infrastructure. Oil revenue has also allowed the government to adopt a relaxed

attitude towards raising domestic resources. In addition, by strengthening the exchange rate of the Yemeni Rial, oil has had a negative impact on the growth of the agricultural and industrial sectors, which are the main non-oil producers of tradable commodities. The poor performance of the agricultural sector has meant that the country is now more dependent on imports for feeding its burgeoning population.

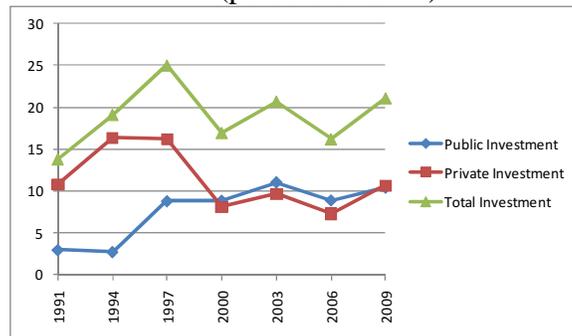
Figure 2.2: Index of GDP by Sector, 1990-2009
(1990=100)



Source: Authors' calculations based on Central Statistical Organization.

Data with three-year intervals for the GDP share of total investment shows large variations and, overall, an increase between 1991 and 2009 (Figure 2.3). Relative to GDP, public and private investment have changed in opposite directions. Public sector investment has risen substantially, from an average level below 5 percent of GDP in the early 1990s to above 10 percent in the period since 2000, while private investment during the same period has declined from an average of 13 percent of GDP in the early 1990s to around 9 percent in the period since 2000. It is possible that stagnant growth in recent years in part is due to the public investment has been relatively inefficient compared to private investment.

Figure 2.3: Investment – public and private, 1991-2009
(percent of GDP)



Source: Authors' calculations based on Bulletin of Government Finance Statistics (various issues) and CSO.

The results of the 2005-2006 Household Budget Survey demonstrate a substantial reduction in urban poverty compared to the survey of 1998 while rural poverty has remained stubbornly high. This result is consistent with a pattern of growth driven by sectors (oil and services) that

mostly create incomes in urban areas. The changes in the external environment, particularly the large-scale return of Yemeni expatriate workers from neighboring countries following the first Gulf War, has clearly rendered the task of reducing poverty more difficult.

2.1.2. Vulnerabilities and economic constraints

The structure of public sector accounts shows that, during its first five years as a unified country, Yemen's government spent over 50 percent of its budget on wages and salaries as it merged the bureaucracies of two civil services, retaining all of their public servants and raising the wages in the South to the Northern levels. However, as it became clear that this state of public finances was not sustainable, public sector real wages were allowed to deteriorate substantially from 1996 onwards, leading to a more moderate share of public spending for wages, falling below 30 percent since 1997. This has allowed an increase in the share of government spending (of GDP) allocated to investment from around 10 percent in 1990-1995 to an average exceeding 20 percent since 1997 (see Table 2.1 and Figure 2.3). However, the decline in real wages has negatively affected the ability of the civil service to attract, motivate and retain qualified staff, leading to a deteriorating quality of public services.

Table 2.1: Major items in the government budget, 1991-2006
(percent of GDP)

	1991	1994	1997	2000	2003	2006
Public Expenditures	29.2	28.4	35.0	33.0	35.6	39.1
Deficit	4.0	14.5	0.9	-6.4	4.1	-1.7
Public Investment	3.0	2.8	8.8	8.9	11.0	8.9
Subsidies	1.9	2.9	10.3	9.5	5.2	10.5

Source: Authors' calculations based on Bulletin of Government Finance Statistics (various issues)

Government current consumption has remained in the 14 percent GDP share range over the entire period 1990-2009. Subsidies were initially introduced to facilitate access to affordable transport and electricity. After initially accounting for less than 10 percent of expenditures, subsidies gained in importance starting from 1997, before diminishing from 12 percent of GDP in 2008 to 6.5 percent of GDP in 2009, mainly owing to the fall in international fuel prices. The reduction in deficits since 1996 led to a reduction in the spending share devoted to interest payments, from 10 percent in the early 1990s to 7 percent in recent years.

Domestic borrowing remained within reasonable levels and external debt was cut substantially through debt reduction measures agreed with major lenders in the early 2000s. In 2009, the total stocks of external and domestic public debt were at 20.6 and 15.8 percent of GDP, respectively, with the government being able to service these debts without difficulty.

Thanks to rising oil prices since 2002, export earnings and external reserves have expanded; in 2009, reserves were sufficient to cover imports for 7.5 months (IMF 2010, p. 21). Therefore the country has not been forced to cut back on imports, which have further been encouraged by an ever more liberal trading regime, with tariff rates on most items cut to single digits and most non-tariff barriers removed. However, oil reserves are expected to be depleted in about 10–12

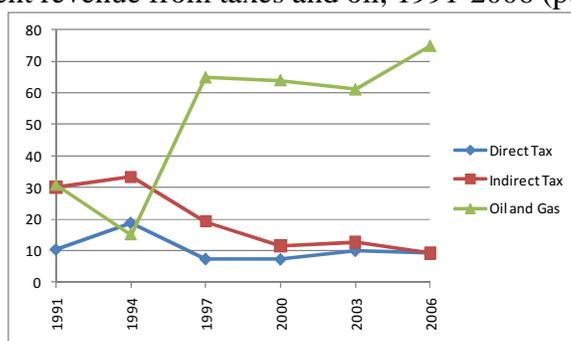
years. In addition, Yemen is also facing the depletion of its groundwater. These challenges are compounded by an expanding population, poor infrastructure, weak institutional capacity, a fragile security situation, and the widespread use of qat—a mild narcotic accounting for over one-third of agricultural production and about a quarter of total water resource use.¹

As an element of its inflation control policy, the Central Bank of Yemen has been maintaining the nominal exchange rate of the Yemeni riyal relative to the US dollar fairly stable, only allowing an annual depreciation of between 3-5 percent in the period since 2002. Given the increase in oil revenues, the real exchange rate has appreciated, encouraging imports and undermining non-oil exports.

The tax effort of the government has been fairly limited, with the share of taxes (direct and indirect) in total government revenues falling from 40-50 percent in the period 1990-1995 to just over 18 percent by 2008, at the same time as the share of oil and gas revenue in public revenues rose from the 30 percent range in the early 1990s to over 70 percent in the period since 2000 (see Figure 2.4). In 2009, due to the decrease in the world price of oil, the share of tax revenue in total public revenue increased to 32 percent, while the corresponding figure for oil and gas decreased to 58 percent.

The share of total tax revenue to GDP fell over the period from 10 percent in 1992 to a mere 7 percent by 2009. This is due to a drastic reduction in indirect taxes, from 7.5 percent of GDP in 1991 to 3.2 percent by 2009. Direct taxes on the other hand have shown a steady increase from a mere 2.5 percent of GDP in 1991 to 3.5 percent by 2009 and can be expected to continue to grow at the same pace into the future.

Figure 2.4: Government revenue from taxes and oil, 1991-2006 (percent of total revenue)



Source: Authors' calculations based on Bulletin of Government Finance Statistics (various issues)

Yemen's economy is well integrated with the outside world. In 2008, foreign trade (the sum of exports and imports) accounted for around 67 percent of GDP, with a trade deficit at some 5 percent of GDP; in 2009, these shares were at 56 and 10 percent of GDP, respectively. The

¹ According to the Yemen Poverty Assessment (see Government of Yemen et al., 2007), "qat impacts the economy in a negative manner through the opportunity cost of lost savings as well as lost work-hours. Although the authorities have developed public awareness campaigns, citing the drawbacks of qat consumption, discouraging qat consumption is a complex and difficult task; it is far too well integrated into the Yemeni economy and social structure to be eliminated on a short-term basis without adverse effects".

trade deficit (and higher levels of domestic final demand) have been made possible by foreign transfers (aid and remittances), which in 2008 and 2009 account for 7 and 5 percent of the GNDI (Gross National Disposable Income), respectively.

With regard to aid, the government of Yemen is receiving official development assistance from neighboring Arab countries as well as OECD donors, but the level of assistance has been negatively affected by political developments since the first Gulf War. The average level of assistance received by Yemen in the past 10 years has been between US\$13-22 per capita, which is very low when compared with levels of assistance received by other LDCs. The low level of external assistance has limited the ability of the government to spend in areas supporting the achievement of the MDGs. Yemen is also dependent on remittances to the tune of US\$1-2 billion per year; due to the concentration of Yemeni expatriates in GCC member countries, this income has been vulnerable to political shocks.

In the trade area, Yemen faced a negative terms of trade shock with the drop in the prices received for its oil exports in the late 1990s, but has benefited from higher oil prices since 2003. In terms of prices of imports, the country had to contend with the substantial rise in food prices in 2007, which is expected by most observers to continue into the future. The rising food prices pose a particularly difficult problem for Yemen, given the very slow increase in domestic food production since unification, with the country currently dependent on imports for over 80 percent of its basic food staples.

The global financial crisis has affected the Yemeni economy negatively through declines in the world price of oil, foreign direct investment, and remittances of Yemeni expatriates due to the economic situation in their countries of residence (see Central Bank of Yemen 2010 and MOPIC 2010). In addition, the economic situation has been aggravated by internal factors, including the declining oil production and security problems that damage the investment climate. As a result of these developments, Yemen's fiscal and external accounts have faced deficits, among other things leading to depreciation of the Yemeni Rial and increased inflation.

2.2. Social policy and MDG achievement

2.2.1. Social policy during the period 1990-2006

When Yemen emerged as a unified country in May 1990, it had to integrate two different socio-economic systems, with the North having a free market tradition with fairly limited provision of basic social services, while the South had followed a socialist path of development, with limited opportunities for the private sector but reasonably well developed structure for public provisioning of basic social services. Hence, while the North had a higher GDP per capita, the South boasted higher levels of literacy and better health indicators. Both countries had a sizeable public service, partly entrusted with providing basic services and partially acting as a social safety net for a burgeoning population in the face of limited job creation in the productive sectors.

As noted, the unification of the country initially imposed high costs in terms of the public wage bill. This extra financial burden, combined with the shock produced by the return of large number of Yemenis working in GCC member countries following the 1990 Gulf War and the

cost of a brief but heavy civil war in 1994 reduced the funds available for meeting the MDGs, while increasing the demand for basic social services due to the large influx of Yemenis returning home.

Initially, the government permitted deficit financing to expand as it tried to cope with these burdens (cf. Section 2.1.1). However, as higher deficits led to higher inflation, the government accepted IMF advice, in 1995 starting the implementation of a structural reform program that by 1997 had brought about a substantial reduction in the public deficit. Public services suffered as a result of reduced real government spending.

2.2.2. Evolution and structure of public spending (current and capital)

In the period from 1990 to 1995, the government put greater emphasis in its budget policy on maintaining public services at the cost of running up persistent budget deficits. However, following the adoption of a structural adjustment program from 1995, stability was given greater importance at the cost of reducing the quality of public services.

Following agreements reached between Yemen and her creditors for debt relief under the HIPC initiative in the early 2000s, the government adopted a Poverty Reduction Strategy Paper covering the period 2003 to 2005. The PRSP called for a substantial real increase in spending on social sectors, with the ratio expected to reach 12.8 percent of GDP by 2004. While spending on social sectors has followed an upward trend for the period since 1991, its 2004 share in GDP fell short of the PRSP target; according to the MAMS database, total spending on health and education, which represent the bulk of social spending, only reached 6.7 percent of GDP in 2004. In 2006, total social spending reached 8.4 percent of GDP, substantially short of the PRSP target. The majority of this spending is on education (6.1 percent of GDP) and health (1.7 percent) (see Table 2.2). At 0.1 percent of GDP, social protection spending is very limited. Spending on the social sectors is also channeled through the Social Fund for Development (SFD). The SFD executed 1,309 projects in 2003-04, at a total cost of US\$123.3 million or about 0.5 percent of GDP per year. A rising proportion of the budget goes to subsidize oil derivatives and electricity, mostly diesel. These subsidies rose from 3.1 percent of GDP in 2002 to 6.3 percent in 2004, and peaked at close to 10 percent of GDP in 2006, substantially exceeding the allocation to education. In 2005, the government started reducing these subsidies on a gradual basis in order to free up resources for poverty reduction, though the rise in international oil prices since January 2006 eroded most of the gains made, with the per liter subsidy actually registering a higher value in 2007 than prevailed prior to price adjustments in 2005.

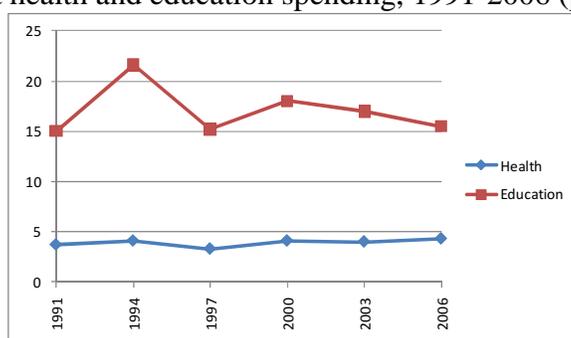
Table 2.2: Major government spending items, 1991-2006 (percent of spending and of GDP)

	1991	1994	1997	2000	2003	2006
Defence	23.3	39.0	18.2	16.8	18.2	14.1
Health	3.7	4.1	3.3	4.1	4.0	4.3
Education	15.0	21.6	15.2	18.0	17.0	15.5
Subsidies	6.4	10.1	29.3	28.7	14.6	26.8
As share of GDP						
Health	1.1	1.2	1.2	1.4	1.4	1.7
Education	4.4	6.1	5.3	5.9	6.1	6.1

Source: Authors' calculations based on Bulletin of Government Finance Statistics (various issues)

Table 2.2 shows that the GDP shares for spending on health and education increased from a combined total of 5.5 percent of GDP in 1991 to 7.7 percent by 2006, with their share in total government expenditure showing a marginal increase from 18.7 percent in 1991 to 19.8 percent by 2006. It is interesting that, in the intervening period between 1991 and 2006, the share of health and education in total public expenditures peaked at 25.7 percent in 1994 and, after reaching another high point in 2000 at 22.1 percent, has been on a downward trend, falling to under 20 percent in 2006.

Figure 2.5: Government health and education spending, 1991-2006 (percent of total spending)



Source: Authors' calculations based on Bulletin of Government Finance Statistics (various issues).

2.2.3. Evolution of MDG indicators 1990-2006

Yemen's first and second Millennium Development Goals Report in 2003 and 2010, produced by the government with support from UNDP, concluded that Yemen is currently off track with respect to meeting the MDGs. As shown in Table 2.3, progress has been made for primary net enrollment (MDG 2), under-five mortality, water access (MDG 7w), and sanitation access (MDG 7s). However, no target has been reached and Yemen was off track for all MDGs with the possible exception of under-five mortality. On the malnutrition front, due to a combination of stagnating per capita income levels and worsening nutritional patterns (including rising consumption of junk food and qat), the situation has deteriorated over time, with the proportion of children under five who are underweight rising from 30 percent in 1992 to 46 percent by 1997/1998 and remaining at that level through 2003 (see Table 2.4).

Table 2.3: Key MDG indicators for Yemen

MDG Indicator	1990 (1)	2004 (1)	most recent	2015
MDG 1: Poverty Rate (% of population) (2)	47.0	46.6	46.6	23.5
MDG 2: Net Enrollment Rate in Basic Education (%)	52.7	62.5	69.8	100.0
MDG 4: Under-five mortality rate (per 1,000 births)	122.0	93.4	78.2	40.6
MDG 5: Maternal mortality rate (per 100,000 live births)	351.0	365.0	365.0	87.8
MDG 7a: Access to safe water (% of population)	34.9	43.9	48.0	67.4
MDG 7b: Access to improved sanitation (% of population)	10.6	15.9	23.0	55.3

(1) nearest available year if data is not available for 1990; interpolated for MDG 7a and MDG 4 in 2004.
(2) the poverty rate in 1990 column is for 1998; 2 US\$ PPP poverty line.
most recent is: MDG 1 = 2009; MDG 2 = 2008; MDG 4 = 2006; MDG 5 = 2003; MDG 7 = 2008.

Source: Authors' calculations based on Central Statistical Organization and MOPIC (2010).

Table 2.4: Under-five malnutrition rates

1992	1997	2005/2006	2015
30.0	46.0	42.9	15.0

Source: Central Statistical Organization and MOPIC (2010).

The 2005/2006 HBS indicates that, in the survey year, 35 percent of the Yemeni population lives under the national moderate (income) poverty line, with substantial differences between rural and urban poverty, with the respective rates of 40.1 and 20.7 percent. Disparities between different governorates are also strong, with poverty incidence highest in the Amran governorate (64 percent), and lowest in Al Mahrah (9 percent). Evidence from comparable household budget surveys in 1997-8 and 2005-6 suggests that income poverty has decreased significantly since 1998 with the proportion of the population below the poverty line falling to 35 percent from 40 percent (see Table 2.5). The proportion below the extreme (food) poverty line shows an even steeper decline, with the rate falling to 12.5 percent in 2006 from over 17 percent in 1998. However, the increase in food prices in 2006-2007 may have undermined all or part of this latter achievement, with some calculations showing that food poverty rates were higher in 2008 than in 1998. The reduction has been remarkable in urban areas, with the poverty rate falling by over 1/3, while rural poverty remains stubbornly high at above 40 percent.

Table 2.5: Evolution of poverty (headcount ratio)

Poverty Indicator	1998	2005/2006
Moderate poverty line		
Urban	32.3	20.7
Rural	42.5	40.1
National	40.1	34.8
Extreme (food) poverty line		
National	17.6	12.5

Source: Yemen Poverty Assessment, Government of Yemen, World Bank and UNDP, 2007.

Analysis carried out based on data from the 2005/2006 household budget survey also demonstrate that the substantial amounts spent on fuel subsidies have only partially benefited the poor, with around 80 percent of the benefits accruing to the non-poor, while the high cost of health care discourages the poor from seeking care. The survey also confirms that public health care services do not target the poor, while the increasing share of education sector expenditures allocated to the tertiary sub-sector does not benefit the poor. There are also major leakages in the public transfer schemes targeting the poor.

Trends over the last few years in primary education point to an increase in the GER (gross enrolment rate) in basic education from 58 percent in 1997/98 to 66.5 percent in 2003/04, with adult literacy reaching 50 percent by 2006. Despite substantial progress in girls' education, the GER for girls only reached 51.5 percent in 2003. These average rates of school enrolment in the country hide serious geographic disparities. Boys and urban children enjoy greater education opportunities and higher enrolment rates. Data from a baseline survey carried out by UNICEF in 30 districts reveal significant disparities among different governorates, with enrolment rates for girls ranging from a mere 13.4 percent in Hajja to a respectable 71.7 percent in Al Mahra. The regional disparity amongst boys is less marked, with the lowest rate being 32.2 percent in Hajja, versus a high of 77.6 percent in Amran. Gender disparities, as measured by the ratio of girls to boys is particularly marked in Hajja, where there are only 42 girls for every 100 boys, while in Al Mahra parity is within reach with there being 95 girls for every 100 boys. There are also significant differences in enrolment rates for both boys and girls between rural and urban areas, with girls in urban areas more likely to attend school than boys in rural areas.

While the gender gap in primary enrolment decreased from 37.2 in 90/91 to 24.8 in 2002, the female enrolment rate in the first year of basic education was only 75 percent of the male enrolment rate. Both boys and girls intake rates in the past few years have increased in large measure due to the emphasis on improving primary school education. Boys are making greater gains in response to these improvements in education access, while girls' primary intake rate continues to lag behind.

The available data shows that both under-five and infant mortality rates had a clear downward trend from 1990 to 2006 – especially during 1990-1997 and 2003-2006. On the other hand, maternal mortality in Yemen in 1990 was generally believed to exceed 500 per 100,000 live births. The ratio had fallen to around 350 by the time the 1997 DHS was carried out, but has not shown much change since, as illustrated by a figure of 365 given in the DHS of 2003. Maternal mortality is the leading cause of deaths among women of reproductive age, accounting for 42 percent of all deaths. 77 percent of births took place at home, with less than 30 percent attended by a qualified person. The high neonatal mortality rate, at 37 per 1000 live births, is closely correlated with the maternal mortality rate.

Yemen has undertaken a certain number of reforms that gradually have liberalized the economy and increased the opportunity for participation of the private sector in the provision of basic social services. Increased provision of health care services by the private sector and stagnant allocation of public resources to the sector has made it more difficult for the poor to access

health care services at the same time as the quality of public health services has declined due to migration of the more qualified staff to the private sector.

Yemen is also unlikely to meet the MDG target of reducing the proportion of people without access to safe drinking water. The rate of progress in access to safe water has been slow, and without an improvement in the rate of change the target is unlikely to be met. The same can be said about the MDG target of reducing the proportion of people without access to improved sanitation.

As indicated, Yemen is not on track to achieve the MDGs, with the possible exception of universal primary education and child mortality. The likely reasons for the slow pace of improvement include insufficient allocation of resources to MDGs, poor use of resources actually allocated to MDGs, and slow growth in household incomes.

The persistence of population growth at rates exceeding 3 percent further complicates the task of reaching the MDGs by requiring substantial increases in services provided simply in order to maintain current coverage rates. For example, with respect to the income poverty goal, the 3 percent increase in population absorbs around 3/4 of the 4 percent annual increase in consumption registered in the period since 2000, thus only allowing for a 1 percent increase in per capita consumption.

Analysis of the factors behind the slow pace of progress towards MDGs indicates the need for a multi-pronged approach including promotion of pro-poor growth, introduction of measures that curb population growth, and ensuring that sufficient MDG services are delivered in areas where bottlenecks to more rapid progress are particularly evident.

In addition to moving forward with actual implementation of previously agreed policies for increased allocation of public resources to basic social services, it is important that the pro-poor focus of such expenditures be improved, inter alia through increased attention to primary education and preventive health care.

Given wide regional diversities in the values of MDG indicators, it is critical that greater attention be paid to areas with the greatest levels of relative deprivation in order to make sure national targets are met in an equitable manner.

2.3. Concluding remarks

Since the reunification of the country in 1990, Yemen has made some progress towards achieving the MDGs. However, the country is currently off-track to reach most of the goals by 2015 (see Table 2.3). While there are opportunities for improving the contribution that economic growth and social policies make towards attainment of MDGs, the steep improvements needed with respect to most indicators for achieving the globally agreed MDG targets render the attainment of these goals unlikely under the most favorable conditions. It might well be necessary to adopt country specific realistic targets that can actually serve as guides to action.

3. Methodology and Data

Our quantitative analysis is based on MAMS, a dynamic-recursive computable general equilibrium (CGE) model, and a (linked) microsimulation model. Taking as reference a baseline scenario for 2004-2015 that assumes continuation of main past economic trends, simulations are conducted to analyze different aspects of MDG achievement. MAMS innovatively incorporates an MDG module that links specific MDG interventions to MDG achievements. The relatively detailed treatment of government activities in MAMS makes this link possible. Specifically, MAMS has a relatively detailed treatment of (1) government and private sector activities in MDG-related areas, in education extended to include higher levels and (2) MDG outcomes as a function of relevant services (provided by the government and private sectors) and other determinants. A sequential “top-down” approach is followed to link the labor market results of MAMS to the microsimulation model, used to quantify the evolution of poverty and inequality. For a detailed description of MAMS and the microsimulation models, see Lofgren and Díaz-Bonilla (2010) and Vos and Sanchez (2010), respectively. In this section we describe the Yemen data used for the two models.

MAMS for Yemen was calibrated to a 2004 Social Accounting Matrix (SAM)² and other data. Table 3.1 shows the accounts in the SAM, which determine the size (i.e., disaggregation) of the model. The government is disaggregated into eight activities: four cycles (levels) of education (basic grades 1 to 6, basic grades 7 to 9, secondary, and tertiary cycles), health, water and sanitation, other public infrastructure, and other government services.³ In the following, the basic grades 1-6 are referred to as primary education (following international standards for the length of primary education). Because of our focus on the MDGs, in addition to other private services, the private service sector is disaggregated into four education activities (with the same cycles as in government education) and a private health activity.⁴ The rest of the economic activities (agriculture and industry) are disaggregated into the twelve sectors showed in Table 3.1. For these sectors, output is exported and sold domestically, competing with imports.

² See Pacheco (2009) for details on the construction of this SAM.

³ As can be seen, the official basic education cycle was split into two sub-cycles; the first includes grades 1-6, and the second includes grades 7-9.

⁴ According to official estimates, the share of students in private institutions is 2.3 percent, 2.0 percent and 14.9 percent for basic, secondary and high education, respectively.

Table 3.1: Accounts in the Yemen 2004 Social Accounting Matrix

Sectors (25)	Sectors (25) – cont.	Institutions (3)
<i>Private (17)</i>	<i>Government (8)</i>	Hoseholds
Agriculture	Water and sanitation	Government
Crude oil, gas and other mining	Other infrastructure	Rest of the world
Food and beverages	Health government	
Textil	Basic education g1-g6	Interest payments (3)
Wood, paper and press	Basic education g7-g9	Domestic interest payments
Liquid petroleum products	Secondary education	Foreign interest payments
Chemical products	Tertiary education	
Non-metal industry	Other government	Capital accounts (3)
Metal and equipment		Hoseholds
Other manufactures	Factors of production (13)	Government
Construction	Unskilled labor	Rest of the world
Other services	Semi-skilled labor	
Health Private	Skilled labor	Investment accounts (9)
Basic education g1-g6	Private capital	<i>Private (2)</i>
Basic education g7-g9	Natural resource	Gross capital formation
Secondary education	Government capital (8)	Stock changes
Tertiary education		<i>Government (8)</i>
	Tax accounts (4)	Water and sanitation
	Commodity taxes	Other infrastructure
	Factor taxes	Health government
	Direct taxes	Basic education g1-g6
	Import taxes	Basic education g7-g9
		Secondary education
		Tertiary education
		Other government

Among the factors of production, there are three types of labor: those with less than completed secondary education (unskilled), with completed secondary education but not completed tertiary (semi-skilled), and with completed tertiary (skilled). Each of these labor types is therefore linked directly to an educational cycle. The growth in the labor force and changes in its composition will in part depend on the functioning of the education system in the model.⁵ The remaining factors include public capital stocks by government activity, a private capital stock, and a natural resource used in oil extraction.

The institutions include the government, a household (the private domestic institution, which represents both households and domestic enterprises), and the rest of the world. Each institution has its own capital account. Taxes have been disaggregated into direct, import, and

⁵ Notice that workers are classified as “unskilled” labor unless they have completed secondary education or higher.

commodity taxes/subsidies. There is one private investment account and eight public investment accounts (one for each government sector). Lastly, the SAM includes accounts for domestic and foreign interest payments. The sectoral structure of Yemen as pictured in the SAM is described in Table A2 in the Appendix.

Apart from the SAM, the MAMS database includes data related to the different MDGs, the labor market, and various elasticities. Most importantly, the first two data types include levels of service delivery required to meet the different MDGs, number of students at different educational levels, student behavioral patterns in terms of promotion rates and other indicators, and number of workers and initial unemployment rates by skill level (i.e., educational achievement). The elasticities include those in production, trade, consumption, and in the different MDG functions. This version of MAMS covers MDGs 2 (primary education), 4 (under-five mortality) and 7 (water and sanitation access).⁶ The elasticities for the MDG functions are informed by two studies done for Yemen by UN-DESA; see Sanchez and Sbrana (2009) and Sbrana (2009) for education and water and sanitation, respectively. However, rather than using the exact point estimates from the econometric partial equilibrium analysis, we use the relative importance of the determinants in choosing the (general equilibrium) elasticities. In addition, the MAMS elasticities were adjusted in order to generate plausible trends under baseline conditions – and this procedure was, in fact, entirely used to define plausible elasticity values for MDG 4 in view of a lack of empirical studies and data to better inform the definition of these elasticities. Reflecting these adjustments, Table 3.2 shows the determinants in the MAMS functions that define MDG outcomes and the corresponding elasticities used in the model.⁷

Table 3.2: Elasticities for the determinants of MDGs

MDG	service	per-capita	wage	public infra	other
Basic education (grd1-grd6)					
First grade net intake rate	1.563	0.195	0.004	0.781	-0.031
Promotion rate	0.466	0.039	0.001	0.155	-0.004
Continuation rate (**)	0.733	0.105	0.001	0.105	-0.020
Under-five mortality rate	-0.865	-0.087		-0.087	-0.084
Access to safe water	0.261	0.010		0.010	-0.084
Access to basic sanitation	1.201	0.120		0.120	-0.105
(*) refers to MDG 4 for education and MDG 7a and 7b for health					
(**) to grd7-grd9 among students who were promoted from grd6					

The determinants in the MDG functions include the provision of relevant services (in education, health, and water and sanitation) and other indicators as per capita consumption and the size of the capital stock in public infrastructure, also allowing for the presence of synergies

⁶ MDG 5 (maternal mortality) can also be included in the version of MAMS being used, but was left out as data was insufficient.

⁷ Sensitivity analysis for the elasticities shows that the overall qualitative results do not change. In addition to the primary education elasticities shown in Table 3.2, the database includes similar data points for the higher educational levels (except for that no continuation rate is defined for tertiary education, this being a terminal level).

between MDGs, i.e., the fact that achievements in terms of one MDG can have an impact on other MDGs. For example, improvements in water and sanitation (i.e., MDG 7) will have a positive impact on the MDG 4. In the cases of health and water and sanitation (i.e., MDGs 4, 7w and 7s), service provision is expressed relative to the size of the population. For the MDG 2, the treatment is slightly more complex. The arguments in Table 3.2 determine the shares of children that enter basic school (out of the cohort of six-year olds), and successfully complete their current grade (among those enrolled in the first basic cycle). The shares that repeat their current grade or drop out from it are determined residually. The service level is measured per enrolled student, an indicator of educational quality. MDG 4 is included as a proxy for the health status of those enrolled. Wage incentives, an indicator of payoffs from continued education, are expressed as the ratio between the wages for labor at the next higher and the current levels of education.

For the secondary and tertiary cycles, the same set of arguments enter functions that determine the shares of enrolled students that pass as well as the shares of graduates from the previous cycle that enter the first grade of these two cycles. The only differences are that the arguments for services (per enrolled student) and wage incentives are redefined to be relevant to these higher cycles and that no continuation rate is defined for the tertiary cycle (as it is viewed as a terminal cycle).

In MAMS, the net (on-time) primary completion rate is the indicator that is targeted in relation to MDG 2 – rather than the net enrolment rate which is the official indicator but is a less informative measure of the extent to which the relevant age group is able to complete the six-year primary cycle.⁸ More specifically, in any year, the net completion rate is defined as the share of the students that would complete primary school on time if this year's net intake and grade promotion rates were to prevail during the coming six years.⁹ Considering the recent evolution of the school system in Yemen and the definition used for the MDG 2, the target for the net on time primary completion rate was adjusted downwards to around 81.5 percent, a rate that still is very ambitious. It could, for example, be the outcome of a 97 percent net intake rate and 97 percent promotion rates throughout the six years of primary schooling. In addition, we report other indicators related to the primary cycle, the gross enrollment rate and the gross completion rate; the latter is used by the World Bank as an alternative MDG 2 indicator.

Generally speaking, the functions for educational outcomes and the other (i.e., non-education) MDGs have all been calibrated to assure that, under base-year conditions, base-year indicators are replicated and that, under a set of other conditions identified in the Yemen Needs Assessment Report (see MOPIC (2005)), the target is fully achieved. Specifically, the Yemen Needs Assessment Report provides estimates of government sectoral spending needs (current

⁸ According to the UN Millennium Declaration, the primary schooling target is to “ensure that, by the same date [2015], children everywhere, boys and girls alike, will be able to complete a full course of primary schooling and that girls and boys will have equal access to all levels of education.”; see <http://www.un.org/millennium/declaration/ares552e.htm>.

⁹ Mathematically, $NPCR_t = NIR_t (PR_t)^y$ where $NPCR$ = net primary completion rate; NIR = net intake rate ($0 \leq NIR \leq 1$); PR = promotion rate ($0 \leq PR \leq 1$); and y = number of grades in the primary cycle. As a simplification, MAMS assumes a uniform PR for all primary grades. This is a period measure; the corresponding cohort measure would use the relevant rates over a series of six year.

and capital) for the period 2006-2015 – which inform MAMS to, later on, generate government spending needs, again, but in a general equilibrium framework.

For all the scenarios that it simulates, MAMS provides wage and employment by activity and labor category (with labor split between three educational levels). In the microsimulation model, this information is used to, in turn, generate a full picture of the impact of changes in the labor market variables on the level and distribution of micro-level household incomes.

As the database for our microsimulation model, we use the Yemen Household Budget Survey 2005/2006; it covers 98,941 individuals in 13,136 households. The information from the household survey is used to estimate the poverty and inequality impacts of different counterfactual scenarios, linking the microsimulation model to the results generated by MAMS. MAMS communicates with the microsimulation model in a “top-down” fashion (i.e., without feedback) via the following aggregate linking variables: wages, sectoral structure of employment, unemployment, and non-labor income. That is to say, results from MAMS scenarios are taken and applied to the full distribution of income as given by the household survey and assume there are no further feedback effects that would affect MAMS. The microsimulation model follows the non-parametric methodology described in Vos and Sanchez (2010) but extended to consider changes in non-labor income. The labor-market structure is defined in terms of the following parameters: unemployment among different groups of the population at working age defined according to skill, sectoral structure of employment, relative and overall level of wages, and skill composition of the employed population. The effect of altering each of those six parameters on poverty and inequality is analyzed. In addition, we consider changes in non-labor income. Specifically, the (per capita) non-labor income is increased or decreased in order to match the change in per capita household income estimated using MAMS. The change in per capita non-labor income depends on the household initial endowment of non-labor income. As a consequence, the absolute change in non-labor income is larger for those households that, according to the HBS, have more non-labor income in the base year.

The microsimulation model estimates a counterfactual individual labor and non-labor income for each MAMS scenario. This new individual income distribution is used to compute a counterfactual household income distribution. We then calculate several standard inequality and poverty indicators such as the Gini coefficient and the poverty headcount ratio.

4. Simulations and Results

This section presents the simulations and analyzes the results for both MAMS and the microsimulation model. The first simulation (base) addresses the question of whether Yemen will achieve the MDGs under current policies and trends. As will be explained later, the MDGs are not achieved under a “business as usual” (BaU) scenario. Taking this base scenario as a benchmark, the other simulations, here referred to as MDG simulations, assess the changes in government spending that are needed to achieve the MDGs and what are the costs and economy-wide effects of trying to achieve the MDGs. These simulations focus on one MDG at a time and then on all MDGs together; each will be run under alternative assumptions about the source of any additional government financing that is needed: foreign transfers (ftr), foreign borrowing (fb), domestic taxes (tax), or domestic borrowing (db) (see Table 4.1 for the definitions).

To be more precise, the domestic borrowing scenarios impose an exogenous increase in domestic borrowing combined with an endogenous increase in direct taxes; each year the government borrows from the domestic private sector around 5 percent of the GDP. For simplicity, in what follows we refer to this scenario as the “domestic borrowing” scenario.

Table 4.1: Simulation names and descriptions

Name	Description	Financing
base	business as usual	Foreign transfers
mdg2-ftr	Targeting of MDG 2	Foreign transfers
mdg2-fb		Foreign borrowing
mdg2-db		Domestic borrowing (*)
mdg2-tax		Direct taxes
mdg45-ftr	Targeting of MDGs 4 and 5	Foreign transfers
mdg45-fb		Foreign borrowing
mdg45-db		Domestic borrowing (*)
mdg45-tax		Direct taxes
mdg7-ftr	Targeting of MDGs 7a and 7b (water and sanitation)	Foreign transfers
mdg7-fb		Foreign borrowing
mdg7-db		Domestic borrowing (*)
mdg7-tax		Direct taxes
mdg-ftr	Targeting of all MDGs simultaneously	Foreign transfers
mdg-fb		Foreign borrowing
mdg-db		Domestic borrowing (*)
mdg-tax		Direct taxes

(*) combined with direct taxes.

4.1. Base Scenario

For the base scenario, which serves as a benchmark for comparisons, we impose the observed growth rates in real GDP at factor cost for the period 2005-2010, and an average growth of 5.2 percent starting from 2011, based on projections from the Fourth Five-Year Socio-Economic Development Plan for Poverty Reduction 2011-2015. The exogenous part of TFP growth is adjusted to generate such a growth path. GDP growth is endogenous for all non-base scenarios. In addition, as a part of the base scenario calibration, we impose a decrease in the exploitation of the natural resource factor in the oil and gas extraction sector; this reflects the recent evolution of the oil and gas sector in Yemen (see Section 2).¹⁰

In the base scenario, government consumption of (or demand for) education and non-education services commodities is kept fixed as a share of absorption (i.e. total domestic final demand) at the base year value. Transfers from government to households are kept fixed as a share of GDP. Tax rates are fixed over time, while the amount spent on commodity subsidies (basically, refined oil products) decreases gradually between 2011 and 2015, according to official projections. The ratio between domestic government debt stock and GDP increases from 10% in 2004 to about 16% during 2011-2015; domestic borrowing is adjusted accordingly. The foreign debt-to-GDP ratio increases from 30 percent in the base year to 37 percent in 2015, being 23 percent in 2009. These assumptions generate results that are consistent with recent trends (see CBY (2010)).

At the macro level, MAMS – as any other CGE model – has three underlying balances (see Robinson and Lofgren 2005). For the base, the government fiscal account is balanced via adjustments in foreign borrowing. The base assumption for private investment is that it is fixed as a share of domestic absorption; given this, adjustments in private savings clear the savings-investment balance; i.e. savings is investment-driven. Across all simulations, the real exchange rate equilibrates inflows and outflows of foreign exchange, by influencing export and import quantities. The non-trade-related payments of the balance of payments (transfers and foreign investment) are non-clearing, determined by their own rules – exogenous shares of GDP are assumed.

The rule for keeping the government account in balance is modified for most MDG simulations. As noted, the government will rely on four alternatives: foreign borrowing (fb), domestic borrowing (db), direct taxes (tax), and an endogenous component of transfers from the rest of the world to the government referred to as foreign grants (the alternative used for the base scenario) (ftr). For non-base scenarios, private investment adjusts endogenously to maintain balance between total savings (from different sources) and total investment (i.e., the model becomes savings-driven). Consequently, the model will capture the crowding-out of private investment when domestic sources of financing are used to achieve the MDGs through increased government spending. The CPI is the model numéraire.

Among factor stocks, growth is driven by investment and depreciation for the different capital types, by a combination of demographic factors and the functioning of the educational system

¹⁰ Specifically, our assumption is based on past and expected evolution of the oil and gas extraction sector real GDP; data was taken from official sources.

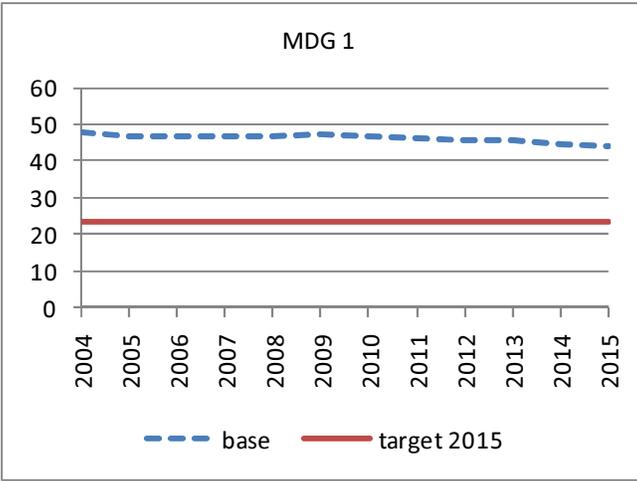
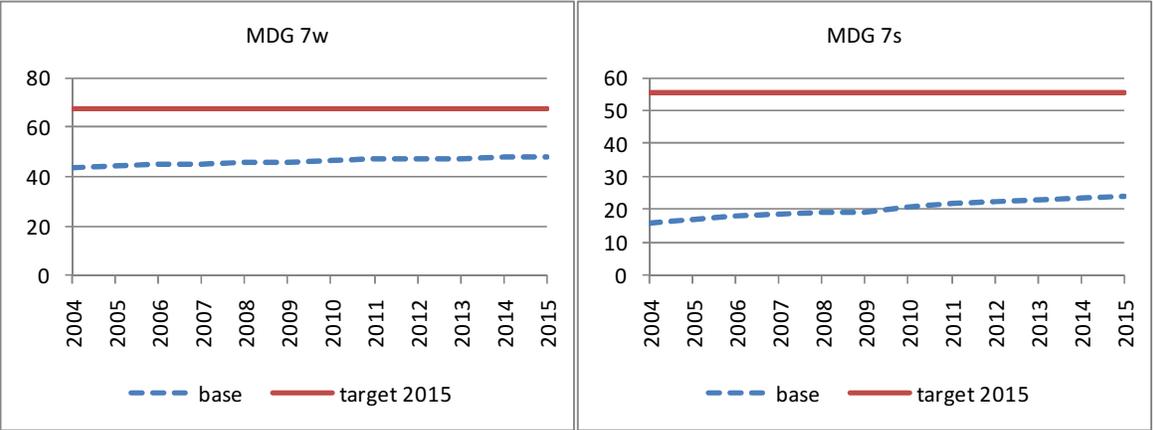
for the different labor categories, and by an exogenous growth rate for natural resources used in the oil and gas extraction sector. For the different types of government capital, markets are not specified; however, it is required that investment be sufficient to ensure that stocks grow at the same pace as the services that are produced. For other factors, flexible wages (or rents) clear the markets. For the different labor types, the model replicates observed unemployment rates in the base year. In other years, the unemployment rate and the wage will typically both change following a “wage-curve” formulation (Blanchflower and Oswald 1994); declines in the unemployment rate will be combined with wage increases and vice versa unless unemployment is at the minimum level (set at 5 percent), at which point wage movements will clear the labor market in question; for the other factors with wage-clearing, supply curves are vertical leaving the adjustments to the demand side.

In the base scenario, the economy evolves according to recent trends, with most macro aggregates growing at 4-5 percent per year, at the upper end of this range for private and public consumption and at the lower end for exports. Relative to GDP, export and import shares in GDP decrease. Per-capita household consumption grows at a rate of 1.6 percent per year. The exchange rate depreciates over time, reflecting the decrease in (real) oil exports. As explained, the foreign debt-to-GDP ratio reaches 37 percent in 2015, a level that is within the range observed for other countries at Yemen’s income level. This increase in foreign borrowing brings about a net improvement in the non-trade balance (in foreign currency) and an increase in the trade deficit (also in foreign currency). However, the decline in oil exports is so large that some depreciation is still required to keep the trade deficit within the permitted limit.

As a result of growth in GDP, government service provision and household per capita consumption, the indicators for MDGs 2 (completion of primary education), 4 (under-five mortality rate), 7w (water access) and 7s (sanitation access) as well as poverty all improve (see Tables 4.2 and 4.3). However, Yemen is not on track to achieve any of these MDGs by the 2015 deadline. Figure 4.1 shows the 2015 targets and the paths over time for the different MDGs. As explained, the MDG 5 is not considered in our MAMS analysis.

Figure 4.1: MDG targets and paths, 2004-2015





(*) 2004 = interpolated value.

According to the microsimulation results, the poverty rate based on the US\$ 2 PPP poverty line decreases from 46.6 in 2005 to 44.1 in 2015, a decline that falls short of the 23.5 percent MDG target. The decline in the poverty rate is primarily due to the increase in non-labor income.¹¹

¹¹ In case the change in non-labor income is ignored, the poverty rate reaches 47 in 2015.

*Table 4.2: Real macro indicators
(percent annual growth, 2004-2015)*

Macroeconomic Aggregate	2004 (LCU) (*)	base	MDG 2				MDG 4			
			ftr	fb	tax	db	ftr	fb	tax	db
Absorption	2536.1	5.3	6.4	6.4	5.3	4.5	7.6	7.6	4.6	3.8
Consumption - private	1691.6	5.4	6.3	6.3	4.9	4.3	6.7	6.7	0.8	-1.0
Consumption - government	325.6	5.5	7.6	7.6	7.7	7.7	8.4	8.4	9.4	9.7
Fixed investment - private	274.3	4.1	5.3	5.3	3.6	-1.4	5.9	5.9	-0.6	-11.7
Fixed investment - government	262.7	4.8	5.4	5.4	5.5	5.3	12.3	12.3	14.8	15.9
Exports	930.8	1.5	0.3	0.3	1.1	0.4	-1.3	-1.3	1.0	0.3
Imports	909.2	3.6	4.9	4.9	3.5	2.7	7.1	7.1	3.3	2.5
GDP at factor cost		5.1	5.4	5.4	5.0	4.2	5.6	5.6	4.3	3.3
Total factor employment (index)		2.8	3.0	3.0	2.9	2.4	3.9	3.9	3.8	3.4
Total factor productivity (index)		2.3	2.4	2.4	2.1	1.8	1.7	1.7	0.5	-0.1
Real exchange rate (index)		2.4	1.2	1.2	2.2	1.8	-0.4	-0.4	2.5	2.2

(*) billions Yemeni Rials.
References: fb = foreign borrowing; db = domestic borrowing; tax = direct taxes; ftr = foreign grants
Source: Authors' estimates.

*Table 4.2, cont: Real macro indicators
(percent annual growth, 2004-2015)*

Macroeconomic Aggregate	2004 (LCU)	base	MDG 7a and 7b				All MDGs			
			ftr	fb	tax	db	ftr	fb	tax	db
Absorption	2536.1	5.3	5.7	5.7	5.2	4.4	9.0	9.0	4.6	3.7
Consumption - private	1691.6	5.4	5.5	5.5	4.8	4.2	8.4	8.4	-0.4	-2.0
Consumption - government	325.6	5.5	6.3	6.3	6.3	6.4	9.9	9.9	11.3	11.5
Fixed investment - private	274.3	4.1	4.3	4.3	3.5	-1.5	8.1	8.1	-1.7	-17.2
Fixed investment - government	262.7	4.8	6.8	6.8	6.9	7.0	12.0	12.0	15.2	15.9
Exports	930.8	1.5	1.1	1.1	1.4	0.7	-4.0	-4.0	0.4	-0.4
Imports	909.2	3.6	4.2	4.2	3.6	2.8	9.5	9.5	3.0	2.2
GDP at factor cost		5.1	5.2	5.2	5.0	4.2	6.0	6.0	4.0	3.1
Total factor employment (index)		2.8	3.0	3.0	2.9	2.5	4.0	4.0	3.9	3.6
Total factor productivity (index)		2.3	2.2	2.2	2.1	1.7	1.9	1.9	0.1	-0.4
Real exchange rate (index)		2.4	2.0	2.0	2.4	2.1	-2.9	-2.9	2.0	1.7

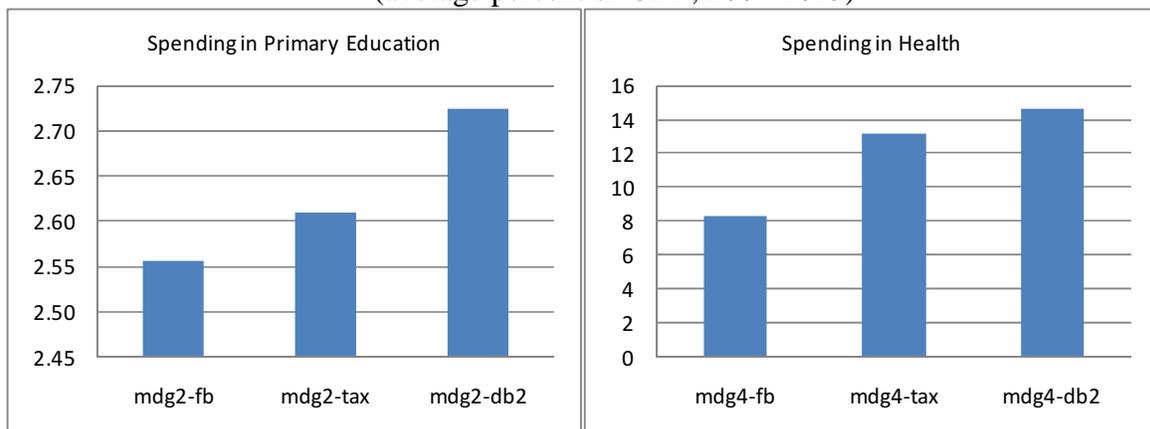
(*) billions Yemeni Rials.
References: fb = foreign borrowing; db = domestic borrowing; tax = direct taxes; ftr = foreign grants
Source: Authors' estimates.

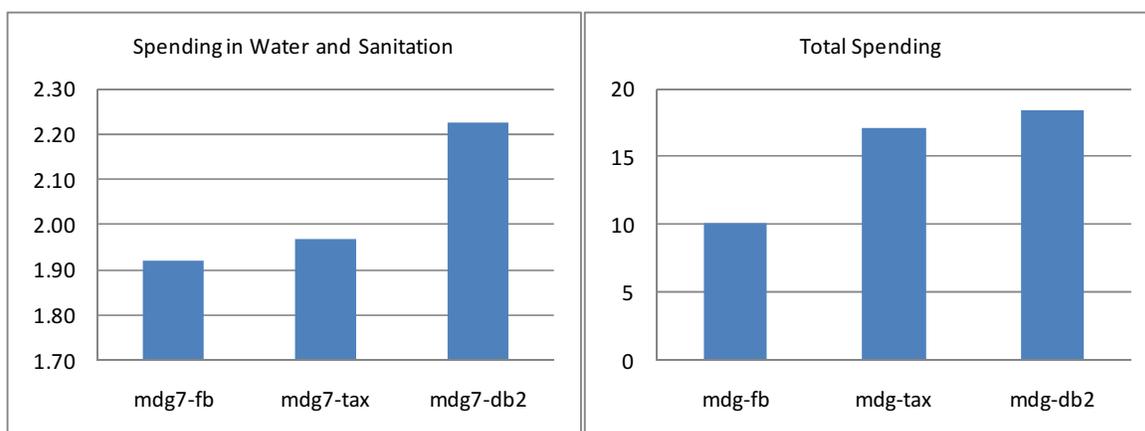
Table 4.3: MDG indicators
(values in 1990, base year and 2015)

year or simulation (*)	MDG				
	mdg1	mdg2	mdg4	mdg7w	mdg7s
1990	47.0	52.7	122.0	34.9	10.6
2004	46.6	16.8	93.4	43.9	15.9
goal2015	23.5	100.0	40.6	67.4	55.3
base	44.3	55.8	68.2	67.4	55.3
mdg2- <i>fr</i>	36.6	87.6	63.5	48.0	23.8
mdg2- <i>fb</i>	36.6	87.6	63.5	48.7	25.2
mdg2- <i>tax</i>	39.9	87.6	71.9	48.7	25.2
mdg2- <i>db2</i>	41.4	87.6	76.3	47.5	22.9
mdg4- <i>fr</i>	36.5	57.3	40.6	46.6	21.3
mdg4- <i>fb</i>	36.5	57.3	40.6	49.6	26.8
mdg4- <i>tax</i>	41.6	52.6	40.6	49.6	26.8
mdg4- <i>db2</i>	43.8	51.0	40.6	45.7	19.2
mdg7- <i>fr</i>	43.4	56.0	62.5	44.2	16.6
mdg7- <i>fb</i>	43.4	56.0	62.5	67.4	56.2
mdg7- <i>tax</i>	44.6	55.4	66.0	67.4	56.2
mdg7- <i>db2</i>	46.1	54.8	69.6	67.4	56.0
mdg- <i>fr</i>	29.1	87.7	40.6	68.4	57.5
mdg- <i>fb</i>	29.1	87.7	40.6	67.4	56.9
mdg- <i>tax</i>	36.5	87.5	40.6	67.4	56.9
mdg- <i>db2</i>	38.8	87.5	40.6	67.7	55.3

(*) the values for simulations are for 2015.
units: % for MDGs 1, 2, 7a, and 7b; per 1000 for MDG 4.
Source: Authors' estimates.

Figure 4.2: Additional government current and capital spending, different scenarios (average percent of GDP, 2004-2015)





Source: Authors' estimates.

Table 4.4: Government consumption, capital stock and fixed investment: annual growth and average share of GDP, 2004-2015 (percent)

Spending Item	2004 (LCU) (*)	base	MDG 2				MDG 4			
			fr	fb	tax	db	fr	fb	tax	db
<i>Average annual growth rate (%)</i>										
Consumption										
Basic education (grd1-grd6)	55.8	5.8	13.3	13.3	13.4	13.5	5.9	5.9	5.6	5.6
Health	19.6	5.1	5.1	5.1	5.1	5.1	25.1	25.1	29.0	29.9
Water and sanitation	0.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Capital stocks (**)										
Basic education (grd1-grd6)	8.9	6.0	13.0	13.0	13.2	13.2	6.1	6.1	5.9	5.9
Health	21.1	5.5	5.5	5.5	5.5	5.5	23.5	23.5	27.1	27.7
Water and sanitation	13.1	6.1	6.5	6.5	5.8	5.3	6.9	6.9	4.9	4.3
<i>Average GDP share for 2004-2015 (%)</i>										
Consumption										
Basic education (grd1-grd6)	2.2	2.3	4.3	4.3	4.3	4.3	2.5	2.5	2.5	2.5
Health	0.8	0.8	0.8	0.8	0.8	0.9	2.9	2.9	3.9	4.1
Water and sanitation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fixed investment										
Basic education (grd1-grd6)	0.3	0.4	1.0	1.0	1.0	1.0	0.4	0.4	0.4	0.4
Health	0.8	0.8	0.8	0.8	0.8	0.8	7.1	7.1	10.9	12.2
Water and sanitation	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.4
(*) billions Yemeni Rials.										
(**) value for 2004 refers to investment										
References: fb = foreign borrowing; db = domestic borrowing; tax = direct taxes; fr = foreign grants										
Source: Authors' estimates.										

Table 4.4, cont.: Government consumption, capital stock and fixed investment, annual growth and average share of GDP 2004-2015 (percent)

Spending Item	2004 (LCU) (*)	base	MDG 7a and 7b				All MDGs			
			ftr	fb	tax	db	ftr	fb	tax	db
<i>Average annual growth rate</i>										
Consumption										
Basic education (grd1-grd6)	55.8	5.8	5.8	5.8	5.7	5.7	13.1	13.1	13.9	14.1
Health	19.6	5.1	5.1	5.1	5.1	5.1	22.1	22.1	27.7	28.3
Water and sanitation	0.1	5.1	70.5	70.5	70.9	72.5	68.7	68.7	72.8	73.8
Capital stocks (**)										
Basic education (grd1-grd6)	8.9	6.0	6.0	6.0	6.0	6.0	12.9	12.9	13.5	13.6
Health	21.1	5.5	5.5	5.5	5.5	5.5	20.7	20.7	25.9	26.3
Water and sanitation	13.1	6.1	15.2	15.2	15.2	15.6	15.1	15.1	15.4	15.5
<i>Average GDP share for 2004-2015 (%)</i>										
Consumption										
Basic education (grd1-grd6)	2.2	2.3	2.3	2.3	2.3	2.3	4.6	4.6	5.0	5.1
Health	0.8	0.8	0.8	0.8	0.8	0.8	2.5	2.5	3.9	4.0
Water and sanitation	0.0	0.0	0.6	0.6	0.6	0.6	0.5	0.5	0.7	0.7
Fixed investment										
Basic education (grd1-grd6)	0.3	0.4	0.4	0.4	0.4	0.4	0.9	0.9	1.0	1.1
Health	0.8	0.8	0.8	0.8	0.8	0.9	4.9	4.9	9.4	10.2
Water and sanitation	0.5	0.6	1.9	1.9	2.0	2.2	1.7	1.7	2.0	2.1
(*) billions Yemeni Rials.										
(**) value for 2004 refers investment										
References: fb = foreign borrowing; db = domestic borrowing; tax = direct taxes; ftr = foreign grants										
Source: Authors' estimates.										

Table 4.5: Government receipts and spending in base year and by simulation in final year (percent of GDP)

Indicator	2004	Final year								
		base	MDG 2				MDG 4			
			ftr	fb	tax	db	ftr	fb	tax	db
Receipts										
Direct taxes	5.7	5.7	5.7	5.7	13.6	13.1	5.7	5.7	37.3	43.9
Import tariffs	2.1	2.6	2.5	2.5	2.4	2.3	2.6	2.6	2.6	2.5
Other indirect taxes (net)	-5.1	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3
Foreign transfers	1.6	2.2	10.1	1.8	2.1	2.2	21.4	1.5	2.2	2.3
Factor income	20.3	15.8	14.4	14.4	15.0	16.2	14.1	14.1	15.7	17.0
Domestic borrowing	5.8	1.6	1.5	1.5	1.6	5.9	1.5	1.5	1.7	5.9
Foreign borrowing	-3.9	3.9	3.2	12.1	3.7	3.8	2.7	23.7	3.9	4.1
Total	26.5	30.4	36.1	36.7	37.1	42.2	46.7	47.8	61.9	74.4
Spending										
Consumption	12.7	13.9	20.1	20.1	20.2	21.2	20.6	20.6	24.1	26.3
Fixed investment	10.3	12.0	11.7	11.7	12.4	13.3	21.9	21.9	33.3	40.2
Private transfers	1.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Domestic interest payments	1.7	1.7	1.5	1.5	1.6	4.9	1.5	1.5	1.7	5.0
Foreign interest payments	0.4	0.4	0.4	0.9	0.4	0.4	0.3	1.5	0.4	0.5
Total	26.5	30.4	36.1	36.7	37.1	42.2	46.7	47.8	61.9	74.4
References: fb = foreign borrowing; db = domestic borrowing; tax = direct taxes; ftr = foreign grants										
Source: Authors' estimates.										

*Table 4.5, cont.: Government receipts and spending
in base year and by simulation in final year
(percent of GDP)*

Indicator	Final year									
	2004	base	MDG 7w and MDG 7s				All MDGs			
			ftr	fb	tax	db	ftr	fb	tax	db
Receipts										
Direct taxes	5.7	5.7	5.7	5.7	9.8	9.8	5.7	5.7	48.6	54.0
Import tariffs	2.1	2.6	2.6	2.6	2.6	2.5	2.3	2.3	2.2	2.1
Other indirect taxes (net)	-5.1	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3
Foreign transfers	1.6	2.2	6.3	2.1	2.2	2.3	25.7	1.1	2.0	2.1
Factor income	20.3	15.8	15.8	15.8	16.1	17.5	13.0	13.0	14.9	16.1
Domestic borrowing	5.8	1.6	1.6	1.6	1.6	5.9	1.3	1.3	1.5	5.8
Foreign borrowing	-3.9	3.9	3.7	8.2	3.9	4.1	1.9	27.8	3.5	3.7
Total	26.5	30.4	34.4	34.7	35.0	40.7	48.5	49.8	71.4	82.5
Spending										
Consumption	12.7	13.9	15.5	15.5	15.5	16.5	27.1	27.1	34.9	37.6
Fixed investment	10.3	12.0	14.4	14.4	14.9	16.4	17.5	17.5	32.1	37.2
Private transfers	1.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Domestic interest payments	1.7	1.7	1.6	1.6	1.7	5.0	1.3	1.3	1.6	4.8
Foreign interest payments	0.4	0.4	0.4	0.7	0.4	0.5	0.2	1.5	0.4	0.4
Total	26.5	30.4	34.4	34.7	35.0	40.7	48.5	49.8	71.4	82.5
References: fb = foreign borrowing; db = domestic borrowing; tax = direct taxes; ftr = foreign grants										
Source: Authors' estimates.										

Table 4.6: Financing needs
(percent)

year or simulation	for debt GDP ratio (*)	dom debt GDP ratio (*)	foreign grants (**)	direct taxes (**)
2004	29.9	10.0	1.6	5.7
base	36.9	16.7	2.1	5.7
mdg2- <i>ft</i> r	30.9	15.5	5.9	5.7
mdg2- <i>fb</i>	76.3	15.5	1.9	5.7
mdg2- <i>tax</i>	35.0	16.1	2.0	9.4
mdg2- <i>db</i>	36.7	48.9	2.1	7.8
mdg4- <i>ft</i> r	25.9	14.9	11.1	5.7
mdg4- <i>fb</i>	122.9	14.9	1.8	5.7
mdg4- <i>tax</i>	37.1	16.8	2.4	19.0
mdg4- <i>db</i>	39.2	50.0	2.4	18.7
mdg7- <i>ft</i> r	35.1	16.4	3.9	5.7
mdg7- <i>fb</i>	57.1	16.4	2.1	5.7
mdg7- <i>tax</i>	37.1	16.7	2.1	7.5
mdg7- <i>db</i>	38.9	49.8	2.1	6.1
mdg- <i>ft</i> r	18.0	12.8	13.9	5.7
mdg- <i>fb</i>	127.4	12.8	1.6	5.7
mdg- <i>tax</i>	33.3	15.6	2.3	24.2
mdg- <i>db</i>	34.9	47.7	2.3	23.8
(*) the values for simulations are for 2015.				
(**) average GDP share 2004-2015.				
Source: Authors' estimates.				

4.2. MDG Simulations

As explained, the MDG simulations impose the achievement of one or more of the MDGs (see Table 4.1). Throughout, MDG 1, the poverty headcount, is not targeted but monitored, both for technical reasons (the top-down approach followed when generating the poverty-inequality results in the microsimulation model) and, more fundamentally, because governments (including Yemen's) in practice cannot target specific poverty outcomes (as they are the result of processes that are not dominated by any available policy tool). In turn, four alternative sources of marginal government financing are considered: foreign grants (*ft*r), foreign borrowing (*fb*), direct taxes (*tax*), and domestic borrowing combined with direct taxes (*db*). The different MDGs are targeted via endogenous variations in government demand (consumption) of the relevant services: primary education services for MDG 2, health for MDG 4, and water and sanitation for MDGs 7w and 7s. The resulting growth in government service production will require increases in government investment; a fixed coefficient relationship links government service provision to government capital demand and required

stock growth. This is the key difference between these simulations and the baseline simulation, under which government demand growth follows an exogenous path (see above).¹²

This simulation design allows us to assess the effects and costs of achieving each MDG separately as well as of the importance of synergies in the form of lower resource needs and costs when the targets are all pursued together. For the MDG simulations, GDP growth may deviate from the rates under the baseline scenario due to different growth rates for TFP (due to changes in the stock of infrastructure and trade openness) and factor stocks, as well as changes in labor unemployment rates.

The simulation results are presented in Tables 4.2-4.7 and Figure 4.2, providing information on macroeconomic aggregates, MDGs, unemployment, and disaggregated government spending required to reach all but MDG 1.

The impact on the rest of the economy from reaching the MDGs will depend on the financing mechanism. In case the marginal financing comes from domestic sources (direct taxes or domestic borrowing), growth declines for private consumption, investment, and GDP. These declines are stronger for the domestic borrowing scenarios, since borrowing directly reduces funding available for private investment, thereby bringing about stronger declines in GDP and private consumption. To make up for the loss in private consumption (which has a positive impact on MDG achievements), it is therefore necessary for the government to add to its spending increase when marginal financing is from domestic borrowing.

On the other hand, when marginal financing comes from foreign sources (in the form of grants or borrowing), the negative impact from increased domestic resource mobilization on private investment will be absent. However, the inflow of foreign resources will give rise to a slower export growth and faster import growth, both will be induced by an appreciation of the real exchange rate.

4.2.1. Targeting MDG 2: Universal Primary Education

As explained, the MDG 2 value, which measures the net (on-time) primary school completion rate, refers to the share of the students that would complete primary school on time if this year's net intake and grade promotion rates were to prevail during the coming six years. Given that it is unreasonable to target 100 percent, we decided to set the target at around 87 percent, which represents a major improvement with respect to the base year value for the MDG 2 indicator in MAMS. MDG 2 is targeted indirectly (not directly like MDGs 4, 7w, and 7s) by targeting, in any single year during 2010-2015, the promotion rate in grades 1-6 of basic

¹² In addition, the following assumptions are made regarding government consumption of non-MDG related commodities (i.e., "other government") in the MDG simulations: (1) absorption share is fixed for scenarios with domestic financing (i.e., those in which absorption decreases), and (2) real growth is the same as in the base for scenarios with foreign financing (i.e., those in which absorption increases). In effect, we assume that the domestic financing option requires not only raising additional domestic resources (via more borrowing or more taxes) but also some domestic reallocation of government resources. As a result, the only government items that expand more rapidly under the MDG scenarios are those directly related to the relevant MDG(s), considering expansion in post-primary education as unavoidable when the number of graduates from primary schooling increases.

school.¹³ In addition, we present results for two related indicators; the gross enrollment rate and the gross completion rate (see Table 4.7). In the MDG scenarios we assume that post-primary education also expands in order to keep the same educational quality (defined as real spending per enrolled student) as in the base scenario in the face of increases in the number of graduates from primary school.

At the macro level, GDP growth increases when marginal financing comes from foreign sources, as in mdg2-ftr and mdg2-fb scenarios; the GDP growth rate is 0.3 percentage points higher - unemployment rate in 2015 decreases 3.8 percentage points (see Table A3). On the other hand, there is a strong decrease in GDP growth in the domestic borrowing scenario (mdg2-db), from 5.1 percent in the baseline to 4.2 percent. The decrease in GDP growth is smaller under the tax financing scenario (mdg2-tax). As explained, GDP growth in the domestic financing scenarios declines as a consequence of the crowding-out of private investment.

Compared to the baseline, the required average annual growth rate of government current consumption of primary education services increases 7.5-7.7 percentage points (see Table 4.4). In addition, public capital stock in primary education grows to 13.4-13.2 percent from 6 percent per year for the baseline scenario (see also Table 4.4). The average GDP share of government current and capital spending in primary education reaches 5.2-5.4 percent, starting from the 2.7 percent for the baseline scenario.

In the foreign borrowing scenario, the ratio between foreign debt stock and GDP reaches 76.3 percent in 2015, an increase of 39.4 percentage points (see Table 4.6). In the tax financing scenario, the ratio between direct tax collection and GDP reaches 13.6 percent in 2015 (not shown); i.e., an increase of 8 percentage points with respect to the baseline scenario.

Compared to the baseline scenario, all four MDG 2 simulations lead to lower employment growth for unskilled workers but higher growth for semi-skilled and skilled workers. This reflects that, instead of entering the labor force, more students remain in school, decreasing the supply of unskilled workers. On the other hand, as more students graduate from secondary and tertiary, the supplies of semi-skilled and skilled workers increase. Consequently, the structure of the labor force changes. For example, in the mdg2-fb simulation, the (relatively large) stock of unskilled labor reaches a level in 2015 which is 2.9 per cent below that of the baseline, while the (smaller) stocks of semiskilled and skilled increase their participation in the total labor force. At the same time, demand for semi-skilled and skilled workers increases as the education sector expands. As a result, wages of skilled workers grow faster than those of other workers.

For the MDG 2 simulations, the 2015 poverty rates are lower than for the baseline, mainly as a result of a decrease in unemployment, a higher average wage, a decrease in the wage gap between unskilled and semi-skilled labor, and an increase in non-labor income (see Table A4). However, while this decline is only around 3.1 percentage point when marginal financing is

¹³ As noted, the target for the promotion rate for grades 1-6 is set at 0.98; given that the net intake rate to the first grade (out of the population that is in the right age to enter first grade) also reaches 0.98 in 2010, the target value for the MDG 2 in 2015 is around 87 percent (100 times 0.97⁷).

from domestic borrowing (mdg2-db), it reaches 7.3 percentage points when foreign grants or borrowing provide required financing (mdg2-fty and mdg2-fb).¹⁴

*Table 4.7: Educational indicators
(percent)*

year or simulation (*)	Gross enrollment rate			Gross completion rate		
	Basic	Secondary	Tertiary	Basic	Secondary	Tertiary
2004	73.7	39.5	11.0	101.1	32.7	7.3
base	89.5	47.8	12.8	141.2	40.8	7.5
mdg2-fty	127.2	68.1	16.7	243.1	49.7	9.9
mdg2-fb	127.2	68.1	16.7	243.1	49.7	9.9
mdg2-tax	126.6	66.5	16.1	240.9	48.2	9.5
mdg2-db2	126.5	66.4	16.0	240.8	48.1	9.5
mdg4-fty	91.2	48.8	13.7	144.5	41.8	8.1
mdg4-fb	91.2	48.8	13.7	144.5	41.8	8.1
mdg4-tax	86.5	46.1	12.9	136.0	38.5	7.6
mdg4-db2	86.3	46.1	12.9	136.3	38.4	7.7
mdg7-fty	89.7	47.9	12.8	141.7	41.0	7.6
mdg7-fb	89.7	47.9	12.8	141.7	41.0	7.6
mdg7-tax	89.1	47.5	12.7	140.4	40.5	7.5
mdg7-db2	89.0	47.6	12.7	140.9	40.5	7.5
mdg-fty	127.7	69.3	17.8	245.0	50.8	10.5
mdg-fb	127.7	69.3	17.8	245.0	50.8	10.5
mdg-tax	125.6	64.2	16.3	236.8	45.1	9.6
mdg-db2	125.3	63.9	16.2	236.6	45.0	9.6
(*) the values for simulations are for 2015.						
Source: Authors' estimates.						

4.2.2. Targeting MDG 4: Reduced Under-Five Mortality Rate

The under-five mortality rate MDG target is – by construction – reached under these four simulations. Compared to the baseline scenario, the required annual growth rate of government demand for health services increases drastically (see Table 4.4). The current and capital spending growth increase needed to achieve the under-five mortality rate target is larger than the one needed for education or water and sanitation (see below). Government recurrent spending on health reaches 2.9-4.1 percent of GDP (average 2004-2015) as compared to 0.8 percent of GDP in the base.¹⁵ Government investment in health also increases quite strongly, from 0.8 percent of GDP in the base to 7.1-12.2 percent (average 2004-2015), reflecting that the expansion of production in the sector also requires an expanded capital stock. Therefore,

¹⁴ Our microsimulation model makes it possible to separate the impact of changes in labor and non-labor incomes. If the change in non-labor income is not considered, poverty in 2015 is 3.5-6.3 percentage points higher (see row U + S + W1 + W2 + M in Table A4).

¹⁵ 2.9 percent with foreign transfers financing; 3.9 percent with tax financing.

total health spending (the sum of recurrent and investment spending) jumps strongly relative to 2004, averaging 14.8 percent of GDP in 2004-2015 in the mdg4-tax scenario. Of course, it may be difficult to implement such a strong spending increase during this short time period. In relation to other Arab countries, this GDP share is high; for example, in 2007, the GDP spending shares on health in Morocco and Jordan were 5 percent and 9 percent, respectively.

In addition, more rapid growth in the relatively skill-intensive health sector results in higher wage and employment growth and lower unemployment rates for skilled workers across all four health simulations. The corresponding growth rate for unskilled and semi-skilled labor is also larger than in the baseline scenario, even when domestic borrowing is the financing mechanism.

The pattern for poverty change is similar to that of the MDG 2 targeting simulations. The poverty rate in 2015 is lower than for the base scenario for all MDG4 scenarios, with the strongest decreases recorded for the simulations based on foreign financing. For these, the 2-dollars-a-day poverty rate declines to 35.7 percent as compared to 44.1 percent for the base, mainly as a result of the decrease in unemployment combined with an increase in the average wage (see Table A4).

4.2.3. Targeting MDGs 7w and 7s– Increased Access to Water and Sanitation

The next four simulations focus on achieving the water and sanitation MDG target. In comparison to the base scenario, the average GDP share of government current and capital spending in water and sanitation increases in 1.9-2.2 percent percentage points. The policy changes and effects of achieving these MDG targets are small relative to other MDGs scenarios, especially for the simulations based on foreign financing.

The foreign debt-to-GDP ratio increases to 57.1 percent in 2015 for the mdg7-fb scenario – 20.3 percentage points higher than in the baseline. In the tax financing scenario, the ratio between direct tax collection and GDP increases an average of 1.8 percentage points for the whole simulation period (see Table 4.6). Generally speaking, the MDGs 7w and 7s are the least costly to achieve. However, our simulations do not take into account that scarce water resources are one main challenge to development in Yemen. In fact, the country is one of the poorest countries in terms of water resources and is currently facing the depletion of its groundwater.

In addition, notice that improvements in water and sanitation have a positive impact on the under-five mortality rate; under the tax and foreign grants scenarios, the MDG 4 in 2015 is 2.2 and 5.7 per 1000 lower than in the base scenario, respectively.

4.2.4. Simultaneous MDG Targeting

In this set of scenarios we simultaneously target MDGs 2, 4, 7w and 7s. The results show that a large and sustained increase in government spending relative to the amount spent in the baseline is required in order to reach all the targets by 2015. In all instances, the required growth in current consumption spending and capital stocks is more than twice the baseline growth. The additional public spending relative to the baseline scenario in primary education,

health, and water and sanitation reaches an average 10.1 percent of GDP for the whole simulation period in the foreign financing scenarios – 4.4 (5.7) percentage points of GDP corresponds to additional current (capital) spending.

In addition, the scenarios that target all MDGs together reveal the importance of cross-MDG complementarities in assessing the costs of reaching multiple MDGs. In fact, progress in the coverage of drinking water and sanitation (MDG 7) exerts a positive influence on health (MDG 4), and thus allows for savings in the production of health services; in turn, a healthier student population more easily achieves completion of educational cycles (MDG 2). For example, the growth rate of current spending on health is lower than the required growth identified above under the MDG 4 scenarios; compare the 25.1 percent for scenario *mdg4-ftr* with 22.1 percent for scenario *mdg-ftr* in Table 4.4. The required growth in spending on education and water and sanitation is also lower than the previous estimates, reflecting the existence of several cross-MDG synergies. Overall, the savings in current and capital spending due to synergies is 2.7 percent of GDP.

If additional financing needs are met with foreign loans, the foreign debt-to-GDP ratio increases to 127.4 percent in 2015 - see scenario *mdg-fb* in Table 4.6. This ratio is 90.5 percentage points higher than for the baseline. In the *mdg-ftr* scenario, foreign grants to the government attain an average level of 13.9 percent of GDP throughout the simulation period, compared to 2.1 percent in the baseline. In the tax financing scenario, the average direct tax collection for the whole simulation period increases from 5.7 percent to 24.2 percent of GDP.

At the macro level, the GDP growth rate increases to 6 percent when marginal financing comes from foreign sources. In fact, spending on MDG-related sectors brings about a moderate boost to growth in production and household consumption, mainly by raising the supply of skilled labor and through increased employment generated by higher public and private investment (see Table 4.2). On the other hand, in the scenarios that use foreign financing, there is an exchange rate appreciation combined with deterioration in the trade balance as imports surge and export growth declines. As described in Sundberg and Lofgren (2006) for the case of Ethiopia, Dutch Disease effects can be a serious concern. In our case, aid-induced appreciation of the real exchange rate and the drop in exports are severe in view of the high cost of MDG financing. In fact, under the *mdg-ftr* scenario, exports in 2015 are 45.6 percent lower than in the base scenario, while the real exchange rate appreciates by 44 percent - the same but less strong impact is observed in the other foreign financing scenarios.¹⁶

When marginal financing comes from foreign sources, the poverty headcount rate falls short of achieving the MDG 1 target by 4.7 percentage points. The main drivers of this result are a decrease in unemployment combined with increases in the average wage and the non-labor income. On the other hand, the poverty headcount outcome falls short of the target by more than 10 percentage points under the domestic financing scenarios.

¹⁶ In the *mdg-ftr* scenario, exports of all products decrease while imports of all products increase relative to the base.

5. Alternative Scenarios for Aid, Government Allocative Efficiency, and Government Productivity

In light of the above results, this second set of simulations was designed to be grounded in what may be feasible once Yemen has emerged from the current political impasse. In these additional simulations, more fiscal space is created through exogenous increases for foreign aid or government efficiency. The government makes use of the resulting addition to fiscal space to expand spending and service delivery in infrastructure and human development (HD).

5.1. Scenarios

The baseline scenario is the same as in the previous set of simulations; as before, we assume that foreign borrowing is used to clear the government budget, at the same time that domestic borrowing increases during 2004-2015 in order to match observed and projected trends. The following additional simulations were implemented:

- aid-hd: increase in transfers from the rest of the world to the government so that they reach an average of US\$67 per capita for the period 2011-2015, close to the average for low income countries in 2007 - aid per capita is increased from US\$13 in 2010 to US\$63 in 2011 and US\$69 in 2015. In terms of GDP, aid reaches an average of around 10% for the period 2011-2015. The increase in government receipts is used to finance an increase in government consumption of (demand for) MDG-related services (primary education, health and water and sanitation). In addition, post-primary education also expands sufficiently to keep the same educational quality (defined as real spending per enrolled student) as in the base scenario as the sector faces increases in the number of graduates from primary school.
- aid-infra: similar to the previous scenario but the increase in government spending is used to finance an increase in the public infrastructure capital stock.
- eff-hd: gains in the allocative efficiency of government spending via a 50% cut in the growth rate for other government during 2011-2015 with expansion in HD-related spending sufficient to make use of the resulting fiscal space.
- eff-infra: similar to the previous scenario but the increase in government spending is used to finance an increase in investment in public infrastructure.
- tfp-hd: total factor productivity increase (5 percent yearly) in the production of government services during 2011-2015. As in the aid-hd scenario, the increase in government spending is used to finance an increase in HD-related government consumption.

- tfp-infra: similar to the previous scenario but the increase in government spending is used to finance an increase in investment in public infrastructure.

Consequently, the counterfactual model closure rule assumes that adjustments in public spending on HD or infrastructure clear the government budget. The definition of the simulations is summarized in Table 5.1; all shocks are introduced during the period 2011-2015.

Table 5.1: Simulation names and descriptions

Name	Description
base	business as usual
aid-hd	increase in aid with human development spending
aid-infra	increase in aid with infrastructure spending
eff-hd	efficiency gain with human development spending
eff-infra	efficiency gain with infrastructure spending
tfp-hd	productivity increase in the provision of gov. services with human development spending
tfp-infra	productivity increase in the provision of gov. services with infrastructure spending
human development spending = health, education, water and sanitation	

5.2. Results

In this section we concentrate on the period 2011-2015. As before, during the period 2004-2010, the baseline scenario is designed to capture the main developments of the Yemeni economy (see Section 4). The non-base simulations only deviate from the base for the period 2011-2015.

5.2.1. Aid Scenarios

In the scenarios aid-hd and aid-infra, foreign transfers are increased to around US\$67 during 2011-2015 (i.e., to around 10% of GDP in 2011-2015). In the aid-infra scenario, GDP growth gains 0.8 percentage points and is accompanied by expansion, not only in government demands, but also in private consumption and private investment as additional infrastructure permit private incomes and savings to grow more rapidly with a positive feedback into the growth process (see Table 5.2 and Figure 5.1). The appreciation of the real exchange rate strengthens this process by adding to domestic purchasing power. It represents a response to the fact that, due to the aid, Yemen is now able to have a more negative trade balance, importing more and/or exporting less. As explained, such aid-induced Dutch Disease effects can be a serious concern if, in the future, these trade deficits are unsustainable and if the economy becomes locked into a structure that is unable to expand production of tradables. However, these concerns should be weighed against the benefits of foreign aid, indicated by the simulation results.

For the aid-hd scenario, the acceleration of growth in GDP is weaker – the GDP growth rate increases by 0.3 percentage points. MDGs 2, 4, 7w, and 7s all improve, as government consumption of primary education, health and water and sanitation increases (see Table 5.3 and

Table 5.4).¹⁷ The average GDP share of government current and capital spending in MDG-related commodities reaches 13.2 percent during 2010-2015, starting from the 6.5 percent for the baseline scenario. The additional public spending in education and health (i.e., scenario aid-hd) has a positive impact on the relative demand for skilled workers, pushing up their relative wage (see Figure 5.2). In fact, the wage gap between skilled and unskilled workers is (on average) 23% higher than in the base scenario.

In the long run – beyond 2015, the end-year of our simulations –, however, the combination of increased education spending and high wages for highly educated labor, both of which make it attractive for students to remain in school and obtain secondary and tertiary education degrees, would lead to an increase in the supply of highly educated labor and a decreasing wage gap between skilled and unskilled workers.

In both aid scenarios, the 2015 poverty rate is lower than for the baseline, mainly as a result of a decrease in unemployment, a higher average wage, a decrease in the wage gap between unskilled and semi-skilled labor, and an increase in non-labor income. Moreover, the poverty effect would be larger if a multidimensional measure of poverty were considered instead of only monetary poverty.

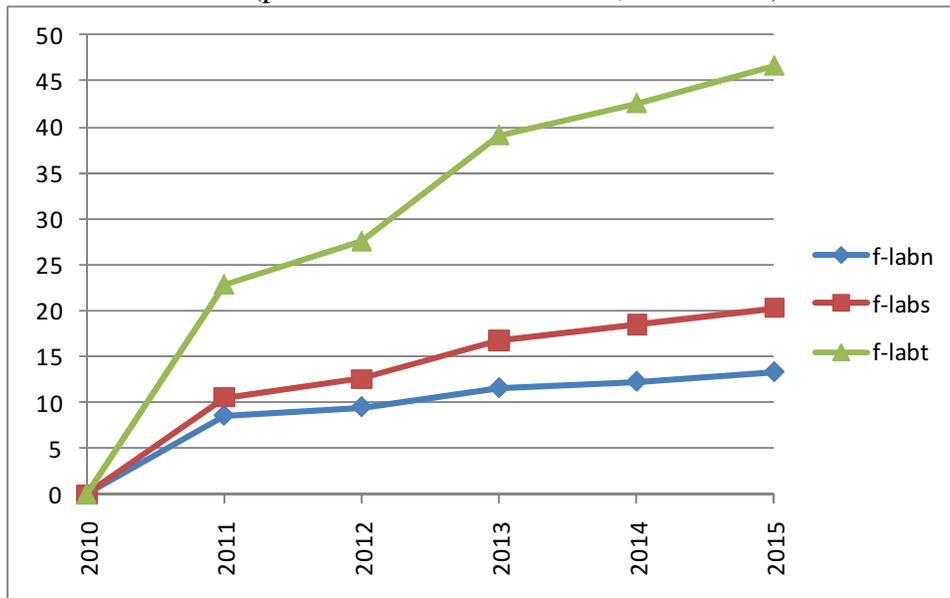
In this set of scenarios, it is important to consider the trade-off between the eventual competitiveness loss caused by aid induced Dutch Disease and the long term gains of improving MDGs.

*Table 5.2: Real macro indicators
(percent annual growth, 2010-2015)*

Macroeconomic Aggregate	2004 (LCU) (*)	base	aid-hd	aid-infra	eff-hd	eff-infra	tfp-hd	tfp-infra
Absorption	2,537	4.5	6.6	6.7	4.5	4.5	4.6	4.6
Consumption - private	1,692	4.6	6.2	5.6	4.7	4.6	4.3	4.2
Consumption - government	325	5.2	9.5	5.5	5.3	3.8	5.9	5.2
Fixed investment - private	274	3.7	5.8	4.9	3.8	3.6	3.4	3.3
Fixed investment - government	263	3.5	6.3	15.1	2.9	5.9	6.2	7.4
Exports	931	2.5	0.0	1.5	2.4	2.8	2.8	2.9
Imports	909	3.0	5.6	6.1	2.9	3.2	3.1	3.2
GDP at factor cost	2,635	5.2	5.7	6.0	5.2	5.3	5.4	5.4
Total factor employment (index)		2.7	3.5	4.0	2.7	2.8	2.8	2.8
Total factor productivity (index)		2.4	2.2	2.0	2.5	2.5	2.6	2.6
Real exchange rate (index)		2.5	0.0	1.0	2.5	2.7	2.8	2.9
(*) billions Yemeni Rials.								
Source: Authors' estimates.								

¹⁷ See also Table A.6 in the Appendix.

Figure 5.2: Real wages
aid-hd scenario
(percent deviation from base, 2010-2015)



Source: Authors' estimates.

Table 5.3: MDG indicators
(values in 1990, base year and 2015)

year or simulation (*)	MDG				
	mdg1	mdg2	mdg4	mdg7w	mdg7s
1990	47.0	52.7	122.0	34.9	10.6
2004 (**)	41.2	16.8	93.4	43.9	15.9
goal2015	23.5	100.0	40.6	67.4	55.3
base	38.5	55.8	68.2	48.0	23.8
aid-hd	34.6	84.3	55.9	48.7	25.2
aid-infra	36.1	69.6	63.1	48.9	26.2
eff-hd	38.3	69.2	64.0	48.1	24.0
eff-infra	38.6	59.9	67.4	48.1	24.2
tfp-hd	39.2	63.9	66.5	48.2	24.1
tfp-infra	39.3	57.5	68.5	48.2	24.2
(*) the values for simulations are for 2015.					
(**) the value for MDG 1 is for 2010.					
Source: Authors' estimates.					

*Table 5.4: Real government consumption by commodity
(percent annual growth, 2010-2015)*

Commodity	2004 (LCU) (*)	base	aid-hd	aid-infra	eff-hd	eff-infra	tfp-hd	tfp-infra
Water and sanitation	0.1	5.2	19.6	5.2	10.8	5.2	8.4	5.2
Other infrastructure	0.2	5.6	5.6	17.1	5.6	8.7	5.6	6.9
Health	19.6	4.6	19.0	4.6	10.2	4.6	7.8	4.6
Basic education (grd1-grd6)	55.8	5.7	20.2	7.1	11.4	6.1	9.0	5.9
Basic education (grd7-grd9)	16.0	5.5	8.0	6.4	6.2	5.7	5.8	5.5
Secondary education	19.5	5.5	6.0	6.4	5.6	5.7	5.6	5.6
Tertiary education	18.0	5.5	7.8	5.9	5.9	5.5	5.1	4.9
Other government	196.3	5.0	5.0	5.0	2.5	2.5	5.0	5.0
Total	325.4	5.2	9.5	5.5	5.3	3.8	5.9	5.2
(*) billions Yemeni Rials.								
Source: Authors' estimates.								

5.2.2. Efficiency Scenarios

In the simulations eff-hd and eff-infra, the annual growth rate for “other government services” (i.e., the parts of the government that are not related to human development or infrastructure) is reduced by 50% during 2010-2015, from around 5% under the baseline to 2.5% for this scenarios. The underlying assumption is that it is possible introduce this growth cut without any negative effects on economic performance. Again, the resulting fiscal space is used to expand spending on MDG-related commodities (eff-hd) and infrastructure (eff-infra), respectively.

For the eff-infra scenario, annual growth in GDP accelerates by 0.1 percentage points. The government reallocates spending from consumption to investment, as infrastructure is more capital-intensive than other government services. MDGs 2, 4, 7w (water), and 7s (sanitation) all improve. For the eff-hd scenario, the acceleration of growth in GDP is weaker (i.e., positive but less than 0.1 percentage points). The government provision of primary education, health and water and sanitation services grows 5.7 percentage points more than in the base scenario. The resulting improvements are stronger for MDGs 2 and 4 and less so for MDGs 7w and 7s. By 2015, the poverty rate is 0.4 percentage points lower than in the baseline.

6. Brief Summary and Final Comments

According to our results, under “business as usual” conditions up to 2015, Yemen will not reach the targets for the MDGs that are covered by our analysis: poverty, primary education, under-five mortality, water, and sanitation.

In order to attain the full set of MDG targets, Yemen’s government needs to expand its social services and related spending significantly. Although expansion of privately provided social services and synergies between different MDGs (for example, improvements in water and sanitation has a positive impact on the objective of reducing under-five mortality) reduce the burden on the government, they are far from sufficient to make a significant dent in the required expansion in government services.

More specifically, for the scenario that targets the achievement of all non-poverty MDGs (and benefits from synergies) with marginal financing from foreign grants, the required annual real growth in government services for the period 2004-2015 is at 22.1 percent for health and 13.1 percent for primary education. In 2015, the total (current and capital) spending on primary education, health, and water-sanitation reaches close to 24.1 percent of GDP as compared to 4.6 percent in 2004. The GDP shares are significantly larger for scenarios that rely on domestic financing since growth is slower and the required real increase in government services larger (as growth in private incomes and demand for social services slows down). Total government consumption and investment reaches 44.6 percent of GDP, compared to 23 percent in 2004 and 25.9 percent for the baseline in 2015.

The challenges would also be severe on the financing, in part a reflection of the need to replace declining oil revenues with other sources of financing. For the scenario that targets all MDGs and relies on foreign transfers, these transfers would have to increase from 1.6 percent of GDP in 2004 to 25.7 percent of GDP (or US\$ 298 per capita) in 2015.¹⁸

If such an increase in grant aid were forthcoming, it would threaten macroeconomic stability and erode the competitiveness of Yemen’s production of tradables (exports and import substitutes) outside of the oil and gas sector. It would also be extremely difficult to efficiently manage the required expansion in services, including mobilization of the skilled labor that would be needed in health and education.

This suggests that the government should set targets that are grounded in Yemen’s reality and priorities and, in order to get a strong positive impact of available resources, strive to improve efficiency and to allocate a larger share of total spending to areas with the strongest payoffs in terms of growth and human development.

¹⁸ In case the considered MDGs are targeted one at a time, we obtain the following results for foreign grants as a share of GDP in 2015: 10.1% in mdg2-*fr*, 21.4% in mdg4-*fr*, and 6.3% in mdg7-*fr*. Again, we notice the importance of synergies when pursuing all the MDGs at the same time.

In light of this overall conclusion, we carried out additional simulations. In the additional simulations, Yemen does not achieve the MDG targets. However, important improvements can be achieved if additional resources are allocated to spending on infrastructure and/or human development. In addition, progress can also be made if government spending efficiency is improved. Under some of the scenarios (aid), there is a Dutch Disease effect, which may harm growth in the production of tradables during the period of these simulations. However, this drawback should be weighed against the medium/long term benefits of improving on the MDGs. In future analysis, it would be important to assess the effects of different policies over a longer time horizon, in particular considering the fact that indicators related to human development should lead to stronger gains in future decades.

7. References

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8. Figures and Tables

9. Appendix: Additional Indicators and Results

Table A1. Macroeconomic Indicators, 2000-2006

Indicador	2000	2006
Population, total (millions)	18.2	21.7
Population growth (annual %)	2.9	3.0
GNI per capita, PPP (current international \$)	1,730.0	2,090.0
GNI per capita, Atlas method (current US\$)	400.0	760.0
GDP (current US\$) (billions)	9.4	19.1
GDP growth (annual %)	4.4	3.3
Inflation, GDP deflator (annual %)	25.8	13.3
Life expectancy at birth, total (years)	59.0	62.0
Official development assistance and official aid (current US\$) (millions)	263.0	284.0
Net barter terms of trade (2000 = 100)	100.0	150.0

Table A2. Economic Sector Structure in 2004

Sector	VAshr	PRDshr	EMPshr	EXPshr	EXP-OUTshr	IMPshr	IMP-DEMshr
Agriculture	11.4	12.8	33.3	3.1	3.7	14.9	16.0
Oil	29.5	16.8	6.6	86.0	78.9	1.6	6.4
Manufactures	11.5	23.5	5.0	4.2	2.8	71.7	33.6
Services non-government	36.4	39.0	28.7	5.1	2.0	10.7	4.0
Services government	11.3	7.8	26.4	1.6	3.2	1.1	2.2
TOTAL	100.0	100.0	100.0	100.0	13.5	100.0	15.5
Vashr = value-added share (%)							
PRDshr = production share (%)							
EMPshr = share in total employment (%)							
EXPshr = sector share in total exports (%)							
EXP-OUTshr = exports as share in sector output (%)							
IMPshr = sector share in total imports (%)							
IMP-DEMshr = imports as share of domestic demand (%)							
Source: Yemen SAM 2004.							

*Table A3. Unemployment Rate
(percent)*

year or simulation (*)	labor category			
	all labor	f-labn	f-labs	f-labt
2004	16.7	18.2	13.0	7.5
base	18.2	19.5	17.3	7.4
mdg2-fty	14.4	15.8	13.1	5.0
mdg2-fb	14.4	15.8	13.1	5.0
mdg2-tax	15.6	17.2	13.9	5.0
mdg2-db2	16.6	18.4	14.9	5.0
mdg4-fty	13.0	14.0	12.6	5.0
mdg4-fb	13.0	14.0	12.6	5.0
mdg4-tax	15.5	16.9	14.1	5.0
mdg4-db2	16.4	17.9	14.9	5.1
mdg7-fty	17.5	18.8	16.7	7.1
mdg7-fb	17.5	18.8	16.7	7.1
mdg7-tax	18.2	19.5	17.2	7.3
mdg7-db2	19.4	20.8	18.3	7.9
mdg-fty	9.6	10.3	8.7	5.0
mdg-fb	9.6	10.3	8.7	5.0
mdg-tax	12.3	13.7	10.0	5.0
mdg-db2	12.9	14.5	10.6	5.0
f-labn = unskilled (< completed secondary)				
f-labs = skilled (completed secondary)				
f-labt = high-skilled (completed tertiary)				
(*) the values for simulations are for 2015.				
Source: Authors' estimates.				

Table A4. Detailed Microsimulation Results

(U = change in unemployment rate; S = change in the sectoral structure of employment; W1 = structure of wages; W2 = average level of wages; M = skill composition of employment; K = non-labor income)

Microsimulation Effect	2005	base		mdg2db		mdg2fb		mdg2fty		mdg2tax	
		2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
OBS	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
U	46.6	46.6	47.2	46.3	46.6	45.9	45.6	45.9	45.6	46.2	46.1
U + S	46.6	46.1	46.5	45.9	45.6	45.4	44.7	45.4	44.7	45.7	45.2
U + S + W1	46.6	46.0	46.5	45.7	45.5	45.3	44.4	45.3	44.4	45.6	45.0
U + S + W1 + W2	46.6	45.9	46.8	44.3	43.3	43.2	40.5	43.2	40.5	43.9	41.9
U + S + W1 + W2 + M	46.6	45.9	47.0	44.4	43.4	43.3	40.7	43.3	40.7	44.0	42.0
U + S + W1 + W2 + M + K	46.6	44.2	44.1	42.5	40.9	41.0	36.8	41.0	36.8	41.8	38.7
Source: Authors' estimates.											

Microsimulation Effect	2005	base		mdg4db		mdg4fb		mdg4ftr		mdg4tax	
		2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
OBS	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
U	46.6	46.6	47.2	46.7	46.6	46.1	45.1	46.1	45.1	46.6	46.1
U + S	46.6	46.1	46.5	46.2	45.5	45.6	44.2	45.6	44.2	46.0	45.2
U + S + W1	46.6	46.0	46.5	46.0	45.4	45.4	44.1	45.4	44.1	45.8	45.0
U + S + W1 + W2	46.6	45.9	46.8	45.7	44.0	43.9	40.1	43.9	40.1	45.3	42.9
U + S + W1 + W2 + M	46.6	45.9	47.0	45.9	44.2	44.0	40.3	44.0	40.3	45.4	43.1
U + S + W1 + W2 + M + K	46.6	44.2	44.1	44.4	42.5	41.8	35.7	41.8	35.7	43.8	40.4
Source: Authors' estimates.											

Microsimulation Effect	2005	base		mdg7db		mdg7fb		mdg7ftr		mdg7tax	
		2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
OBS	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
U	46.6	46.6	47.2	46.8	47.7	46.5	46.9	46.5	46.9	46.6	47.2
U + S	46.6	46.1	46.5	46.3	47.1	46.0	46.2	46.0	46.2	46.1	46.4
U + S + W1	46.6	46.0	46.5	46.3	47.1	46.0	46.2	46.0	46.2	46.0	46.4
U + S + W1 + W2	46.6	45.9	46.8	46.3	48.1	45.5	46.2	45.5	46.2	45.8	46.7
U + S + W1 + W2 + M	46.6	45.9	47.0	46.4	48.2	45.6	46.3	45.6	46.3	46.0	46.9
U + S + W1 + W2 + M + K	46.6	44.2	44.1	44.9	46.4	43.7	43.3	43.7	43.3	44.3	44.1
Source: Authors' estimates.											

Microsimulation Effect	2005	base		mdgdb		mdgfb		mdgftr		mdgtax	
		2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
OBS	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
U	46.6	46.6	47.2	46.3	45.2	45.4	44.0	45.4	44.0	46.1	44.9
U + S	46.6	46.1	46.5	45.7	44.1	44.9	43.1	44.9	43.1	45.5	43.9
U + S + W1	46.6	46.0	46.5	45.6	44.3	44.7	43.0	44.7	43.0	45.3	44.2
U + S + W1 + W2	46.6	45.9	46.8	43.4	38.0	41.1	34.1	41.1	34.1	42.9	37.2
U + S + W1 + W2 + M	46.6	45.9	47.0	43.6	38.2	41.3	34.3	41.3	34.3	43.1	37.5
U + S + W1 + W2 + M + K	46.6	44.2	44.1	41.7	35.4	38.6	28.2	38.6	28.2	41.1	34.0
Source: Authors' estimates.											

*Table A5. MDG indicators
all (official) available data, 1990-2009*

MDG	1990	1991	1994	1997	1998	1999	2003	2004	2005	2006	2008	2009
MDG 1					47.0				46.6			47.6
MDG 2	52.7							62.5			69.8	
MDG 4	122.0			105.0			102.0			78.2		
MDG 5				351.0			365.0					
MDG 7a		34.9				38.4					48.0	
MDG 7b			10.6					15.9			23.0	
Source: CSO and MOPIC (2010).												