Realizing the Millennium Development Goals through socially inclusive macroeconomic policies

Country Study

Assessing Development Strategies to Achieve the MDGs in

The Republic of Uzbekistan

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UNDP Uzbekistan funded project "Statistical capacity building for MDG monitoring and reporting"

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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 ***Ma****quette* for **M**DGs **S**imulation (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 compromises 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.

The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the United Nations or its member states.

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AIDS	Acquired immune deficiency syndrome
CGE	Computable General Equilibrium Model
CIS	Commonwealth of Independent States
GDP	Gross Domestic Product
HIV	Human immunodeficiency virus
MAMS	MAquette for MDG Simulation
MDG	Millennium Development Goal
MOE	Ministry of Economy of the Republic of Uzbekistan
SAM	Social Accounting Matrix
SCS	State Committee of Uzbekistan on Statistics
UNDAF	UN Development Assistance Framework
UNDESA	United Nations' Department of Economic and Social Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
WIS	Welfare Improvement Strategy

1. Introduction

The Millennium Development Goals (MDGs) are a framework agreed upon by world leaders to reduce poverty and improve the wellbeing of people. These goals set specific and quantitatively defined development targets to be achieved by humankind by the year 2015.

The Government of Uzbekistan, in collaboration with donor organizations and civil society, has embarked on the process of formulating its own national MDG targets and indicators. In particular, during the development of the Welfare Improvement Strategy for 2008-2010 (WIS), the Government and UNDP worked jointly on the nationalization of the MDGs, taking into account the specifics of the country. This document contributed to the definition of the national goals, objectives and indicators, which may be used to monitor the process of implementation of development strategies and other national target programs.

The main objectives in driving the country towards achievement of MDG 1 are twofold: halve poverty by 2015 and halve the number of underweight children under five in 2000-2015. The second global MDG (i.e. universal access to secondary education) has already been achieved in Uzbekistan as measured by full coverage of the population of school age with education, but one of the strategic trends in this area that remains to be a challenge is the improvement of the quality of education at all levels. With this regard, the global MDG objective has been slightly modified to read: “improvement of the quality of education in primary and secondary schools while maintaining universal access to it”.

In line with the third global development goal the government has adopted a number of laws and national programs that outlines priority areas for promoting gender equality and empowering women in Uzbekistan. With regard to the health MDGs, the country has made tangible progress towards reducing child and maternal mortality. Based on current trends, Uzbekistan is likely to meet the under five and maternal mortality targets but adding better policies and resources. Measures for environmental protection and the rational use of natural resources will enable to reverse environmental damage, securing tangible results. Moreover, access of urban and rural households to safe drinking water and sewage will be improved to the extent of meeting the established targets by 2015.

In that context it is essential to assist national policy makers to develop knowledge and skills to integrate macroeconomic and social goals in policy formulation for the timely achievement of the MDGs. Since 2007, within the framework of the UNDP-funded project on “Statistical capacity building for MDG monitoring and reporting”, several activities are being conducted to explore the possibilities of using methods of mathematical modeling in explicitly determining key policy assumptions and identifying the best “receipts” for meeting the MDGs that will offer insights and serve as the underlying ‘building blocks’ for the MDG achievement strategy in Uzbekistan.

In 2008, under the Development Policy and Analysis Division of the United Nations’ Department of Economic and Social Affairs (UN-DESA/DPAD) project on “Assessing development strategies to achieve the MDGs in Asia”, Uzbekistan was included in the list of countries selected to carry out a quantitative analysis to define strategies for MDG achievement.

Specifically, the above mentioned UN-DESA/UNDP joint initiative aimed at adapting an economy-wide analytical framework to country needs, in order to enable assessments of alternative financing strategies for scaling up public investments for the timely achievement of the MDGs while taking into account a wide range of economic trade-offs. The framework uses

a combination of macro, sector and micro level economic analysis to study determinants of MDG achievement, economy-wide interactions and poverty and income distribution. Expected specific project outcomes for Uzbekistan are a fully calibrated model for carrying out policy simulations; building of new technical capacities; and the elaboration of a final country study making policy recommendations.

The present report is precisely the final country study of the project and was developed with support from a group of national experts including representatives of the number of key ministries and agencies, as well as research centers of the country.[1] This report attempts to discuss briefly key social and economic reforms which have taken place in Uzbekistan during the period of 2000-2009 with a primary focus on MDG progress and challenges. The main determinants to MDG achievement in the country are identified. Furthermore, an analysis of simulation results generated by MAMS – or MAquette for MDG Simulation, a Computable General Equilibrium (CGE) model with an MDG module developed by the World Bank – and a summary of key findings and practical policy recommendations based on such results complete this report.

The structure of the report flows as follows. Section 2 begins with a brief overview of main economic reforms, economic performance and vulnerabilities of the country. Section 3 reviews the government's social policy, and examines inequality and poverty trends and the evolution of the MDGs during the period 2000-2009 in Uzbekistan. In addition, this section discusses whether the country is on-track to achieve the MDGs under current policies and attempts to define policies that should be implemented to achieve the global and national MDGs. Sections 4 and 5 lay out the methodological framework and estimation approaches. They explain how the MDG-related parameters/elasticities were obtained to calibrate MAMS and how the Social Accounting Matrix (SAM) that provides the accounting framework of the model was built in order to complete the data set that feeds up MAMS. Section 6 contains the empirical results, including an analysis of MAMS MDG scenarios with financing options and the main macroeconomic trade-offs where all goals – but that of halving extreme poverty - are achieved at a time. Finally, Section 7 presents conclusions and policy implications.

2. Economic performance and policies

Macroeconomic policies and achievements during 1991-2009

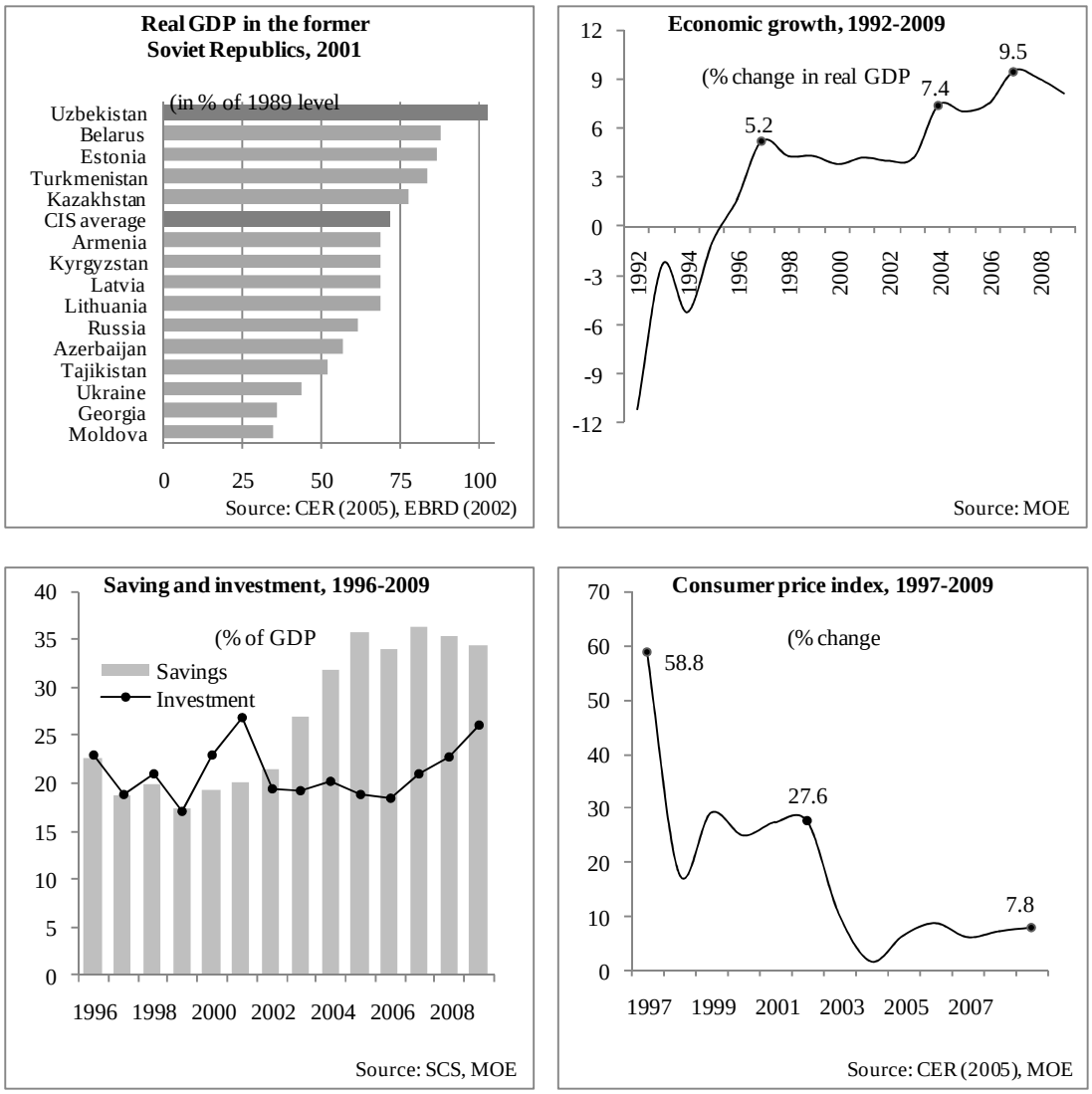
The policy model chosen by the government, when Uzbekistan emerged as an independent state in 1991, was based on a gradual transformation of the economy. The ultimate goal of the Government in that period was to prevent a sharp fall in output, a reduction in people's incomes, and unemployment growth. Privatization of small and medium companies, and of the housing and social sectors (public catering, retail, services); comprehensive support to expansion of private ownership; and the development of small private businesses, were the focus of economic transformation.

Uzbekistan made it possible to avoid deeper economic recessions typical for most CIS (Commonwealth of Independent States) countries by supporting and reforming key industrial

[1] The national modeling team consisted of a group of leading specialists from the Ministry of Economy of Uzbekistan, Institute for Macroeconomic Analysis & Forecasting, and State Committee of Uzbekistan on Statistics.

and agricultural sectors. As a result, the economic recession was virtually halted in 1995. By 2001 Uzbekistan's GDP was 3% above the 1989 level, making the country's growth performance the best of the former Soviet Republics (Figure 1).

Figure 1. Uzbekistan: Macroeconomic performance



In the second half of the 1990s fundamental changes occurred in macroeconomic policy. Mainly, the accumulation and channeling of funds, including centralized loans to the prioritized projects, were actively promoted. Direct instruments of regulating monetary policies were widely used and customs tariffs and excise for a number of imported consumer goods were raised.

The Implementation of import-substitution policies by a broad use of direct instruments of economic policies enabled to achieve certain results, which was facilitated by the fact that exports were dominated by commodities with a low elasticity to exchange rate changes in both the short- and medium-run. As a result, in the first years after the introduction of the regime of 'foreign currency rationing', the share of investments goods in the overall imports increased significantly. Achievement of energy and wheat self-sufficiency and emergence of new sectors (example, automobile industry) and companies could be considered as the positive outcomes of

this policy.

In this period of development, the economy of Uzbekistan experienced substantial difficulties in increasing the proceeds of foreign currency due to falling world prices for main export commodities, including cotton, and the 1998 Russian financial crisis. Despite these difficulties, since 1996 Uzbekistan featured stable moderate growth rates of 3.5-4.0% (Figure 1). Inflation rates, although remained relatively high, leveled off at 18-29%. In the period of economic boom, the ratio of investments to GDP was maintained at 20%, and savings at 19.7% (i.e., domestic savings were sufficient to finance investments). But the budget deficit averaging 2.6% of GDP caused insignificant shortage of domestic savings.

Since 2002 total savings were higher than investments, partially due to the growth in total currency reserves. The government already implemented measures aimed at developing effective mechanisms to transform national savings into production assets. In 2006, the Fund for the Reconstruction and Development of Uzbekistan was established with its objectives being to ensure the macroeconomic stabilization and utilization of financial resources generated as a result of favorable world prices for the financing of strategically important investment projects in the basic sectors of the economy.

In the literature Uzbekistan's economic performance during the second half of 1990s is called the 'Uzbek growth puzzle'. Based on an output growth model applied with data for 26 transition economies, Berg et al. (1999) found that the model systematically under-predicted the Uzbek economic growth, including a mistaken prediction of a large output collapse in late 1994. Zettelmeyer (1998) also shows that a standard panel model of growth in transition under-predicts Uzbek growth from 1992 to 1996, confirming the view that Uzbekistan's performance constitutes a puzzle. This study concluded that the following three factors could explain part of Uzbekistan's better-than-predicted growth: a low level initial industrialization; the presence of cotton production – a readily exportable product; and finally, the achievement of energy balance (energy self-sufficiency achieved by 1995).

At the outset of the new century emerged the clear need for adjusting economic policies. Over time, the appreciation of the real exchange rate started to influence the competitiveness of domestic producers and exports negatively. Among the main priorities of the new economic policies adopted were the following: to reduce the degree of government intervention in the economy, to strengthen the guarantees and protection from illegal interventions of oversight bodies in the operations of businesses, and to further liberalize the foreign currency market.

Special programs for support of small and medium enterprises (SMEs) were adopted in this period, and the privatization of large companies in the basic sectors of the economy were started through promoting privatization of state-owned enterprises and their sale to foreign investors. Along with a significant reduction of the Central Bank's exchange rate, these measures practically enabled to unify exchange rates in the mid-2003. Strict monetary and fiscal policies along with a broader use of indirect tools of monetary policy enabled a significant reduction of the inflation rate[2] and created the prerequisites for the liberalization of the hard currency market (Figure 1). In October 2003 commitments were taken according to the Sections 2(a), 3 and 4 of the Article VIII of the Agreements of the International Monetary Fund to facilitate current account convertibility of the domestic currency.

[2] While the consumer price index grew by 26.6% and 21.6% in 2001 and 2002, respectively, starting 2003 this indicator was below 8%.

The distinct feature of economic growth achieved in 2001-2009 is the high degree of its stability. Since 2001 the domestic economy has been growing at high and sustainable rates: annual GDP growth averaged 6.1% and increased 1.8 times relative to 2000. Economic development was spurred by improved macroeconomic stability characterized by lower inflation (from 28 to 7.4%), a balanced government budget (0.2% of GDP), a current account surplus (7.1% of GDP), substantial growth of gold and hard currency reserves and a reduced tax burden on the economy (declined from 28.5% in 2000 to 23% of GDP 2009).

Growth performance

The main driving factors of the economic growth in 2000-2009 were the high rates of economic activity which have been largely explained by liberalization to foreign economic activity and faster development of export capacity, large-scale investments into the economy, and gradual improvement of its composition. The growth rate of investments exceeded 18.5% per annum on average in 2005-2009 and it peaked to 28.3% in 2008. The growth of investments was primarily supported by increased foreign investment and loans.

Despite the global economic crisis, foreign investments increased by 4.5 times in 2005-2009 and exceeded USD 2.7 billion (86% - FDI flows). In 2009 the share of foreign direct investments and loans in overall investments reached 27.8% against 13.2% in 2005. The continuation of the new investments boom is directly related to the modernization and technical overhaul of the companies, modernization of fixed assets according to the targeted programs for development of the sectors of the economy, construction of industrial infrastructure and social facilities.

Another important driving factor behind economic growth is external demand. In the past five years GDP increased by 1.5 times, while exports grew by 2.5 times. The growth of exports was facilitated primarily by increasing the exports of non-commodity goods and products with high value-added (i.e., cars and transportation services), which in turn allowed for a current account surplus.

The current account balance improved substantially from 2.6% of GDP in 2000 to 5.4% of GDP in 2009. The external debt was significantly reduced and position has improved since 2002. According to the assessment of international organizations, it decreased from 44% of GDP in 2002 to 37.9% in 2004, 26% in 2006, 13% in 2008 and further to 9.5% in 2010.

It is widely acknowledged that economic growth and higher incomes of the people constitute the main recipe to reduce poverty. However, economic growth may turn out to be insufficient if the poorest population groups do not benefit from higher income. Poverty reduction also depends on an equitable distribution of the generated income. Along with gradual economic recovery, the poverty rate started to fall from 44.5% identified after ad-hoc random sample in 1994 to 27.5% according to the findings of the household budget survey conducted in 2001.[3]

Economic growth had a positive impact on poverty reduction in 2001-2009, and the share of the population living below the national poverty line declined from 27.5% in 2001 to 19.5% in 2009 (i.e., on average by 3.3% per annum). Poverty declined by 0.38% per one percent increase in GDP, which illustrates a tangible influence of economic growth on poverty reduction.

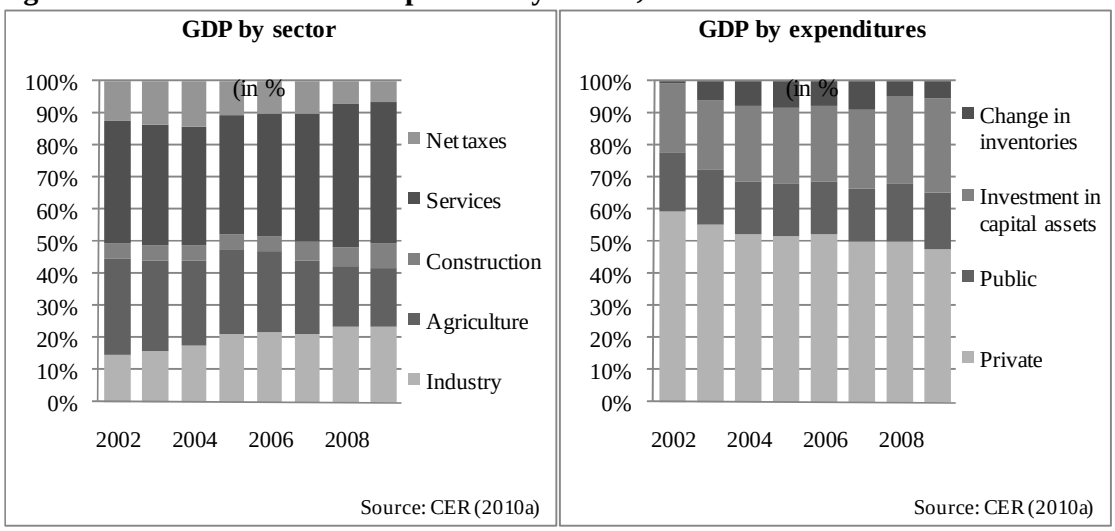
[3] At the same time, 70% of the poor lived in the villages, and a deterioration of the distribution of income was made apparent by a Gini coefficient that went up to 0.50 from 0.45.

Nevertheless, the distribution of income from economic growth was not equitable among miscellaneous population groups, according to a Gini coefficient that was quite high in 2000-2006 (0.45-0.50). However, this coefficient decreased steadily to 0.40 in 2009.

Economic growth has been accompanied by poverty reduction as a result of specific measures that have been implemented by the government. The support and development of small businesses and private entrepreneurship have facilitated job creation and employment. For instance, in 2009 the workers of small businesses accounted for 74.2% of total number of employed against 57.2% in 2009, whereas the small businesses accounted for 50.1% of GDP against 35.6% of GDP in 2004. In the past six years, the creation of a favorable environment to enhance the access of the most vulnerable population groups to social services and to increase household income also helped households' monetary income to rise 3.3 times.

According to the analysis of output trends in major sectors of the economy, manufacturing, agriculture, and services sectors demonstrated fairly sustainable growth rates. Manufacturing and services made the major contribution to GDP growth. During 2000-2009, the share of the industry continued to grow steadily, from 14.2% to 23.6% of GDP, and that of the services sector also increase from 37.2% to 44.1% (Figure 2). In the structure of aggregate demand the share of capital assets accumulation went up from 22.1% in 2002 to 29.2% in 2009. In the meantime, private and public final consumptions decreased on average by, respectively, 1.7% and 0.2% per year in 2002-2009 (Figure 2).

Figure 2. Uzbekistan: GDP composition dynamics, 2002-2009



Certain types of economic vulnerabilities may pose serious constraints upon economic growth and could hinder sustainable industrial growth in the subsequent years in Uzbekistan. In order to overcome the negative impact of the global financial and economic crises that erupted by mid-2008, the following issues need to be addressed:

First, sectors involving primary processing of raw materials prevail in the composition of the manufacturing sector, given the lack of development of manufacturing of finished goods, particularly in high-tech and research-intensive industries. The share of commodities and the energy sector, primarily of fuel and energy complex and non-ferrous metallurgy, still remains high. For instance, natural gas, non-ferrous metals and cotton fiber together account for more than 70% of total exports. This makes the country heavily vulnerable to world price fluctuations

and it also makes it difficult to guarantee long-term stable development in the domestic manufacturing sector. Despite miscellaneous benefits and preferences, the textile industry is not developing in a stable manner, as the extent of processing cotton fiber is inadequate.

Second, despite the trends of lower material intensity of output in 2009, expenditures for raw materials accounted for 43.7% in the composition of industrial goods, which indicates material intensity endures in industrial production, and therefore, a large amount of raw materials and energy are still required per unit of output. As a result, competitiveness of economy could be put at stake.

Third, the barriers in the course of modernization and technological overhaul of manufacturing processes and implementation of innovations at the companies consist of gaps in R&D as well as low receptivity of domestic companies to innovations.

Fourth, small and private businesses' share in industrial output remain insignificant (e.g. 16.9% in 2009), their cooperative contacts with large companies are not well developed, and there is a low degree of specialization and investment activity.

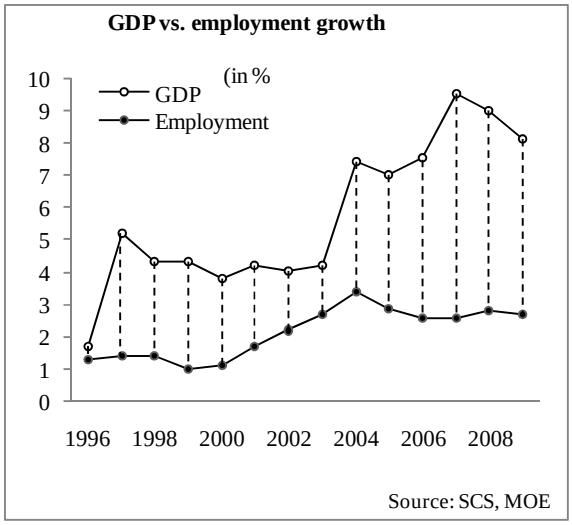
Labor market trends

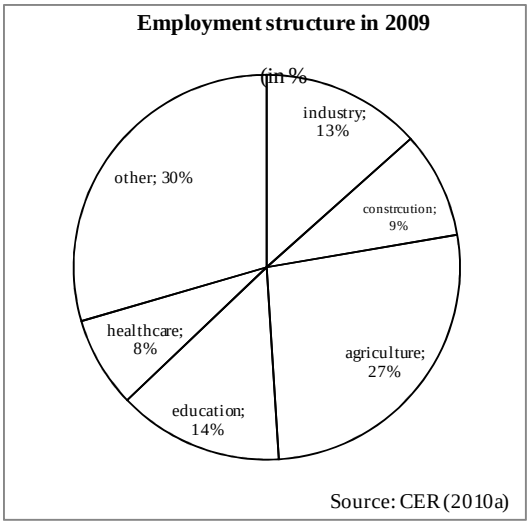
In general, higher and rapid economic growth does not necessarily translate into faster poverty reduction. This depends on whether growth is pro-poor and whether such pro-poor growth generates employment and income among the poor. Since 1996, the growth pattern of employment has been changing. According to data from the State Committee of Uzbekistan on Statistics, the rate of employment growth has consistently lagged behind real GDP growth. It peaked in 2004 (3.4%) and remained relatively stable, dropping considerably to 2.7% in 2009.

With regard to the changes in the labor market, in 2004-2009 the labor force grew by 23.9% and gathered 16 million people, while the employed population increased by 26.1% and totaled 11.3 million people in 2009. In general, growth of jobs in recent years amounted to 2.7-2.9%, which is higher than in the early 2000s. Unemployment remains low – less than 5% of the economically active population – but high underemployment remains a challenge.

In Uzbekistan provision of productive jobs to the growing labor population is particularly important for addressing the issue of poverty. Labor employed in agriculture has the greatest share in the composition of employment, and about 50% of the rural workforce is employed in agriculture, which features low productivity and low wages. Another sector of employment with wages below the average is civil service (healthcare, education, utilities, etc.), which account for more than 20% of the workers (Figure 3). The situation in this area has been improving due to increased public spending for the social sectors and higher wages for civil service workers. At the same time, despite unprecedented measures taken, staunchly high scales of informal employment and illegal labor migration remain as fundamental problems in the social and labor sectors.

Figure 3. Uzbekistan: Changes in labor market, 1996-2008 and 2009





Fiscal developments

Fiscal policy in the past ten years has been focused on ensuring balanced government revenues and expenditures, concurrently reducing the tax burden on the businesses. Starting in 2000, the corporate tax rate for companies was set at 31%, in order to be gradually reduced to 18% in 2004, 12% in 2006 and 9% in 2010. The individual income tax rate was reduced from 40% in 2000 to 22% in 2009, while the unified tax rate was reduced from 37% to 25%.

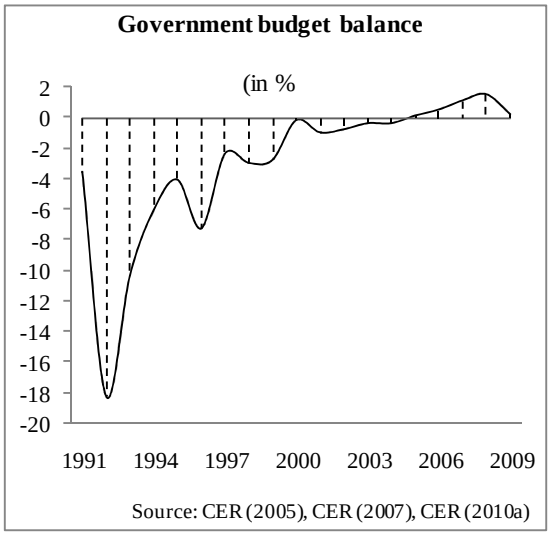
Furthermore, for legal entities and individuals receiving taxable income as dividends and interest, the relevant income tax rate was reduced from 15% to 10%, while the single social tax rate was reduced from 37% to 25% in 2006 and down up to 24% in 2007. A 13% single tax payment was introduced for micro firms and small businesses in all sectors, replacing the single tax, mandatory contributions to the extra budgetary Pension Fund, Republican Road Fund, and School Education Fund, which previously added up to the burden of 15.2%. In 2007 this rate was reduced to 10% and down to 7% in 2010.

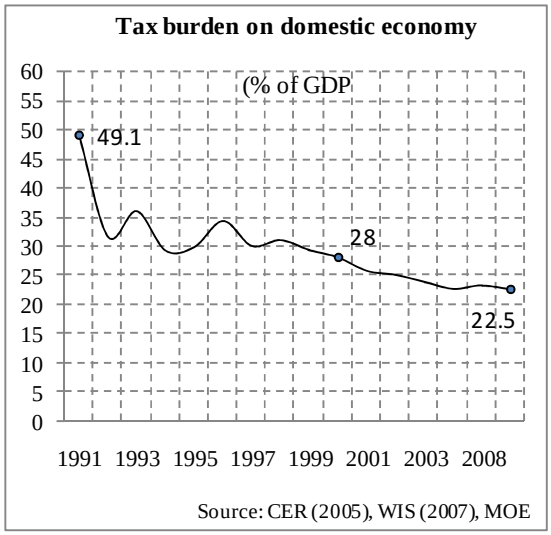
Consequently, in 2009 the ratio of total government tax revenues to the GDP used as the indicator of tax burden on domestic economy went down by more than 5.5% of GDP relative to 2000 and it amounted to 22.5% (Figure 4). Meanwhile, the ratio of direct taxes to GDP decreased from 8.1% of GDP to 5.6% in the same period and that of indirect taxes went down from 12.7% to 11.3%.

Table 1 shows changes in the composition of government revenues as percentage of GDP during various sub-periods between 1995 and 2009. In 1995-2000, total government revenues remained in the range of 28-34 percent of GDP, while during the period of 2001-2009 these decreased by on average of 0.4 percentage points per year, and accounted for 23% of GDP in 2009. The shares of both direct and indirect taxes decreased, while the share of revenue from resource and property tax payments as proportion of GDP steadily increased from 2.4% in 2001

to 3.7 in 2009.[4]

Figure 4. Uzbekistan: Fiscal trends, 1991-2009





Due to declines in output and tax revenues, Uzbekistan's fiscal deficit worsened with the period average of 8.5% of GDP in 1991-1995, but it fell to 3.9% in 1996-1999.[5] In the light of improved tax administration and increased tax revenues, fiscal imbalance has not been large as it ranged from a deficit of 0.2% to 1.0% of GDP in 2000-2004, in order to become a surplus of 0.1% to 1.5% of GDP in 2005-2009 (Figure 4).

Table 1. Uzbekistan: Government revenues, 1995-2009 (period average; as % of GDP)

	1995-2000	2001-2003	2004-2007	2008-2009
Revenue total:	**31.5**	**25.1**	**22.1**	**23.4**
- direct taxes	10.4	7.3	6.0	6.1
- indirect taxes	15.3	13.8	10.9	11.4
- resource payments and property tax	2.6	2.2	3.6	3.7
- other revenues	3.3	1.9	1.6	2.2

Source: Adapted from CER (2005) and CER (2010a).

Measures taken to reform the tax system have had little effect on reducing tax rates for the benefit of poor population groups and labor-intensive sectors of the economy. Retention of high rates of excise taxes for basic consumption goods (vegetable oil, sugar, etc.) caused by the need to maintain parity of prices with neighboring countries in many respects limits the purchasing power of the income of poor households, for whom these goods are essentials, and constitute a substantial part of their consumer basket. Furthermore, the individual income taxation system is sub-optimal and does not stimulate higher incomes.

[4] In relation to the state budget the share of revenue from resource and property tax payments was equal to 16.6% in 2009. In 2009, contribution of the mining and property tax receipts (due to re-assessment of the inventory cost of property belonging to individuals) equaled 2.5% and 0.7% of GDP, respectively.

[5] During this period, Uzbekistan's fiscal deficit performance placed it about in the middle in the Central Asian neighbors (Kazakhstan, Kyrgyz Republic, Tajikistan and Turkmenistan) and better than the CIS average.

Table 2 presents the total foreign aid provided to Uzbekistan by international financial institutions and foreign governmental/non-governmental organizations during 1993-2008. As can be seen, this amounted to 10.9 billion US dollars. In 1993-2000, the share of grants/technical assistance and humanitarian aid in total aid amount equaled 3.5% and 2.4%, respectively. By 2001-2003 the amount of grants and technical assistance had increased more than threefold, while new credit commitments amounted to 2.5 times less than in 1993-2000.

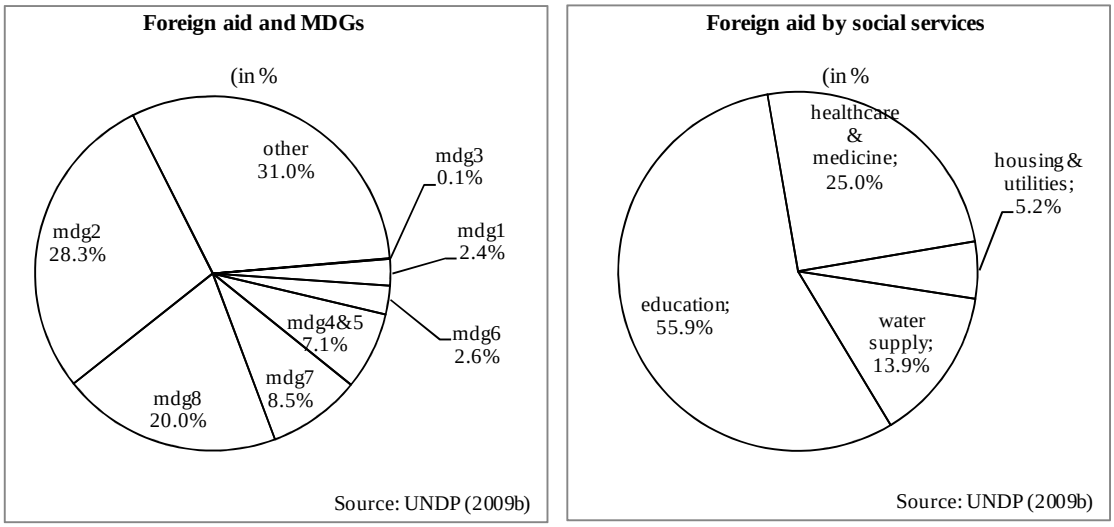
Table 2. Uzbekistan: Foreign aid, 1993-2000 (billion USD)

	1993-2000	2001-2003	2004-2008
Total foreign aid:	**5.80**	**2.87**	**2.20**
- long- and medium-term loans	5.46	2.12	1.60
- grants & technical assistance	0.20	0.64	0.53
- humanitarian aid	0.14	0.11	0.07

Source: Adapted from UNDP (2009b).

Attainment of the MDGs is facilitated by the international community through preferential loans, credits and grants in Uzbekistan. UNDP (2009b) concludes that during 2004-2008 one-third of foreign aid (about USD 696 million or 31% of total foreign aid, including technical assistance, soft and commercial loans) targeted the implementation of tasks that cover all of the MDGs in Uzbekistan (Figure 5).

Figure 5. Uzbekistan: Foreign aid, 2004-2008



During 2004-2008 USD 528.5 million worth loan agreements were signed with the aim of developing social infrastructure, including education, healthcare, water supply, housing and utilities (Figure 5). Projects in healthcare are aimed at reforming the healthcare system in rural areas, improving women's and children's health, as well as strengthening the emergency medical services in urban and rural areas. Initiatives in the areas related to water supply service provision in urban and rural areas are mainly targeted towards improvement in facilities and infrastructure.

The Anti-Crisis Program

The current world economic crisis affected the Uzbek economy due to reduced demand in the world markets for export commodities such as precious and non-ferrous metals, cotton, petroleum products, gas, mineral fertilizers, etc. Exports turned out to be the most sensitive GDP component to external shocks and the instability of the world economy. In 2008-2009, the growth rate of the Uzbek exports fell from 28.7% to 2.4%.

The government passed the Anti-Crisis Program to ameliorate the impact of global financial crisis. The main objectives of this have been to stimulate domestic demand through investments in the backbone sectors, to support domestic manufacturers by granting fiscal benefits, and to create new jobs through state-based projects, particularly in the rural areas were government policy sees priorities. In order to support rural development, two large state banks – "AgroBank" and "Qishloq Qurilish Bank" – were formed in 2009, and these offer soft financing to development projects in the rural areas.

Due to the implementation of the Anti-Crisis Program, the Uzbek economy managed to retain sustainable economic growth rates. The macroeconomic policies implemented in recent years, the substantial accumulation of state reserves, and structural and institutional transformations have enabled to significantly ameliorate the negative implications of the global financial crisis. In 2009, when many developing countries recorded negative growth, GDP growth in Uzbekistan totaled 8.1%, nominal monetary incomes grew by 36.4%, and the number of workers employed in the economy increased by 2.7%, compared to 2008.[6]

3. Social policy and MDG achievement

Social policy trends

It is well documented that one of the distinctive features of the Uzbek model is gradual economic transition to a market economy aimed at avoiding the short-term disruption associated with more rapid transition while maintaining social expenditures and improving wellbeing of the population. In this regard, a strong social policy has been one of the fundamental priorities of the government.

Uzbekistan is one of the first among CIS countries that have started the implementation of social policies on a programmatic basis. In the educational sector, both the National Human Resources Training Program and the School Education Development Program were designed for the period up to 2009, starting from, respectively, 1996 and 2004.

The national educational reform envisaged a new concept for the country, including the creation of the system, which would enable continuous human education; mandatory universal free-of-charge 9-year basic education; the introduction of 3-year free universal mandatory secondary special and vocational education for the graduates of Grade 9 of basic schools, thereby extending the mandatory free education up to 12 years.

Public current and investment spending on education remained nearly stable over 2001-2003 in the range of 6.7%-7.4% of GDP, and it increased from 23.2% to 33% of the government budget

[6] It is worthy noting that the IMF and the World Bank highly rated the timeliness of the Anti-Crisis Programme of the government.

between 2000 and 2009, while its share in GDP is equaled to 8.1% in 2009. This allowed achieving full literacy and enrolment in primary education and high levels of enrolment in secondary and higher education.

In the health sector, the Healthcare Reform Program for the period up to 2004 was adopted in 1998. The Child Sports Development Program was approved in 2004. In the 1998-2009 period, healthcare reforms in Uzbekistan emphasized on: creating a favorable environment for the birth and upbringing of healthy generation; developing infrastructure in the health sector; allotting more government funds to primary care; providing outpatient and polyclinic-based treatment and prevention, instead of inefficiently using costly beds; and creating the system of emergency medical care at all administrative and territorial levels.

Table 3. Uzbekistan: Government current expenditures on social sectors, 2000-2009 (% of GDP)

	2000-2003	2004-2007	2008-2009
Education	6.6	6.3	7.1
Healthcare	2.4	2.4	2.7
Social protection	2.0	1.5	2.1

Source: Ministry of Finance and Ministry of Economy of the Republic of Uzbekistan.

Between 1995 and 2002 public healthcare expenditure dropped from 3.6% to 2.4% of GDP, though. This was due to a scarcity of funds that forced the government to allot health spending mainly to maternal and child health care. Between 2000 and 2009, the share of healthcare spending in the government budget increased from 8.7% to 12%, while its share in GDP equaled 2.6% in 2009.

The utilities sector witnessed the adoption of several policies during 1996-2009. For example, several programs targeted the supply of potable water, the installation of meters for utility services, major renovations to apartment blocks built before 1991, the modernization of boiler houses, the supply of water to apartment blocks, and the overall improvement of access to water supply and sanitation facilities.

In the area of public welfare programs, since 1994 the government's financial aid system has been introduced for deprived families, including households with children. Aid is provided to the family and the final decision on who becomes a beneficiary is made by local self-governance institutions. In addition, social support is provided to all socially vulnerable groups, including retirees, disabled persons and children with mental retardation, etc.

Before 2000 the public welfare programs sought to guarantee social security virtually for all population groups but, subsequently, vulnerable groups of the population have been targeted. In order to enhance the living standards of other population groups, the government started developing special programs to create new jobs, increase employment and incomes inter alias, through development of private entrepreneurship including small business development. The welfare expenditures increased from 8.3% to 11% of the government budget between 2000 and 2009.

However, the volume of funds allocated for social protection is falling thus making the issue of effective targeting more and more important. Total coverage of social aid is low (4% of the total number of households according to the official statistics) but it is rather high in respect to family

allowances (more than 11% of all households and more than 30% of families with children under 16).

In August 2007, the government adopted the first national, so-called MDG-based Welfare Improvement Strategy (WIS) for 2008-2010, aimed at ensuring the coordinated implementation of national and sector programs and development plans to provide for sustainable economic growth and enhancing the population's wellbeing.

As it was emphasized in the strategy's document, Uzbekistan was one of the first countries in the CIS to initiate the implementation of social policy in a 'programmatic framework', which is mainly targeted to the following MDG-related objectives:

- Ensuring high and sustainable economic growth accompanied by an expansion in employment and opportunities for income generation as well as comprehensive area development, especially for rural regions, based on the available natural, labor and financial resources;
- Enhancing the quality of and access to basic social services, particularly education and health for all, ensuring gender equality and the comprehensive participation of women in economic and social processes.
- Strengthening structural and institutional reforms to increase economic competitiveness including liberalization and the development of the financial sector as well as other transformations aimed at establishing and strengthening market institutions.
- Implementing further public administration reforms in order to increase the efficiency of policy formulation and implementation as well as the quality of public services.

In fact, the year of 2007 was a turning point in socio-economic policy direction of the government. Table 4 summarizes key directions and priorities of social policy in Uzbekistan prior and after endorsement of the WIS.

Table 4. Uzbekistan: Key directions of social policy before and after 2007

Before 2007	After 2007
• Social orientation of transition period (doctrine) • Full coverage of social policy to avoid sharp fall in living standards (in early years of transition) • The highest level of social policy expenditures among CIS countries and other transition economies • Targeted measures of public policy against individual groups of population • Narrowing of coverage, strengthening of targetness, increasing of volumes of social assistance	• Transition from 'socially-oriented' policy to 'pro-poor' macroeconomic and institutional reforms • Consolidation of all macroeconomic, sector and regional programs into a single strategy to provide complexity and synergies • Attempting to reconsider macroeconomic policy – from 'export-led' growth to 'investment-led' growth • Localization of national priorities and regional development strategies

Source: Authors' observations.

A brief overview of advantages and disadvantages of the current policy priorities/focuses reveals the following specific observations in the area of MDG-related activities:

- ***Focus on development of education*** (considerable investments in infrastructure; universal access to primary and secondary education, high rates of literacy; development of professional education), but the quality of services does not meet the requirements of labor market;
- ***Focus on development of the healthcare system*** (development of primary healthcare, particularly in rural areas; focus on reproductive and maternal/child health; balanced nutrition, access to drinking water and sanitation), but accessibility and quality of health care services can be improved;
- ***Focus on employment and income generation*** (targeted employment programs; private sector development), but elasticity of employment with respect to economic growth is low and employment does not always protect from poverty;
- ***Strong focus on guaranteeing protection for the vulnerable groups*** (pensions, allowances and other transfers plays important role in supporting vulnerable groups, including poor families with children; some allowances are allocated specifically for families with children), but (1) targeting is good but can be improved; (2) the amount paid to a household can be inadequate to protect the family.

Summarizing, despite challenges and difficulties of the transition period, the government of Uzbekistan was able to generate enough revenue to finance key pro-growth expenditures, including education and healthcare. Besides, the adverse effects of falling social spending on living standards are to some extent offset by strengthened efforts to refocus it on basic education and primary health care that benefit the poor (ADB, 2006).

Evolution of the MDGs

In terms of the MDGs the WIS (2007) defined the following objectives that are used in setting up the country specific targets for 2015, presented in Table 5:

- The poverty rate will be reduced from 27.5% in 2001 (baseline) to 14% by 2015;
- The necessary improvements in primary and secondary education will be delivered and the share of women with a higher education increased;
- The under-five child mortality rate will be reduced from its 2006 rate by one-third, and by another one third by 2015;
- Maternal mortality will be reduced by 15% by 2010 and a further 15% by 2015;
- The spread of tuberculosis will be halted by 2010, and the prevalence of tuberculosis will begin to subside by 2015. It is expected that the HIV/AIDS infection rate will be substantially reduced by 2015;
- Measures for environmental protection and the rational use of natural resources will enable to reverse environmental damage, securing tangible results by access of urban and rural households to safe drinking water and sewage will be improved from its 2006 level by 25% by 2010 and by 50% by 2015.

The Government has made substantial efforts with a view to achieve MDG 1 – reducing poverty and malnutrition – in the framework of national strategies and development programs, and in partnership with international development institutions. Starting from 2001, the Government, in cooperation with international donor organizations, has been implementing the program of

Household Budget Surveys (HBS)[7], which provides information on the factors that influence the poverty level. As a baseline for the identification of poor families, a food poverty threshold has been determined: each member of a household should consume 2,100 cal per day.

Table 5. Uzbekistan: Progress towards the MDGs, 2000-2008 and 2015 target

MDG and related indicator	2000	2005	2008	2015 (target)
MDG 1: People living below the national poverty line (% of population)	27.5[1/]	25.8	21.8	14.0
MDG 2: Primary completion rate (% of relevant age group)	98.9	98.4	99.0	100.0
MDG 4: Under-five mortality rate (per 1,000 live births)	28.5	20.6	17.3	13.4[2/]
MDG 5: Maternal mortality rate (per 100,000 live births)	33.1	29.2	22.4	17.4[3/]
MDG 7a: Access to an improved water source (% of population)	80.4	82.6	82.6	100.0
MDG 7b: Access to improved sanitation facilities (% of population)	46.6	48.2	51.5[4/]	65.0

Source: UzbekInfo 1.0 and UNDP (2009a).
Notes:
1/ According to the first Household Budget Survey results, conducted by the World Bank in 2001, the estimated poverty level was equal to 27.5%.
2/ According to the WIS (2007), the under-five child mortality rate would be reduced from its 2006 value, which is equal to 20.1 per 1,000 live births, by one-third in 2010, and by another one-third by 2015.
3/ According to the WIS (2007), maternal mortality rate would be reduced from its 2006 value, which is equal to 24.8 per 100,000 live births, by 15% in 2010 and a further 15% by 2015.
4/ The 2007 year value.

With the aim of supporting the WIS for 2008-2010, the government developed and approved the National Nutrition Improvement Strategy for 2009-2011, which envisages the activities to support national programs on flour fortification, iodine enrichment of salt, and promotion of breastfeeding. In the framework of the WIS, the government has particularly focused on the creation of new employment opportunities, particularly in the rural areas. For instance, the State Rural Development and Beautification Program for 2009 focused on enhancing the effectiveness of the agricultural sector, the creation of new jobs, primarily for the youth in the rural areas, as well as the improvement of incomes and living standards of rural residents.

New jobs creation and household income generation are among the prioritized objectives of the government's Anti-crisis Program, developed and approved at the end of 2008. The government also implemented policies focused on enhancement of support for social sector and increasing household income, which included higher government spending for the social sector and welfare as well as increasing the wages of the workers.

National programs were followed up by the adoption of the National Strategy for Improved Public Nutrition for 2009-2011, with an ultimate goal to achieve exclusive breastfeeding for 95% of the children under six months. The Decree of President on Implementation of Flour Fortification Program was adopted in 2006. The Law on Prevention of Iodine-Deficiency

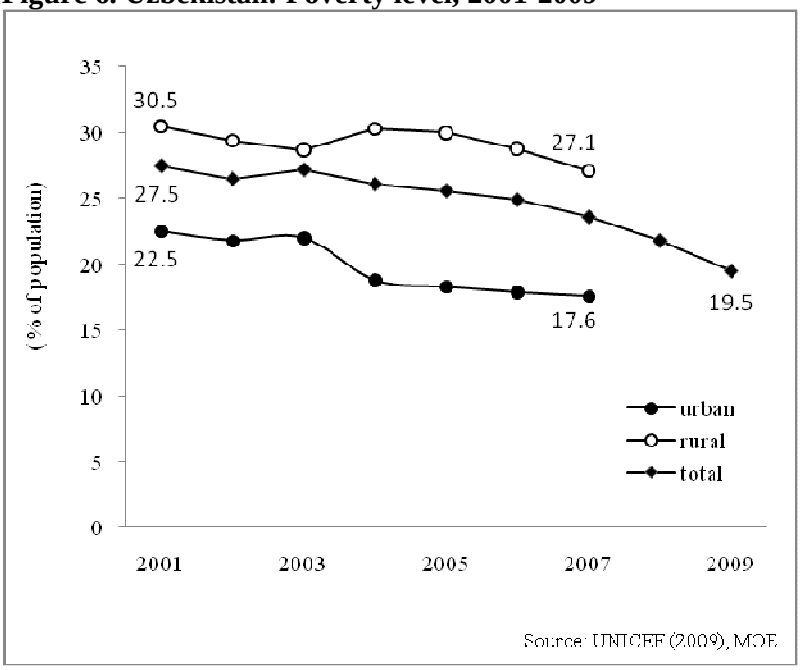
[7] Since 2001, the State Committee of Uzbekistan on Statistics is regularly undertaken household budget surveys covering approximately 10,000 households.

Caused Illnesses was passed in 2007. Furthermore, international donor organizations such as World Bank, ADB, UNDP, UNICEF, etc. provided active support to the government efforts to reduce poverty and malnutrition.

The above efforts yielded substantive results. Quality of public nutrition in general and child nutrition in particular were improved. Iron/folic acid supplementation and the first stage of the flour fortification enabled to reduce the incidence of under-5 child anemia from 66.6% in 2000 to 33.5% in 2009, along with the reduction in the prevalence of diseases caused by iodine deficiency from 47.7% to 28.6%. Greater birth spacing and better awareness of the parents about child care also facilitated the reduction of malnutrition. The number of births with interval over 2 years as a percentage of all births increased from 90.9% to 95.5%.

The poverty rate decreased from 27.5% in 2001 and amounted to 19.5% in 2009 (i.e., it decreased already by one-third). At the same time, the poverty rate is significantly higher among rural population than urban population (Figure 6). In 2008 24.9% of rural residents were defined as poor, whereas only 16.3% of urban residents were poor. The rural population accounts for 63.7% of country's population and 72.9% of all poor. Rural poverty is caused by the prevalence of low-pay jobs, the existence of families with many children, and poor social infrastructure compared to urban areas.

Figure 6. Uzbekistan: Poverty level, 2001-2009



Current poverty trends show a decline in the estimated poverty level by 0.6 percent points per year and based on a linear continuation of past trends it would be equaled to 16% by 2015, which is insufficient progress towards timely achievement of MDG 1. Therefore, meeting the income poverty target will require sustained broad-based growth achieved through further provision of productive jobs in Uzbekistan.[8]

[8] Two studies – World Bank (2005) and ADB (2006) – also conclude that despite constant decline poverty rates, the country may not meet targets on current trends; and the likelihood of achieving the MDG 1 on current trends is too low.

The second global MDG is aimed at providing universal access to primary education, which was already achieved in Uzbekistan. Therefore, in the context of Uzbekistan, the internationally-agreed MDG objective has been slightly modified to read: "improvement of the quality of education in primary and secondary schools while maintaining universal access to it".

With the aim of improving the quality of primary education, the government is taking actions for implementation of the State School Education Program, which enabled to improve school infrastructure significantly, supply them with equipment and information technologies, and create a solid ground for further qualitative changes in the primary and basic education. In 1990-2010, 1,559 new schools were built and their total number increased from 8,535 to 9,791, and more than 8,000 schools were completely renovated and provided with access to natural gas, running water, and district sewage systems.

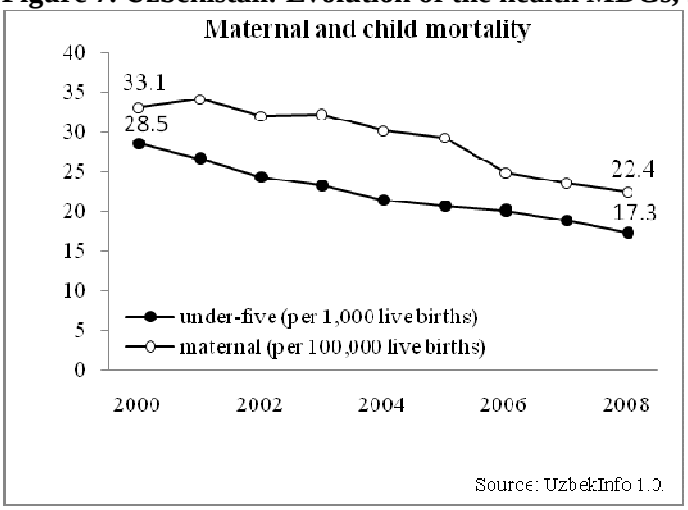
Several concrete measures are being undertaken to maintain 100% overall and net enrollment and ensure gender equality in primary education. The percentage of students, which started their education in Grade 1 and reached Grade 9, is 97%. In 2000-2008, the coverage of the population aged 7-15 by primary educational programs equaled more than 98%. Meanwhile, the literacy rate at the age of 16-24 was nearly 100%. Generally, another indicator of the quality of education – the teacher-student ratio – has also improved in the country.

The government also actively collaborated with international development institutions to support school education. The activities of international institutions such as the Asian Development Bank, the World Bank, UNICEF, UNESCO, etc. have an important role in supporting the school education. The areas of international support included making grants available to support provision of textbooks and computers to schools, improving teachers' qualifications, enhancing the effectiveness of school management and conducting experimental educational methods.

In line with the ***third global development goal*** the government has adopted a number of laws and national programs that outline priority areas for promoting gender equality and empowering women in Uzbekistan. Gender equality is guaranteed by the Constitution, so there are no gender disparities in primary and secondary education. However, notable differences are observed at higher levels of education. For instance, for the 2004/2005 academic year the ratio of boys to girls was relatively equal (51% for boys against 49% for girls). For specialized and professional education, in particular, the ratio was 64%/36%.

Targets set by Uzbekistan for ***MDGs 4 and 5*** fully correspond to the global definition that is focused on the efforts ***to reduce the under-five and maternal mortality rates by two-thirds and one-third*** by 2015, respectively. Child mortality in the country is considered to be one of the lowest among Central Asian countries. The under-five mortality rate was 28.5 per 1,000 live births in 2000 and it was brought down to 17.3 in 2008. At the same time, the maternal mortality rate decreased more moderately from 33.1 to 22.4 per 100,000 live births between 2000 and 2008 (Figure 7).

Figure 7. Uzbekistan: Evolution of the health MDGs, 2000-2008



The government has adopted and is employing a regulatory and legal framework and targets national programs aimed at reforms of the healthcare system, enhancement of medical culture in the family, and the improvement of maternal health and upbringing of a healthy generation. In particular, a number of special programs focused on protection of maternal and child health were adopted, including "Healthy Generation" (2000), "Mother and Child" (2001), "Additional Measures to Enhance the Health of Women and Young Generation" (2002), and "Measures for Implementation of Prioritized Areas of Enhancement of Health Awareness in the Family, Strengthening Women's Health, Birth and Upbringing of Healthy Generation" (2005).

Public current and capital expenditures are channeled primarily to the provision of guaranteed free healthcare, which includes, inter alia, maternal and child health services. In 1998-2003 the public health expenditures barely decreased from 2.9% to 2.3% of GDP, but as of 2006 the expenditures have increased, reaching 2.7% of GDP by 2009.

Health financing in Uzbekistan may improve in the foreseeable future. Currently, the Programme for Improvement of the Health Infrastructure and Facilities for 2010-2014, and the Law on Mandatory Health Insurance are under consideration. Implementation of the mandatory health insurance will help to improve the mechanisms of healthcare system financing, thereby improving the public health in general, and the maternal and child health in particular.

Nevertheless, child mortality indicators remain high compared with developed countries. Moreover, the maternal mortality rate is unstable and there are considerable differences in maternal mortality rate indicators by regions. Based on current trends, Uzbekistan is likely to meet the under five and maternal mortality targets if better policies and additional resources are put in place.

During the Soviet period most cities and towns have been piped and had an access to centralized water supply and sewage systems. In the rural areas other forms of semi-centralized systems have been widely utilized, including wells, springs, rainwater collections, etc., that allowed having a relatively stable access to potable water. It indicates that the population already used to have a higher service level than that defined by the MDGs agenda. COWI (2004) argues that "the MDG definition in this area is not extremely specific and therefore, represents a range of possible service levels".

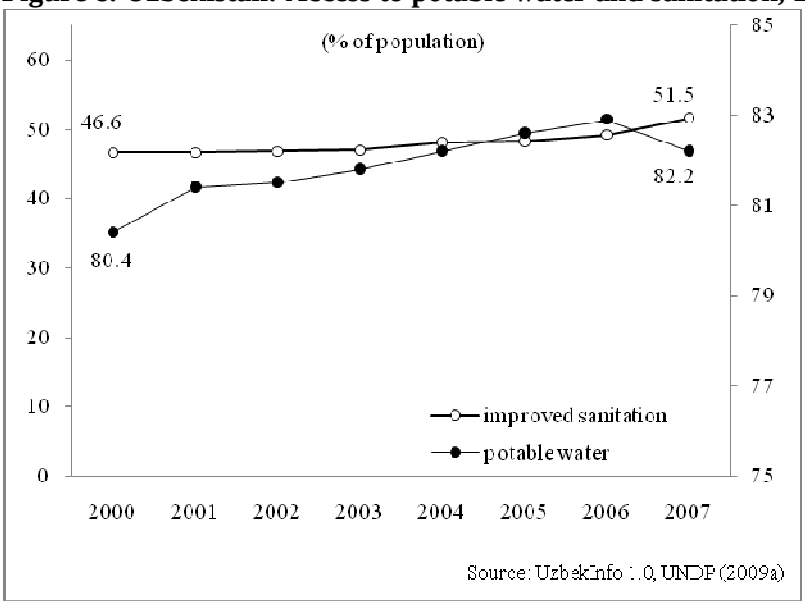
Therefore, in the Eastern Europe, the Caucasus and Central Asia (EECCA) region definitions of

two targets of the global MDG 7 – ***access to drinking water and basic sanitation facilities*** – are interpreted as following:

- "improved" water supply technologies include household connection, public stand-pipe, borehole, protected dug well and spring, rainwater collection, while "not improved" are unprotected well and spring, vendor-provided water, bottled water (it is based on concerns about the quantity of water supplied and not about the quality of water), tanker truck-provided water;
- "improved" sanitation technologies include connection to a public sewer, connection to septic system, pour-flush latrine, simple pit latrine, ventilated improved pit latrine, while "not improved" are service or bucket latrines, public latrines, latrines with open pit.

During 2001-2009, special government programs on construction of water pipelines were implemented, allowing for about 54,000 km of new water pipelines, of which 47,900 km were build in rural areas. They have resulted in increased access to potable water from 80.2% in 2000 to 82.6% in 2005 (Figure 8).

Figure 8. Uzbekistan: Access to potable water and sanitation, 2000-2008



The percentage of the population with access to sanitation services has also gradually increased from 46.6% in 2000 to 51.5% in 2007 (Figure 8). Achievement of the above two targets of MDG 7 in Uzbekistan is most likely, and depends on further progress mainly in rural areas where the shortage is much larger.

4. Sector analysis of MDG determinants

Poverty reduction

As it was discussed in the previous section, poverty is defined as the state of one that lacks own resources (material and monetary) to ensure national minimal consumption standards. The

available poverty studies[9] underline the following stylized facts in connection to poverty in Uzbekistan:

- Rural residents are more likely to be poor than urban residents (more than 70% of poor families live in rural areas whereas the share of the rural population in the country is about 60%);
- Poverty is higher among households where the head is unemployed or has a low level of education. Moreover, the poor are more likely to be employed in low-wage occupations (the "working poor").
- People with low or higher education suffered less from poverty compared with persons with middle-level education and this pattern was consistent for males and females.
- Household incomes of the poor are mainly determined by social transfers and wages and these measures do not seem to have improved since 1998.
- Households with many children, especially with 3 or more, aged less than 16 are at a greater risk of being poor.

According to ADB (2006) a one percentage change in GDP led to an estimated 0.80% change in the poverty rate. However, the elasticity of household income with respect to GDP growth remains low and has been estimated to be 0.32 for the period 2007-2009. This implies that increased poverty reduction can be achieved through raising incomes and expanding economic opportunities for the poor.

UNESCAP (2010) examines the potential "growth effect" on poverty – or the reduction in the poverty headcount resulting from a 1% increase in the rate of growth of per capita consumption – without any change in inequality, in selected Asian countries. Uzbekistan is listed among those countries that would benefit the most from faster growth with a poverty reduction of more than half a percentage point (0.59 percentage points in 2003).

Improving the quality of education

The second national MDG is aimed at improving the quality of education in primary and secondary schools while maintaining universal access to it. To achieve this goal in Uzbekistan, the government should firstly ensure maximum enrolment in primary schools, and then, make sure that all students receive education of good quality. Therefore, there is an urgent need to create mechanisms aimed at raising the quality of the educational services system, to improve the content and educational technologies and to upgrade the efficiency of the educational sector management.

There is a number of difficulties that the school system currently faces and has an adverse impact on the accessibility and quality of education. For instance, lack of teachers in certain specializations and educational levels, insufficient logistical support to schools and inadequate levels of textbook availability, are among others.

Child mortality

Despite the ongoing reforms and the government's efforts in the area of improving children's

[9] For instance, UNICEF (2009), WIS (2007) and ADB (2006) are among others.

health and wellbeing, the following are among the leading causes of child mortality in Uzbekistan:

- inadequate logistical support of healthcare institutions and staffing with qualified medical personnel, especially in rural and remote areas;
- low level of knowledge/skills of the medical personnel in the area of neonatal resuscitation and basics of the newborn child care that contributes to a high level of infant mortality during the neonatal period (two thirds of death cases in this period occur during the first seven days of life);
- lack of the standards meeting international requirements on medical assistance in primary healthcare institutions and in the in-patient clinics; and obsolete equipment of the laboratories, hospitals and reanimation departments,
- lack of medicines and of knowledge among the general population on child care issues, especially during postnatal period.

Prenatal (the period occurring around the time of birth; i.e., 5 months before and 1 month after) and neonatal (i.e., the period of up to 1 year) services are major determinants of both maternal and newborn health. Newborn mortality in Uzbekistan is far more highly correlated with obstetrical management, neonatal resuscitation practices and newborn care. At present, more than 95% of time births occur in hospital maternity units and the birth attendance rate exceeds 98%. Such a large proportion of relatively preventable causes of death, especially of asphyxia and infections, could be explained by very poor skills and knowledge of medical staff in neonatal resuscitation, as well as in essential newborn care (UNDP 2006).

Tandon (2005) examines the empirical evidence on dominant determinants of health MDGs, particularly, under-five mortality rates observed over the period 1990-2000 in 36 developing countries in the Asian region, including Uzbekistan. The estimated elasticity derived from cross-country data was equal to about 0.7; pointing out that a per capita GDP growth rate of 1% is associated with about a 0.7% decline in child mortality.

This study concludes that economic growth is an important determinant of the child mortality reduction, but at the same time, it alone will not be enough to attain MDG 4 by 2015. Indeed, growth increases the capacity and ability of individuals to demand and consume better health care, housing, nutrition, etc. On the supply side, it also helps improve the capacity of the government to supply more and better health care through better infrastructure.

Another applied finding of Tandon (2005) comes from empirical evidence that defines public health expenditure as an insignificant determinant of child mortality after controlling for income and other factors such as female education. At the same time, investments in primary health care and implementation of cost-effective interventions such as immunization programs, capacity building initiatives aimed at increasing health-related human resources and improving physical infrastructure can all have a significant impact on child mortality.

Maternal mortality

In the case of progress in reducing maternal mortality, the direct outcome of interest is maternal death. On the other hand, there are several factors that directly and indirectly affect the health and safety of new and expectant mothers and that of their child. One of the related indicators is

the number of births that are attended to by skilled health personnel who have been trained to conduct deliveries and care for newborns.

There are common factors such as under-nutrition and high prevalence of anemia, together with economic pressures that keep women doing hard physical work while pregnant. Also lack of financial means prevents many women from receiving adequate antenatal care and contributes to maternal mortality. Also anemia remains among the most frequent ailments affecting women and severely influencing maternal health in Uzbekistan (UNDP, 2006).

In a recent study on MDG achievement in Asia, ADB (2010) documents that the proportion of births attended by skilled health personnel is low in many economies of the region. Only in eight economies, including Uzbekistan, it was reported that 99–100% of births were professionally attended. The linear regression of maternal deaths per 100,000 live births on the percentage of births attended by skilled health personnel for 30 Asian economies suggests that about 79% of the variation in maternal mortality ratios is explained by whether or not skilled health personnel are in attendance. The regression results also suggest that maternal mortality ratios fall by about 6.5 per 100,000 live births for every percentage point increase in the percentage of births attended by skilled health personnel.

Access to safe water and sanitation

Uzbekistan is making good progress towards attaining MDG 7: that is, halving the proportion of people without sustainable access to safe drinking water and basic sanitation. The main factors affecting the supply and quality of drinking water are remaining old equipment for water filtration; financial complications; infrastructure for rural areas; low public awareness on nature-friendly use of drinking water (UNDP, 2006).

Table 6. Uzbekistan: MDG 7a & 7b – coverage & investment costs

I. Water supply and sanitation coverage (2004, in %)				
	Water supply		*Sanitation coverage*	
	urban	*rural*	*urban*	*rural*
"Improved" centralized	93.2	65.5	46.5	2.5
"Improved" other	6.2	22.9	53.0	97.0
"Not improved"	0.6	11.6	0.5	0.5
Total:	100.0	100.0	100.0	100.0
II. Investment costs of achieving MDG 7a & 7b[1/] (totals in mln.Euro; per capita in Euro)				
	Investment costs		*Average annual expenditure[2/]*	
	Total	*Per capita*	*Total*	*Per capita*
Water supply	1,150	46	420	16.8
Sanitation coverage	500	20	110	4.3
Total:	1,650	66	530	21.2

Source: COWI (2004).
Notes:
1/ Including operations & maintenance, reinvestment, and the investment for MDG.
2/ MDG 7a – access to potable water; MDG 7b – access to sanitation (sewage) services.

Table 6 clearly shows that the share of the population covered by so-called 'centralized' water supply and sanitation facilities is much higher in the urban areas than in the rural areas. Coverage through other – alternative to a centralized – facilities is dominant for provision of sanitation in both urban and rural areas where this is equaled to 53% and 97%, respectively. It is

worth noting that pit latrines were considered as an improved source of sanitation (97%) in most rural areas.

COWI (2004) also reports the overall cost estimates for achieving the MDG 7 in the EECCA region. The total range of investments costs is estimated at 7 to 21 billion EUR. Table 6 also demonstrates that the majority of the investments relate to improvement of water supply services – 70% of total investment costs and 79% of average annual expenditures.

This study concludes that closing the financing gap can be done in two ways: reducing the expenditure need or increasing the supply of finance. On the latter, authors analyzed the potential for increasing the user charge contribution, and found that the effect of a gradual increase in the level of household user charges to on average of 4 percentage of household income, gives a significant contribution to closing the gap. However, they also point out that such increase is difficult to implement due to the high level of poverty in many parts of the EECCA region.

The following logic and sequence, adopted from World Bank (2004), perhaps best summarizes existing important linkages among the human development goals; in particular for the MDGs. Improved access to safe water and basic sanitation facilities is an essential condition that maintains the good health of a child. Adequate nutrition and good health positively affect the probability that a child will enroll and succeed in school. Public infrastructure, including roads and other transport facilitates access to education and health facilities as well as improves the quality and effectiveness of the public services. Quality of education and better health contribute to increased productivity and higher incomes. Higher incomes and less poverty mean better human development outcomes.

5. Methodology

Overview of MAMS

This section briefly overviews the MAMS modeling framework, and draws heavily on technical documentation by Lofgren and Diaz-Bonilla (2006) and Lofgren and Diaz-Bonilla (2010). MAMS – MAquette for MDG Simulation – is a dynamic CGE model that is designed to analyze strategies for achieving the MDGs and, more broadly, strategies for growth, and poverty reduction in developing countries. The term “maquette” reflects that the model is designed to capture the key processes for MDG achievement in a manner that is applicable to a wide range of countries.

The main novelty of MAMS compared to standard CGE models is the inclusion of the MDG-related social services and their impact on the rest of the economy. A key objective of this model is to link government spending and MDG outcomes in a dynamic way, permitting several outside influences as follows:

- It allows the returns of scaling up government spending to vary with the level of service delivery; particularly, at low levels, increasing returns may prevail as network and learning effects and synergies are predominant, while at high levels of service delivery, government spending may suffer from decreasing returns to scale.
- It permits the effectiveness of government spending to depend on many variables; in general terms, this means that spending on services becomes more effective if demand

conditions for those services are more favorable.

- The model considers that the costs of service delivery may change with macroeconomic conditions; the more intense the MDG effort, the stronger the impact on costs as skilled labor becomes scarcer and financial conditions become tighter. In particular, from a general budgetary perspective the impacts on costs are even larger, because changes in macroeconomic conditions do not only affect MDG-related spending, but also other, non-MDG-related government spending.

In the model government services are produced using labor, capital, and intermediates. The government's demand (consumption and investment) is classified by function of social services (including education, health, water and sanitation), infrastructure and other government services. The selection of the variable clearing the government budget is an important part of many MAMS policy scenarios. In this regard, the budget deficit could at the time be financed by taxes, domestic borrowing, foreign borrowing, or foreign grants. The model also tracks government domestic and foreign debt stocks (including foreign debt relief) and related interest payments.

Among other key characteristics of the model it is worth noting that: the application of the model to any country will involve adapting it to country-specific conditions through a dataset; the model structure is recursive (i.e., the bulk of the decisions of economic agents depend on the past and the present, not the future); and the applicability of the model to specific policy issues depends in part on the degree of disaggregation.

Core CGE and MDG modules

The MAMS consists of two integrated modules: a core CGE module and an MDG module.

The core CGE module captures the basic structure and interactions of the economy, namely, it examines the bulk of the production (activities producing outputs using factors and intermediate inputs), consumption (by households and the government), investment (private and government) and trade-related (domestic and foreign) decisions of the economy for each time period. This module is divided into six blocks covering prices; production and trade; domestic institutions; investments; system constraints and macro variables; and stock updating and productivity.

The price block defines prices that can be expressed as functions of other endogenous variables (as opposed to being free variables that perform market-clearing functions).

The production and trade block includes the first-order conditions for profit-maximizing production and transformation decisions as well as cost-minimizing domestic demand decisions. Production activities are divided into two levels: at the top, gross output is determined by aggregation of primary factors (a Constant Elasticity of Substitution – CES) and intermediate inputs (a Leontief function), while factors can be substitutes at the bottom. On the other hand, both exports and domestic sales are determined by aggregation of market sales of any commodity from different activities (on the basis of a Constant Elasticity of Transformation – CET function). A CES function also helps determine the optimal combination of domestic output and imports for domestic consumption purposes.

The domestic institutions block accounts for the receipts and expenditures of all domestic institutions, both government and non-government (households) as well as current, non-trade

payment flows to and from the rest of the world (factor incomes and transfers). Allocation of household incomes net of direct taxes, savings, and transfers to other institutions is performed according to demand functions belonging to a linear expenditure system (LES).

The investment block covers the determination of government and private investment (including foreign direct investments) and how these are financed. Different treatments are applied to various types of capital. For service capital, growth in service production is the driving force; investment demand is determined as the difference between the anticipated capital demand next year and the capital stock that would remain if no investments were made. For infrastructure capital, government investment demand is determined as the difference between an exogenous growth term times the infrastructure capital stock and the capital stock that would remain if no investments were made.

The system constraints and macro variables block considers the constraints under which the economy operates (the budget constraints of institutions and producers; macro balances; and market constraints for factors and commodities). In particular, the foreign exchange constraint imposes equality between foreign exchange uses (spending on imports, factor incomes and transfers to the rest of the world, and interest payments on foreign debts) and sources (export revenues, transfers, factor incomes, borrowing, capital grants, and FDI). For each composite commodity, the supply is set equal to the sum of demands. The market constraint for factors states that total demand for any factor equals the total endowment times the employment rate.

Macro closures define the mechanisms through which the three macro accounts (savings-investment, balance of payments, and government) reach balance. The budget deficit is financed by taxes, domestic borrowing, foreign borrowing, and foreign grants. One of the main closure rules included in MAMS are three categories of built-in government clearing mechanisms aimed at: closing the gap between income and spending accounts of the government budget; allocating government final consumption spending; and addressing alternative means used to determine the income of government institution.

The stock updating and productivity block updates selected parameters (including factor supplies, population, and factor productivity) on the basis of exogenous trends and past endogenous variables. A new equilibrium is computed at each period, thus representing the dynamics of the economy.

The MDG module captures the processes that determine MDG achievement in the human development area that typically are most costly and have the greatest interactions with the rest of the economy: universal primary school completion (MDG 2; measured by the net primary completion rate), reduced under-five and maternal mortality rates (MDGs 4 and 5), and increased access to improved water sources and basic sanitation (part of MDG 7).

It species the mechanisms that determine the values for the indicators related to the different MDGs, educational behavior and the size of disaggregation of the labor force. The evolution of the MDGs is affected by the rest of economy through variables related to household consumption, the provision of various types of MDG-related services, labor wages and capital investments in infrastructure. Moreover, the evolution of one set of MDGs can influence other MDGs (Table 7).[10]

[10] These determinants are typical for a country study, and were identified on the basis of sector studies underpinned by econometric analysis and subject to the constraints of an economy-wide model like MAMS.

Table 7. Determinants of MDG achievements

MDG	Service delivery	Household consumption per capita	Wage incentives	Public infra-structure	Other MDGs
1. Poverty reduction		X			
2. Access to primary education	X	X	X	X	4
4. Under-five mortality	X	X		X	7a, 7b
5. Maternal mortality	X	X		X	7a, 7b
7a. Access to potable water	X	X		X	
7b. Access to sanitation	X	X		X	

Source: Lofgren and Diaz-Bonilla (2010).

The educational component of the MAMS tracks evolution of enrollment in each cycle and service measured per student in each teaching cycle (primary, secondary, tertiary). The educational outcomes are treated as functions of a set of determinants, including for each cycle, rates of entering, passing, repeating, and dropping out; and, between cycles, the share that continue to the next cycle. Based on the below information, the model defines the number of enrolled students by each cycle and year:

- The share of the enrolled that pass their current grade (‘*pass’*), drop out (‘*dropout’*), or repeat (‘*rep’*) the grade next year, where *‘pass’ + ‘dropout’ + ‘rep’ = 1*. It means that during the school year, a student must pass, drop out, or become a repeater.
- The share among the passers from their current grade (‘*pass’*) who graduate from their current cycle (‘*grdcyc’*) or continue to a higher grade within this cycle (‘*contcyc’*). In terms of shares: *‘grdcyc’ + ‘contcyc’ = ‘pass’*.
- The share among cycle graduates who exit the school system (‘*grdexit’*) or continue to next cycle (‘*grdcont’*), where *‘grdexit’ + ‘grdcont’ = 1*. For graduates from the last cycle, the share of those who exit is unity; and
- The share of the cohort of the 1st year in primary school that enters school (‘*g1entry*’).

Poverty and inequality analysis, as in other CGE models, can be performed in several ways. For the purposes of this study a method will be applied that uses an elasticity calculation for poverty given changes in per-capita household consumption.

Calibration of MAMS with country-specific data

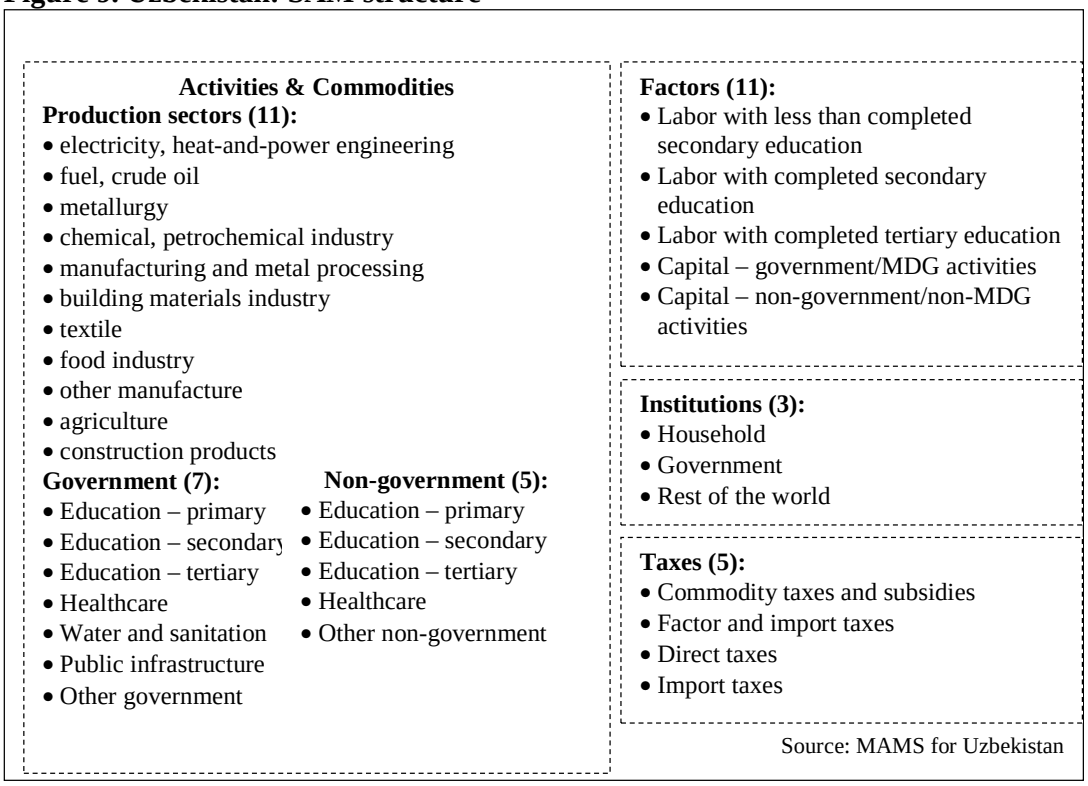
With the aim of calibrating the MAMS for Uzbekistan, a ***Social Accounting Matrix (SAM)*** was constructed for the year of 2005 – the base year of the MAMS model. National accounts data and the 2005 input-output matrix (presented by the State Committee of Uzbekistan on Statistics) were key data sources. Following the accounting structure and other requirements of MAMS, the MDG-related government activities are disaggregated as follows: public and private education (by cycle), public and private health, the public provision of water and sanitation, other public infrastructure services, and other government services.

In the SAM, investment and capital stocks are disaggregated by function into three education sectors and sectors for health, water and sanitation, public infrastructure, and other government activities. Furthermore, the matrix includes eleven production sectors (agriculture, electricity

and heat-and-power engineering, crude oil, metallurgy, chemical and petrochemical industry, manufacturing and metal processing, textile, construction, building materials production, food industry and other manufacture) and three types of labor (unskilled, skilled and highly-skilled). The primary government revenue sources consists of direct, indirect and import taxes, foreign borrowing and grants (Figure 9).

The full specification of the MAMS model requires some understanding of the complementarities in spending across different MDGs, where progress in one MDG has a positive impact on another MDG outcome. In the MAMS modeling framework this effect is captured by ***cross-elasticities***. Due to absence of econometrically estimated standard (substitution, transformation, income-expenditure, income-savings, and etc.) and MDG elasticity values for Uzbekistan, the required model elasticities have been borrowed from the existing literature on CGE/MAMS modeling[11] or defined based on expert opinion.

Figure 9. Uzbekistan: SAM structure



It is evident that borrowing of such 'extraneous' values could have a negative impact on the accuracy and precision of the model simulation results. However, we believe there are at least *three main reasons* why this approach is justified.

– All used parameters are within the possible and plausible ranges, so that the baseline simulation reasonably replicates the aggregate functioning of the economy and generates a smooth continuation of past trends for key macroeconomic variables. In addition, some essential adjustments were made during the model calibration process.

– The modeling exercise developed here is not expected to generate precise and ready-to-

[11] Particularly, the MDG elasticity values are taken from recent studies for Chile, Costa Rica, Ecuador, Ethiopia, Honduras, and Nicaragua.

use estimates on the cost of attaining the MDGs: rather, it is expected to provide policy recommendations on how the country should strategize to achieve the MDGs and how costly the process could be.

– A sensitivity analysis - similar to that reported in other countries - indicates reasonable changes to the used elasticities do not have an extreme impact on the simulation results and performance of the model, in general.

Another set of parameters to be estimated is a series of ***basic educational indicators*** that consists of the number enrolled in each cycle per year, the number of non-cohort entrants to first grade in primary cycle, and new students entering each cycle, as well as average rates for students that pass a grade, drop out and leave, repeat, continue their studies and graduate in each education cycle.

To calibrate the logistic functions of the MAMS model, some ratios were added to provide the value in 2015 relative to the value in the base year for the MDG determinants, in a starting MDG scenario. For current public spending on education, for example, the ratio shows how much larger public spending on education per student needs to be in 2015, compared to the base year of the country application of MAMS, in order to achieve MDG 2. The computation of current public spending on education per student for the base year and the target year are estimated based on two main indicators: total recurrent public expenditures on education[12] and the number of students enrolled in the cycle.

Total current public expenditures for the base year are extracted from existing statistical databases, while target expenditures are estimated based on benchmark quality standards set by the international community. These standards include the number of teachers, the qualification of teachers and school management, adequate supply of teaching materials, etc. Projected and base year number of students enrolled in primary school can be obtained from population-related databases.

For ease of computation it is assumed that the public recurrent expenditure on quality of education for entering the cycle (*'g1entry'*), passing the cycle (*'pass'*) and graduating from the cycle (*'gradcont'*) is assumed to be the same across educational cycles.[13] Due to omitted variables that affect education attainment over time, this approach gives a very approximate picture of financing needs for achieving the necessary student behavior. To find the MAMS-related parameter, public recurrent expenditure per student in 2015 is divided by public recurrent expenditure per student in the baseline year.[14]

To our knowledge, there is no literature available on the financing needs for Uzbekistan's education system. One of the reasons could be a high level of education attainment in Uzbekistan, which indicates that the country is already on-track to achieve MDG 2. Therefore, improvement of the quality of education in primary and secondary schools while maintaining universal access to it becomes an important consideration for this target (for detailed discussion see Section 3). Accordingly, with the aim of ensuring sustainable enrolment, certain quality standards need to be put into place.

In general, the calculations followed the steps outlined above. The number of enrolled students is extracted from the UNESCO database and the State Committee of Uzbekistan on Statistics.

[12] This does not include capital cost and solely focuses on estimating recurrent spending on education.
[13] It follows the assumption of an absence of economic growth.
[14] See Kabulova and Kaldewei, 2010 for details.

The benchmark for teacher/student ratio is adjusted upward from 1/40, as suggested by the Millennium Project, to 1/30, in line with what is considered optimal for countries with the same level of development. The benchmarks for secondary and tertiary education are set based on the baseline conditions in the country. Then the estimated parameters are used to fill in the corresponding cells in the column *'edu-qual'* of the *'mdgeduscen'* worksheet in the MAMS MDG-dataset (see Annex 1 for variables and equations used in computation of the ratio for *'edu-qual'*).

In order to estimate the extent to which, under an MDG-achievement scenario, public expenditure needs to increase in ***the water and sanitation sectors***, we calculate the ratio for *'c-wtsn'* which is equal to the recurrent public per capita expenditure in 2015 is divided by the recurrent public per capita expenditure in the MAMS baseline year (see Annex 2 for variables and equations used in computation of the ratio for 'c-wtsn').

As in the section on education, for these purposes MAMS only requires information on recurrent public expenditure, since the model assumes that any required additional investment in the water and sanitation infrastructure will move proportionally with recurrent spending. For practical estimation purposes, however, the opposite approach is more feasible, basing the required recurrent spending on the "shadow" cost of the necessary infrastructure.

In a first step, the actual and the targeted coverage rates for improved access to water and sanitation are assessed based on existing data and on the targets for water and sanitation that are part of MDG 7. The current coverage rate is estimated based on the information on the total population and the number of people with access to improved water and sanitation facilities in the baseline year. These numbers are then multiplied by the estimates of unit infrastructure capital costs, drawn from COWI (2004), and defined as the capital cost of new per-capita infrastructure investment in water and sanitation. This calculation yields the "shadow" costs for the entire domestic water and sanitation infrastructure systems needed to achieve the desired coverage rates.

Based on these "shadow" costs, it is possible to calculate the required recurrent public spending in each sector, for operation and maintenance of hardware, emptying of septic tanks and latrines, water treatment and distribution, sector regulation and monitoring. Subtracting the share of private recurrent spending from total recurrent spending, and dividing the remainder by the number of targeted individuals, yields public recurrent spending per capita.

It is worth note that similar to most needs assessment studies the approach described above neglects some important components of financing the water and sanitation sector, such as the cost of developing water storage and conveyance infrastructure, hygiene education, wastewater treatment, etc. It also assumes constant unit prices over time, which immediately eliminates the following assumptions: the existence of technological progress, and possible exhaustion of water resources. Neither of these is taken into account in the MAMS model.

In a last step, the ratio of public recurrent spending per capita in 2015 to public recurrent spending per capita in the base year of the country application of MAMS can then be calculated. The results are used to fill in the *'c-wtsn'* cells of the *'mdgeduscen'* worksheet.

In contrast to the other public-spending parameters such as education, health, and water and sanitation, the requirement for ***"other public infrastructure"*** (*'f-capoinf'* column in the worksheet *'mdgeduscen')* is defined in terms of capital stock; all related recurrent spending is automatically generated by MAMS, based on the estimated capital stock. Owing to data

limitations, the required parameter for the "other public infrastructure" sector is borrowed from recent studies for Yemen.

In general, "other public infrastructure" includes a wide range of infrastructure assets in transportation, energy, telecommunications and other sub-sectors. However, following recommendation of UNDESA (2010) the parameter estimation for the "other public infrastructure" sector could be based solely on calculations for the transportation sub-sector. More specifically, it uses actual and targeted levels of road density to approximate the necessary scale-up of "other public infrastructure" (Annex 3).

The parameters for ***the healthcare sector*** (*'c-hlthg'*), defined as the ratio between per-capita real health services in target and base years, were imputed by authors on the basis that it falls within the feasibility range of MAMS as determined through sensitivity analysis of the baseline scenario for Uzbekistan. The same values were assumed for both child and maternal mortality rates.

The estimated parameters related to public spending (*'c-hlthg'*, *'edu-qual'*, *'c-wtsn'*, *'f-capoinf'*), used to calibrate the MDG-achieving scenarios, are presented in Table 8.

Table 8. Uzbekistan: Determinants related to public spending in MAMS

	'c-hlthg'	*'c-wtsn'*	*'edu-qual'*	*'f-capoinf'*
MDG 4 – under-five mortality	3.50			1.89
MDG 5 – maternal mortality	3.50			1.89
MDG 7a – access to potable water		3.72		1.89
MDG 7b – access to sanitation		3.51		1.89
'g1entry' – primary			2.03	1.63
'pass' – primary			2.03	1.63
'pass' – secondary			4.67	1.89
'pass' – tertiary			3.12	1.89
'grdcont' – secondary			4.67	1.89
'grdcont' – tertiary			3.12	1.89

Source: MAMS for Uzbekistan.
Notes:
'g1entry' – the probability that a child (7 years old) enters the first grade of primary school.
'pass' – the share of the enrolled that pass their current grade.
'grdcont' – the probability of graduating from the last grade and continue on the next.
'c-hlthg' – per capita supply of health services.
'c-wtsn' – per capita supply of water and sanitation (centralized sewage system) services.
'edu-qual' – quality of education.
'f-capoinf' – infrastructure.

In addition to the afore-mentioned ratios, the elasticity of each MDG indicator with respect to its determinants also needs to be specified. Taking into consideration that mortality among children and mothers has common causes and correlates, in the Uzbek MAMS the same elasticities were assumed for both child and maternal mortality rates. In the case of the environment-related targets (i.e. access to improved water resource and sanitation facilities) the respective values for determinants were computed based on the 2005 SAM and COWI (2004) data.

Regarding the range and sign of associated elasticities, reasonable and informed assumptions are made based on existing studies, economic logic and the opinion of experts in the field. For

example, since public provision of primary education is the constitutional responsibility of the state, the wage premium, household consumption and public infrastructure provision may have only a small positive or even no impact on decisions to enter primary schools, indicating that values near the lower limit of the feasibility range of MAMS can be assigned for the elasticity in question. At the same time, these factors could play important role in the shaping of demand for higher education. In this case, the needed value can be determined through sensitivity analysis of the MAMS baseline scenario keeping in mind the feasibility range of MAMS results.

Summarizing, various open information sources have been extensively used in the process of calibration of MAMS with country-specific data for Uzbekistan. The parameters and elasticity values essential for running the Uzbek MAMS were computed from accessible data (including, the 2005 Uzbek SAM), and/or borrowed from the existing literature on CGE/MAMS modeling when data was not available. The used behavior elasticities of the millennium goals module of MAMS for Uzbekistan are presented in Table 9.

Table 9. Uzbekistan: Behavior elasticities of the MDG module of MAMS

	c-hlthg	*c-wtsn*	*edu-qual*	*f-capoinf*	*qhpc*	*MDGs*			*wge-prem*
						4	*7a*	*7b*	
MDG 1					-0.32				
MDG 4	-0.75			-0.05	-0.10		-0.05	-0.05	
MDG 5	-0.75			-0.05	-0.10		-0.05	-0.05	
MDG 7a		0.50		0.10	0.09				
MDG 7b		0.20		0.10	0.12				
'g1entry' – prim.			0.08	0.01	0.02	-0.03			0.10
'pass' – prim.			0.08	0.01	0.02	-0.01			0.10
'pass' – second.			0.10	0.01	0.02	-0.01			0.20
'pass' – tertiary			0.10	0.01	1.00	-0.01			0.40
'grdcont' – second.			0.10	0.01	0.02	-0.01			0.20
'grdcont' – tertiary			0.10	0.01	1.00	0.00			0.40

Source: MAMS for Uzbekistan.
Notes:
'MDG 7a' – access to potable water.
'MDG 7b' – access to sanitation (centralized sewage system).
'g1entry' – the probability that a child (7 years old) enters the first grade of primary school.
'pass' – the share of the enrolled that pass their current grade.
'grdcont' – the probability of graduating from the last grade and continue on the next.
'c-hlthg' – per capita supply of health services.
'c-wtsn' – per capita supply of water and sanitation (centralized sewage system) services.
'edu-qual' – quality of education.
'f-capoinf' – infrastructure.
'qhpc' – per capita household consumption.
'wge-prem' – wage premium (wage gap: secondary vs. no education; tertiary vs. secondary).

6. MAMS scenario analysis

The discussion in this section mainly focuses on the simulation results, including analysis of MAMS/MDG scenarios with financing options and the main macroeconomic trade-offs where all goals are achieved at a time. In particular, the following series of policy questions will be addressed:

- What effects do selected MDG strategies have on MDG indicators, economic growth, exports and imports, the labor market, and the roles of the government and the private sector in the economy?
- What models of effective public policies in relation to attainment of MDGs are available, and how much does it cost to achieve the MDGs? What synergies among MDGs could reduce these costs?
- What kinds of trade-offs and policy options are available given a set of constraints (limited foreign aid, underdeveloped domestic borrowing market, etc.)? What would be the most convenient strategy for the government of Uzbekistan to achieve the MDGs?

Baseline scenario

A **baseline scenario** was defined for the Uzbek MAMS which covers ten years (2006-2015). In the baseline scenario we follow the current optimistic medium-term projections and assumptions. This scenario is calibrated around current resource availability, where no additional public interventions are introduced to target MDG achievement.

Real GDP grows by on average rate of 8.1% per annum through the year of 2015, while population grows on average by 1.5% per annum. It is also assumed that the volume of public spending grows at the same rate as that by which real GDP growth. In general, the optimistic baseline scenario reasonably replicates the aggregate functioning of the economy and generates a smooth continuation of past trends for key macroeconomic variables.

As a result, annual growth rate of real GDP (at market prices) increases by 8.2% in the baseline, which is about 1 percentage point higher than the average rate of 2004-2005. The real exchange appreciation encourages increase in imports from 31.3% of GDP in the base year to 32.2% in 2015, and induces a decline in exports from 39.2% of GDP to 30.5%. At the same time, both private and final government consumption are increased as share of GDP by 9.0 and 2.5 percentage points in 2015 with respect to the base year, correspondingly. Investment increases as a percentage of GDP.

The government's current account surplus decreases from 4.6% to 3.5% at the end of the simulation period owing to the increase in consumption which, in turn, is reflected in a gradual decrease of the GDP share of the government total investment (from 4.7% to 3.4%). Domestic borrowing remains at the level of -2.0% of GDP[15], while foreign borrowing is on average declining at 0.5% per year.

During 2006-2015, total employment increases with an annual average rate of 2.9%, while employment growth for semi-skilled (skilled) workers grows by 8.0% (4.4%) on average per year. The observed employment growth was 2.7% per year during 2006-2009, compared with 2.6% in the baseline during those years. This difference is explained by the increase in both secondary and tertiary education in the model, which reduces the participation rate for less unskilled workers by 0.6% per year. In the baseline scenario, the average real wage rate increases by 5.3% per year during the projection period. Labor income of unskilled and skilled workers grows by 10.6%, and 5.5% per year, respectively, while the real wages of semi-skilled workers decrease by 0.1% per year through 2015.

[15] A negative entry stands for lending.

In 2006-2009 public social spending (current) grows on average by 9.3% per year in the baseline which is close to that the observed rate of 9.4%. Implemented social programs in educational (the National Human Resources Training and the School Education Development Programs) and healthcare (the Healthcare Reform Program) sectors allowed achieving substantial –though insufficient – progress towards the MDGs.

The results of the baseline scenario further show that government tax revenue remained at the level of 20.8% of GDP per year. External savings go from -8.0% to 1.5% of GDP, while domestic government debt is reduced from 2.5% to 0.4% of GDP, and the foreign public-debt ratio from 25% to 6.4%.

Table 10. Uzbekistan: MDG achievement in the baseline scenario, 2005-2015

MDG and related indicator	2005	2010	2015	2015 (target)
MDG 1: People living below the national poverty line (%)	25.6	20.4	14.9	14.0
MDG 2: Primary completion rate (%)	97.9	98.5	98.5	100
MDG 4: Under-five mortality rate (per 1,000 live births)	20.6	17.1	15.8	13.4
MDG 5: Maternal mortality rate (per 100,000 live births)	29.2	23.4	21.2	17.4
MDG 7a: Access to an improved water source (%)	82.6	92.4	97.5	100
MDG 7b: Access to improved sanitation facilities (%)	48.2	54.6	60.2	65.0

Source: MAMS for Uzbekistan.

Table 10 demonstrates that in this baseline simulation, MDGs are not reached by 2015. The expected improvements in per capita consumption of health services as well as access to improved water and sanitation facilities positively affected the MDG health outcomes. The under-five mortality rate decreases from 20.6 deaths per 1,000 live births to 15.8 between 2005 and 2015, while the maternal mortality rate would decline by eight points (from 29.2 to 21.2 per 100,000 live births). However, in both cases the attained progress is insufficient for achieving MDG 4 and 5 in Uzbekistan.

MDG achievement scenarios

Next 9 **MDG-related scenarios** that take the baseline scenario as their benchmark were ran and analyzed. In these scenarios achievement of one or two of the goals at the time or all of them simultaneously is targeted under alternative financing mechanisms of public spending (domestic tax financing, foreign and domestic borrowing), except for the goal of reducing poverty (MDG 1) for methodological reasons, as explained in the below, and the goal of achieving universal access to primary education (MDG 2) which has already been met.

In these simulations, we impose full achievement of targets for health (MDG 4 & 5) and water and sanitation (MDG 7a & 7b) (Table 11). The following three distinctive policy options and financing strategies were experimented: i) adjustment of the tax rates to finance the achievement of the required MDGs (scenarios 1-3); ii) foreign borrowing to achieve MDGs (scenarios 4-6); and finally, iii) domestic borrowing to ensure the financing of the cost related to the achievement of millennium goals (scenarios 7-9).

Table 11. The MDG scenarios generated by MAMS for Uzbekistan

Scenarios/simulations / *Strategies/policy options*	Achievement of MDGs 4 & 5	Achievement of MDG 7a & 7b	Achievement of all MDGs
Taxes are increased to finance the achievement of MDGs	*mdg45-tax [1]*	*mdg7-tax [2]*	*mdgs-tax [3]*
Government relies on foreign borrowing to achieve MDGs	*mdg45-fb [4]*	*mdg7-fb [5]*	*mdgs-fb [6]*
Domestic borrowing is used to target MDGs	*mdg45-db [7]*	*mdg7-db [8]*	*mdgs-db [9]*

In order to maintain primary completion rates as in the baseline without setbacks in terms of the achievement of MDG 2, these scenarios assume that the quality of education per student is maintained fixed at the levels shown in the baseline scenario. Public spending (current and investment) increases are strictly associated with achieving one or two of the goals separately or all of them simultaneously.

The performance of the MDG indicators during the sub-period 2010-2015 improves over that of the baseline in all scenarios and most goals are achieved by 2015 except MDG 1 –which happens by construction, as part of the functioning of the modeling. This is mainly associated with a strategy whereby public resources are deliberately scaled up to expand service delivery, especially in health and water and sanitation to the extent needed for MDG achievement. In the simulations, real GDP grows on average by 7.7% per annum through the year of 2015.

Based on the outcomes of the baseline scenario (Table 10), the government should have to target MDGs 4, 5, 7a and 7b. From a broader policy perspective it is worth analyzing two interrelated issues: the first, the resource estimates of the cost of attaining the MDGs and the second, the availability and feasibility of financing strategies to scale up public spending aiming at achieving these MDGs.

Incidence of poverty under the baseline and MAMS scenarios

The evolution of MDG 1 is examined using a simple constant-elasticity relationship between the headcount poverty rate and real GDP per-capita. However, CGE models, including MAMS, in any case typically fail to specify the income distribution detail that is required to properly estimate poverty at the household level, given the use of “representative households” (Vos and Sanchez, 2010).

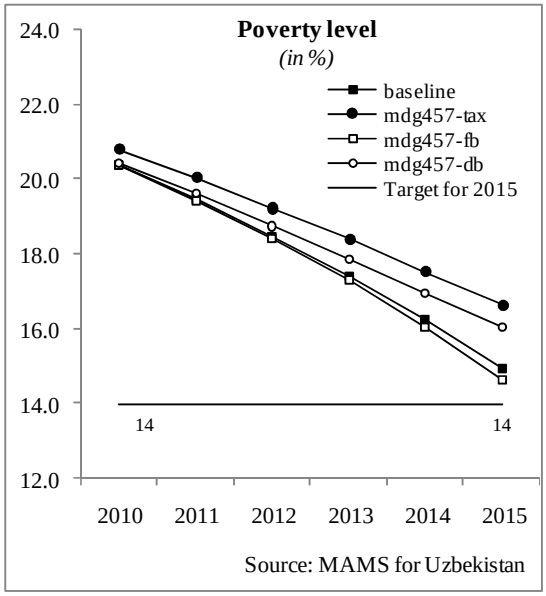
To deal with this limitation, the UN-DESA team developed a microsimulation methodology that takes into account the full income distribution, and allows obtaining poverty and inequality estimates using results produced by running scenarios with MAMS. Owing to data limitations, the microsimulation analysis has not been used in this study.

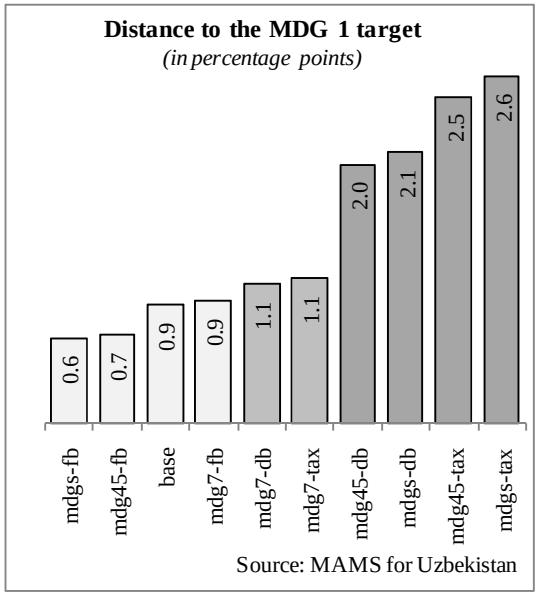
In general, poverty would be reduced in all scenarios with alternative sources of financing as a result of the expansion of the economy as a whole, including significant positive changes in the structure of the labor market. For instance, average labor income of unskilled workers increased about 10.6% per year in the case of all MDG scenarios, while the share of skilled labor in educational composition considerably enlarged up to 35% at the end of the projection period.

However, the reduction is not sufficient for timely achievement of the target of halving extreme

poverty between 2000 and 2015 and the country needs to accelerate its decline to achieve this target by 2015 (Figure 10). The trends shown in Figure 10 suggest that the estimated distances[16] to target varies across different simulations. These trends reveal that the biggest progress is observed under the baseline and foreign borrowing scenarios, where the estimated distance is about less than 1 percentage points. Meanwhile, other two simulations i.e. adjustment of the tax rates and domestic borrowing to finance the achievement of either the health or all MDGs yield a larger distance that ranges between 2.0 and 2.6 percentage points.

Figure 10. Uzbekistan: Poverty incidence curve for the baseline and MDG scenarios





One possible conclusion may be drawn is that alternative financing mechanisms of public spending such as tax financing and domestic borrowing may cause a slowdown of the decline in poverty rate over time. It is explained mainly by a restrain in real per capita household consumption (reduced from 7.8% and 8.6% to 5.4% and 5.3% in 2015 in the case of tax financing and domestic borrowing, respectively) and a slowdown in economic growth (on average 0.5 percentage points per year in the case of domestic borrowing scenario).

In summary, the poverty-related target is not met in any of the financing scenarios and the remaining underperformance varies across different simulations. Another implication is that achieving the millennium goals for education, health and environment as well as the increase in public spending on social sectors does not have a substantial impact on poverty outcomes during the projection period.

Table 12. Uzbekistan: Public spending on MDG-related services in the baseline and MDG scenarios (% of GDP)

	Base year 2005	*Baseline scenario*	**Additional public spending with respect to the baseline scenario, 2010-2015[1/]**		
			***mdg-tax*[2/]**	***mdg-fb*[2/]**	***mdg-db*[2/]**
			***MDG 4 &5 scenario*[5/]**		
Environment[3/]	**0.04**	**0.04**	**0.00**	**0.00**	**0.00**

[16] It is computed as difference between the MDG 1 levels in 2015 and the 2015 national target (14%).

- current	0.04	0.04	0.00	0.00	0.00
- investment	0.00	0.00	0.00	0.00	0.00
Healthcare	**2.50**	**2.75**	**4.12**	**4.15**	**4.26**
- current	2.40	2.71	2.81	2.93	2.88
- investment	0.10	0.04	1.30	1.22	1.37
Education[4/]	**2.38**	**2.57**	**0.17**	**0.27**	**0.19**
- current	2.18	2.44	0.11	0.22	0.12
- investment	0.20	0.13	0.06	0.05	0.06
Total 1:	**4.92**	**5.36**	**4.29**	**4.42**	**4.44**
			MDG 7 scenario[6/]		
Environment[3/]	**0.04**	**0.04**	**0.37**	**0.37**	**0.37**
- current	0.04	0.04	0.36	0.36	0.36
- investment	0.00	0.00	0.01	0.01	0.01
Healthcare	**2.50**	**2.75**	**0.00**	**0.01**	**0.00**
- current	2.40	2.71	0.00	0.01	0.00
- investment	0.10	0.04	0.00	0.00	0.00
Education[4/]	**2.38**	**2.57**	**0.01**	**0.02**	**0.01**
- current	2.18	2.44	0.00	0.01	0.01
- investment	0.20	0.13	0.00	0.00	0.00
Total 2:	**4.92**	**5.36**	**0.38**	**0.40**	**0.38**
			all MDGs scenario[7/]		
Environment[3/]	**0.04**	**0.04**	**0.38**	**0.37**	**0.41**
- current	0.04	0.04	0.37	0.36	0.39
- investment	0.00	0.00	0.01	0.01	0.01
Healthcare	**2.50**	**2.75**	**4.07**	**4.11**	**4.21**
- current	2.40	2.71	2.78	2.90	2.85
- investment	0.10	0.04	1.29	1.21	1.36
Education[4/]	**2.38**	**2.57**	**0.18**	**0.28**	**0.19**
- current	2.18	2.44	0.11	0.23	0.13
- investment	0.20	0.13	0.07	0.05	0.06
Total 3:	**4.92**	**5.36**	**4.62**	**4.76**	**4.81**
The MDG synergy effect[8/]			***0.04***	***0.06***	***0.02***

Source: Author's calculations based on the results of MAMS for Uzbekistan.

Notes: Some minor discrepancies between the total value and the sum of items are due to rounding.

1/ Simple period average.

2/ *'mdg-tax'* – adjustment of the tax rates to finance the achievement of the required MDGs; *'mdg-fb'* – foreign borrowing to achieve MDGs; *'mdg-db'* – domestic borrowing to ensure the financing of the cost related to the achievement of MDGs.

3/ Access to potable water and improved sanitation facilities.

4/ Includes the primary, secondary and tertiary education.

5/ Full achievement of targets for health (MDG 4 & 5).

6/ Full achievement of two targets for environment, specifically water and sanitation (MDG 7a & 7b).

7/ Simultaneous achievement of all MDGs.

8/ The MDG synergy effect = Total 1 + Total 2 – Total 3.

Cost of attaining the MDGs by 2015

The results of the MDG 4 & 5 scenarios show that with respect to the baseline scenario, the additional public spending required to achieve the health goals ranges, depending on the financing option, between 4.1 – 4.3 percentage points of GDP per year for the period of 2010-2015 (Table 12). The model predicts that two targets – reducing the under-five child and maternal mortality – are achievable by 2015 through increasing the government current and investment spending by more than two times, while the additional cost required to maintain primary completion rates as in the baseline ranges from 0.2% to 0.3% of GDP.

The MDG 7 scenario simulation results illustrate that the additional cost for achieving the targets for water and sanitation would be around on average 0.37% of GDP per year, for the period of 2010-2015 compared with the baseline. The simultaneous achievement of all MDGs shows that synergies exist when the attempt is made to reach all of the goals at once. In 2010-2015, the MDG synergy effects amounted to 0.06, 0.04 and 0.02 percentage points of GDP per year, respectively, when using external financing, higher income taxes or domestic borrowing simulation.

The additional cost achieving the under-five and maternal mortality is approximately less by 0.05 percentage points of GDP per year than the sum of the cost of reaching the goals separately. Current government spending on healthcare would be on average 0.04 percentage points of GDP less compared to the scenarios where only MDG 4 & 5 and MDG 7 are targeted.

The total additional public spending required for achieving all goals would be 4.6%, 4.8%, and 4.8% of GDP per year on average during 2010-2015, respectively, depending on whether it is financed through taxes, external borrowing, or domestic borrowing. In general, the simultaneous achievement of all MDG also has a positive impact on the economy. A moderate improvement in real GDP growth rate, higher growth in public investment, and broad-based employment growth are among others.

Based on the results of the MDG scenarios, we estimated the costs of attaining the health, education and environmental goals in Uzbekistan. In particular, the additional public spending (current and investment), required to reach MDGs of interest, are computed. Table 13 presents a rough breakdown of the estimated additional public – current and investment – spending. It should be noted that the calculations in this study should be treated as and representing a range (indicative) rather than precise point-estimates.

Table 13. The average annual cost of achieving the MDGs in Uzbekistan, 2010-2015

	Baseline scenario		**MDG scenarios**	
	bln.UZS	*%*	*bln.UZS*	*%*
Education (primary)	75	2.6	76 – 84	2.7 – 2.9
Health (child and maternal mortality)	80	2.8	193 – 204	6.8 – 7.0
Environment (water and sanitation)	1	0.04	11.9 – 12.4	0.41 – 0.45
Total:	*156*	*5.4*	*281 – 301*	*9.9 – 10.4*

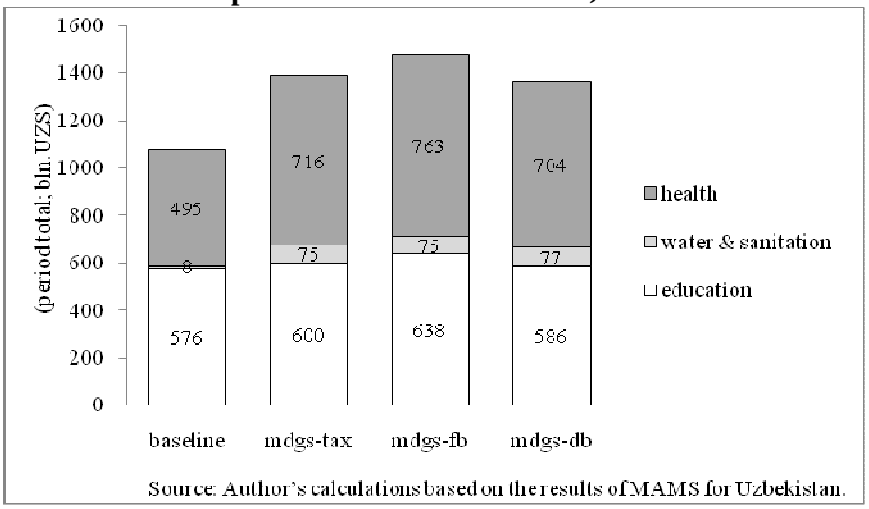
Source: Author's calculations based on the results of MAMS for Uzbekistan.
Notes: *UZS* – local currency unit (Uzbek Soums); *%* - in percentage of nominal GDP.

The immediate conclusion to be drawn from this table is that, in the case of the MDG achieving simulations, there is a need to increase the share of MDG spending in GDP from 5.4% to 10.4% or in terms of local currency unit by two times between 2010 and 2015, as compared with the baseline scenario. However, it could be an overestimate, because of existing interrelationships between the various kinds of diseases.[17] For instance, like many infectious diseases, tuberculosis spreads more quickly and is much more dangerous in the presence of AIDS, which in turn may have an impact on child and maternal mortality. In contrast, oral rehydration therapy, vaccinations, and promotion of breast feeding largely contribute to reduction in infant mortality.

On the other hand, expanding the MDG-related services substantially over baseline levels could have a less-than-anticipated impact in terms of absorptive capacity. Solving capacity constraints are not easy and often take a longer time to build. For that reason, careful sequencing of public investment across sectors as well as improvement of governance and institutional structures can significantly reduce the cost of achieving the MDGs.[18]

From this point of view, for all the health-related goals, it is estimated that the additional total cost of achieving the respective millennium targets by 2015 ranges from UZS704 to UZS763 billion depending on whether taxes, external borrowing, or domestic borrowing strategies are used (Figure 11). We can conclude from the above discussion that it is crucial to consider synergies among MDGs in order to have a more precise estimation of costs involved and to identify better policy options.

Figure 11. Uzbekistan: The additional total cost of achieving the MDGs in MAMS scenarios with respect to the baseline scenario, 2010-2015



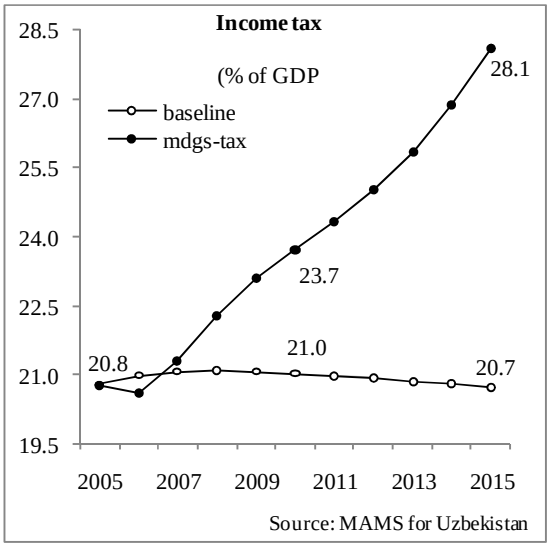
[17] At the same time, it could also be an underestimate considering that other MDGs are not being modeled here.
[18] See Bourguignon and Sundberg (2006) for detailed discussion about building absorptive capacity to reach the MDGs.

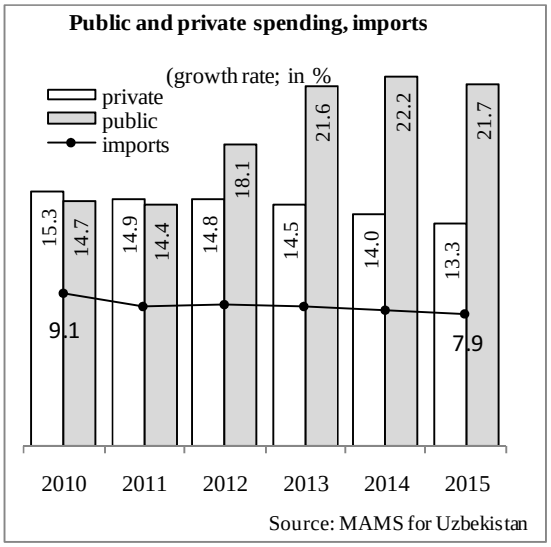
Financing strategies to achieve the MDGs

Tax financing

In the case of tax financing, the total public consumption (current and investment) increases from 20.8% in 2005 to 29.7% as share of nominal GDP in 2015, which would be financed through an increase in annual tax revenues from 20.7% of GDP to 28.1% of GDP (Annex 4). As a result, the transfer of resources from the private to the public sector crowds out most growth in private spending as well as reduces import demand (Figure 12).

Figure 12. Uzbekistan: The tax burden and spending in the tax financing scenario





Total government revenues as proportion of GDP steadily increased by an average 0.9 percentage points per year, and accounted for 41% as share of nominal GDP in 2015. A sizable part of government revenue (almost two-thirds) is generated from both indirect and direct taxation. Foreign aid remains at same level as for the baseline scenario.

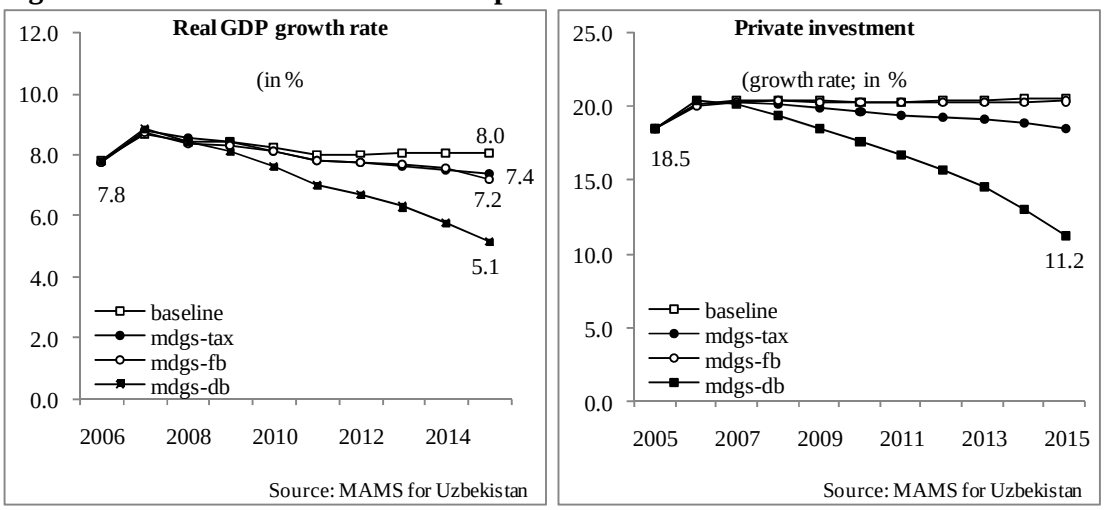
In general, the required increase in the tax revenues seems to be an unfeasible scenario because of at least three reasons: i) gradual expansion of the tax burden by 0.8 percentage points of GDP per annum during 2010-2015; ii) political constraints – the government's fiscal policy in the past ten years is focused on ensuring balanced government budget concurrently reducing the tax burden on the businesses (see Section 2); and iii) due to the high share of agriculture and informal economic activity typical of economies in transition, direct taxes (corporate and personal) are unlikely to be a major source of domestic revenues in the short- to medium-term (DevCom, 2004).

On the other hand, there are policy options that allow enhancing domestic revenue mobilization and generating significant revenues, needed to achieve the MDGs, at a relatively low cost. For instance, the potential for generating additional revenues can be improved by broadening the tax base, taking measures to increase in the efficiency of existing MDG-related spending (or general budget management and tax administration) and attracting external resources.

Domestic vs. foreign borrowing

In the domestic borrowing scenario, internal public debt would increase up to 41.9% of GDP in the year 2015 from an initial level of 2.5% of GDP in the base year. Domestic borrowing would lead to doubling of the fiscal deficit with respect to the baseline scenario, while tax revenues almost do not change and external government debt falls from 25% to 7.1% of GDP, as expected owing to the nature of the scenario. Different from previous scenarios, in the domestic borrowing simulation real GDP grows about 1.0 percentage points less than in the baseline. In this simulation, the government absorbs more by crowding out resources that would otherwise be used for private investment (Figure 13).

Figure 13. Uzbekistan: Real GDP and private investment in the MDG scenarios

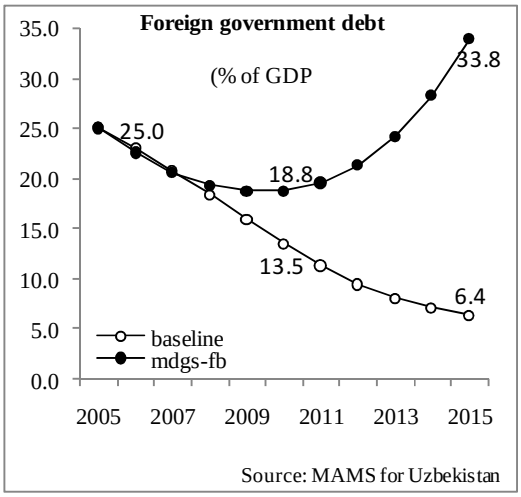


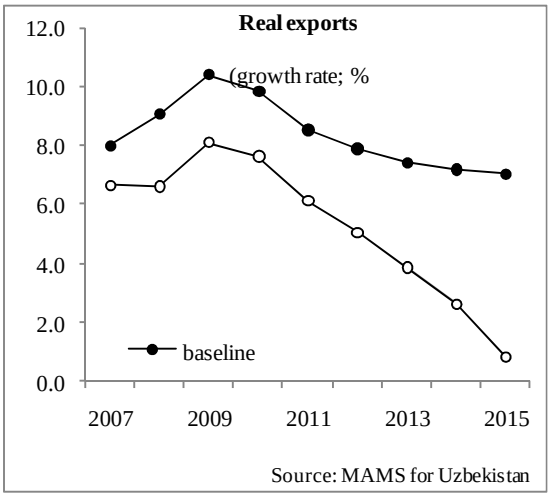
The external borrowing scenario leads to an increase in the foreign-debt-ratio to 33.8% of GDP in 2015, up from 25% in the baseline that puts into question the feasibility of this scenario for Uzbekistan. In addition, consistent with the existing MAMS literature, reliance on foreign resources tends to bring about real exchange rate appreciation and slower export growth, eroding export competitiveness of the national economy (Figure 14). These trends are clearly the symptoms of the Dutch disease phenomenon, which permanently damages the economy by shrinking the tradable sector, and may cause serious risks to future capacity for economic growth if it persists over time.

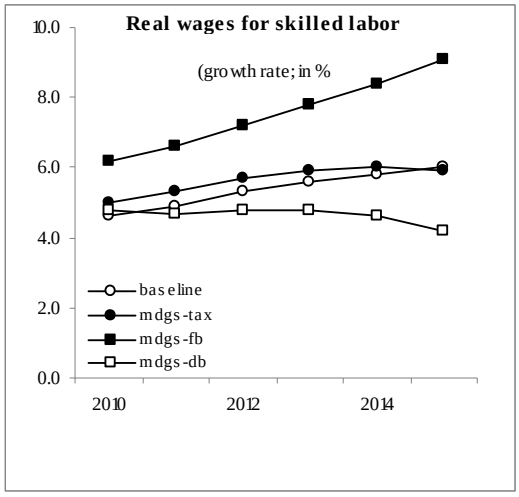
Compared to the domestic borrowing scenario, the availability of external resources allowed an increase in government absorption (31% of GDP in 2015 against 22.5% in the baseline) without crowding out the private sector. As for revenue, the main increases are based on foreign borrowing and factor income, which substantially increased up to 7.8% and 4.5% of GDP in 2015, respectively, while tax revenues are slightly reduced.

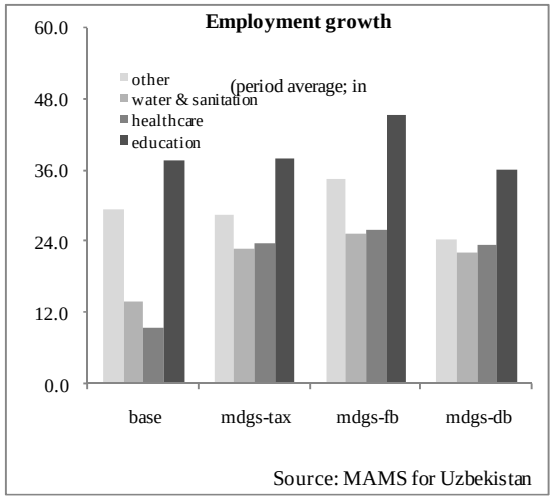
The trade deficit is substantially widened, reaching 9.5% of GDP by the end of the projection period. In contrast to the domestic borrowing scenario, in the external borrowing simulation, the combination of increased MDG spending and elevated wages for skilled labor with tertiary education leads to a higher demand for education and educated labor supply (Figure 14 and Annex 4).

Figure 14. Uzbekistan: Key trends in the foreign borrowing scenario









7.

Conclusions and policy implications

In summary, it can be concluded that the analysis of the MDG needs assessment for Uzbekistan based on the MAMS modeling framework illustrates that in general terms most goals would be achieved by 2015. But this depends of the successful implementation of a growth-driven strategy to achieve the millennium goals, where the additional growth increases public resources that could be spent on public services, including health, water and sanitation and education.

By using the MAMS for Uzbekistan, 10 policy simulations (including the baseline scenario) that cover ten years (2006-2015) were ran and analyzed, taking into consideration alternative financing mechanism of public spending, and achieving one or two of the goals separately or all of them simultaneously, except for and MDG 2 –which has already been achieved.

The evolution of MDG 1 is examined using a simple constant-elasticity relationship between the headcount poverty rate and real GDP per-capita. It is worth noting that, in general, CGE models (including MAMS) typically fail to specify the income distribution detail that is required to properly estimate poverty at the household level. To deal with this limitation, UN-DESA developed a microsimulation methodology that takes into account the full income distribution, and allows obtaining poverty and inequality estimates using results produced by running scenarios with MAMS. However, owing to data limitations, the microsimulation analysis has not been used in this study.

In the baseline scenario we follow the current optimistic medium-term projections and assumptions. This scenario is calibrated around current resource availability, where no MDG interventions are introduced (no MDG targeting). In the MDG scenarios, we impose full achievement of the health (MDG 4 & 5) and water and sanitation (MDG 7a & 7b) related millennium targets employing various sources of financing, including adjustment of the tax rates, domestic or foreign borrowing.

The total additional public spending required for achieving all goals would be 4.6%, 4.8%, and 4.8% of GDP per year on average during 2010-2015, respectively, depending on whether it is financed through taxes, external borrowing, or domestic borrowing. The simultaneous achievement of all MDGs shows that synergies exist when the attempt is made to reach all of the goals at once instead of one or two of them at the time. These synergies would generate a savings in costs. For instance, in 2010-2015 the additional cost of achieving the under-five and maternal mortality goals is 0.05 percentage points of GDP per annum lower compared to the summed up cost of reaching the same goals separately.

The simulation results show that, in general, poverty would be reduced in all scenarios with alternative sources of financing. However, the reduction is not sufficient for timely achievement of the target of halving extreme poverty between 2000 and 2015 and the country needs to accelerate its decline to achieve this target by 2015. It should be noted that achieving the millennium goals for education, health and environment as well as the increase in public spending on social sectors does not have a substantial impact on poverty outcomes during the projection period.

With regard to policy options, none of the scenarios (policy simulations) dominates the others, which makes it necessary to consider trade-offs and identify better policy options. Tax financing scenario may lead to expansion of the tax burden, and due the high share of agriculture and informal economic activity in a transition economy like Uzbekistan's, direct taxes (corporate

and personal) would unlikely be a major source of domestic revenues in the short- to medium-term.

Meanwhile, domestic borrowing leads to slowdown in economic growth, an explosive rise in public indebtedness and substantially increases in the fiscal deficit. Also the government absorbs more by crowding out credit resources for private investment. In the case of foreign borrowing, heavy reliance on foreign resources tends to bring about real exchange rate appreciation consequently slowing export growth, thus eroding export competitiveness of the national economy. This may cause serious risks to future capacity for economic growth.

Despite these trade-offs, financing the required public spending through direct/indirect taxes seems to be the most convenient option since domestic revenue mobilization needed to achieve the MDGs could be generated at relatively low cost. For instance, the potential for generating additional revenues can be improved by broadening the tax base, taking measures to increase in the efficiency of existing MDG-related spending and attracting external resources.

Provision of productive jobs to the growing labor population is particularly important in addressing the issue of poverty in Uzbekistan. In this regard, the development of labor-intensive sectors (including textile, shoemaking and food industries), higher territorial and sector mobility of the workforce, particularly in the rural areas, as well as the creation of a legal framework to increase employment through the legal and socially protected export of labor resources are among the priority policy areas. Moreover, the further reduction of the employment rate in the informal labor market and encouraging the legalization of such employment, particularly amongst start-up small businesses would play an essential role in mitigating poverty and inequality.

With regard to public health expenditures, it is necessary to increase the amount and efficiency of public spending needed for modernization of the healthcare sector. Current healthcare spending is insufficient for achieving the required improvements in public healthcare and achieving the health MDGs in Uzbekistan. Increased financing should be channeled, in particular, to capital investment in the infrastructure of healthcare and also operational costs unrelated to the remuneration of health workers, especially the maintenance and upgrading of medical equipment to provide both quantitative and qualitative improvements in the healthcare infrastructure.

As far as the education sector is concerned, the government policies should be focused mainly on upgrading the country’s education profile that includes improving the quality of education and further development of lifelong training system for all workers both in the public and private sectors. In order to improve access to safe water and sanitation, primarily rural areas, Uzbekistan needs to expand its public spending significantly for the period of 2010-2015.

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Annexes

Annex 1: Variables and equations used in computation of the ratio for *'edu-qual'*

#	Variables to be estimated	Equations
(1)	Number of school age children enrolled in primary school in base year	Number of school age children enrolled in primary school = GER * Number of primary school age children
(2)	Enrolment (2015)	Enrolment (2015) = Number of children enrolled in primary school (2015) *NER
(3)	Number of teachers	Number of teachers = Number of children enrolled in primary school / Benchmark teacher per student ratio
(4)	Salary cost	Salary cost = Number of teachers * Benchmark salary
(5)	Non-salary cost	Non-salary cost = Salary cost * Benchmark non-salary share
(6)	Total recurrent cost	Total recurrent cost = Salary cost + Non-salary cost
(7)	Recurrent public cost	Recurrent public cost = Total recurrent cost –Private recurrent cost
(8)	Ratio: 'edu-qual'	'edu-qual' = Recurrent cost per student (2015) / Recurrent cost per student (t0)

Annex 2: Variables and equations used in computation of the ratio for *'c-wtsn'*

#	Variables to be estimated	Equations
(1)	Target coverage rate	Target coverage rate = (100% -Coverage rate in MDG base year) /2 + Coverage rate in MDG base year
(2)	Service expansion cost	Service expansion cost = Unit cost * Target population
(3)	Total recurrent spending	Total recurrent spending = Service expansion cost * Benchmark recurrent spending share
(4)	Community contribution	Community contribution = Current contribution share * Total recurrent spending *or* Community contribution = Tariff * Coverage
(5)	Public recurrent spending	Public recurrent spending = Total recurrent spending – Community contribution
(6)	Ratio: 'c-wtsn'	'c-wtsn' = Public recurrent spending per capita (2015) / Public recurrent spending per capita (t0)

Annex 3: Variables and equations used in computation of the ratio for *'f-capoinf'*

#	Variables to be estimated	Equations
(1)	Paved public road density (t0)	Paved public road density (t0) = Paved public road length (t0) / Population (t0)
(2)	Paved public road length (2015)	Paved public road length (2015) = Benchmark paved road density * Population projection * Share of paved public road length in t0
(3)	Public road asset value (t0)	Road asset value (t0) = Current replacement cost * Paved public road length (t0) * Depreciation rate * Road infrastructure age
(4)	Depreciation rate	Depreciation rate = 1 / Road infrastructure life span
(5)	Public road asset value (2015)	Road asset value (2015) = Current replacement cost * Paved public road length (2015)
(6)	Ratio: 'f-capoinf'	'f-capoinf' = Public road asset value (2015) / Public road asset value (t0)

Annex 4: Key macroeconomic results in the MAMS scenarios

	Base year 2005	Baseline scenario		Scenario for health, water and basic sanitation goals with:					
				taxes		foreign borrowing		domestic borrowing	
		2015	2010-2015	2015	2010-2015	2015	2010-2015	2015	2010-2015
Exchange rate (2005 index = 100)	100	100.1	99.4	100.2	99.5	99.3	99.1	100.3	99.5
Real GDP growth rate (%)	8.2	8.0	8.1	7.4	7.8	7.2	7.8	5.1	6.7
Private consumption[1/]	49.8	58.8	58.9	53.7	56.0	58.1	58.6	60.2	59.5
Government consumption	16.6	19.1	18.5	24.7	21.8	26.3	22.7	25.3	22.1
Gross formation of fixed private capital	18.5	20.5	20.4	18.6	19.1	20.3	20.3	11.2	14.8
Gross formation of fixed public capital	4.2	3.4	3.4	5.0	4.7	4.8	4.6	5.3	4.8
Exports of goods and services	39.2	30.5	31.2	28.1	29.8	22.9	26.6	27.2	29.4
Imports of goods and services	31.3	32.2	32.4	30.1	31.1	32.4	32.7	29.2	30.7
Foreign savings	8.0	1.5	0.9	1.5	0.8	9.5	5.2	1.5	0.8
Government savings	4.6	3.5	3.6	5.1	4.8	5.1	4.9	7.8	6.2
Income taxes	20.8	20.7	20.9	28.1	25.6	20.3	20.7	20.5	20.7
Domestic government borrowing[2/]	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	7.4	2.9
External government borrowing	0.7	-0.1	-0.8	-0.1	-0.8	7.8	3.6	-0.1	-0.8
Domestic government debt	2.5	0.4	0.8	0.4	0.8	0.3	0.8	41.9	23.1
External government debt	25.0	6.4	9.3	6.2	9.1	33.8	24.3	7.1	9.7
Labor market (growth rates; in %):									
Employment[3/]									
- Unskilled workers	583,932	0.7	-0.2	0.2	-0.5	0.4	-0.4	0.2	-0.4
- Semi-skilled workers	211,898	5.8	6.5	6.5	7.2	4.6	7.0	6.2	7.0
- Skilled workers	223,800	4.5	4.4	4.5	4.4	4.6	4.5	4.5	4.4
Real wage per worker [4/]									
- Unskilled workers	347,246	10.3	11.0	9.0	10.4	11.8	12.1	7.2	9.4
- Semi-skilled workers	624,620	3.5	1.8	3.7	2.2	9.4	4.2	2.6	1.6
- Skilled workers	608,098	6.0	5.4	6.0	5.7	9.2	7.6	4.3	4.7

Source: MAMS for Uzbekistan

Notes: 1/ - In % GDP unless otherwise specified. 2/ - A negative entry stands for lending. 3/ - Number employed (‘000) in base year and growth rate in scenarios. 4/ - In UZS in base year and growth rate in scenarios

Annex 5. MDG indicators in the baseline and MAMS scenarios

Goal	2005 (base year)	2015 (target)	2015 (baseline)	Scenario for health goals with:		
				tax	***fb***	***db***
mdg1	25.6	14.0	14.9	16.5	14.7	16.0
mdg2	97.9	99.8	98.5	98.7	98.6	98.7
mdg4	20.6	13.4	15.8	13.4	13.4	13.4
mdg5	29.2	17.4	21.2	17.4	17.4	17.4
mdg7a	82.6	99.8	97.5	97.5	97.7	97.2
mdg7b	48.2	65.0	60.2	59.9	60.5	59.6

Goal	2005 (base year)	2015 (target)	2015 (baseline)	Scenario for water and sanitation goals with:		
				taxes	**foreign borrowing**	**domestic borrowing**
mdg1	25.6	14.0	14.9	15.1	14.9	15.1
mdg2	97.9	99.8	98.5	98.5	98.5	98.5
mdg4	20.6	13.4	15.8	15.8	15.7	15.8
mdg5	29.2	17.4	21.2	21.2	21.1	21.2
mdg7a	82.6	99.8	97.5	99.8	99.8	99.8
mdg7b	48.2	65.0	60.2	66.1	66.2	66.2

Goal	2005 (base year)	2015 (target)	2015 (baseline)	Scenario for all goals with:		
				tax	***fb***	***db***
mdg1	25.6	14.0	14.9	16.6	14.6	16.1
mdg2	97.9	99.8	98.5	98.7	98.6	98.7
mdg4	20.6	13.4	15.8	13.4	13.4	13.4
mdg5	29.2	17.4	21.2	17.4	17.4	17.4
mdg7a	82.6	99.8	97.5	99.8	99.8	99.8
mdg7b	48.2	65.0	60.2	65.8	66.2	65.9

Notes: *mdg-tax'* – adjustment of the tax rates to finance the achievement of the required MDGs; '*mdg-fb*' – foreign borrowing to achieve MDGs; '*mdg-db'* – domestic borrowing to ensure the financing of the cost related to the achievement of MDGs.

Annex 6. Educational composition of the labor force in simulations

	2005 (base year)	2015 (baseline)	Scenario for all goals with:		
			tax	***fb***	***db***
Unskilled workers	57.5	40.5	39.8	40.2	40.0
Semi-skilled workers	20.8	34.3	35.0	34.6	34.8
Skilled workers	21.7	25.2	25.1	25.3	25.2
Total:	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes: *mdg-tax'* – adjustment of the tax rates to finance the achievement of the required MDGs; '*mdg-fb*' – foreign borrowing to achieve MDGs; '*mdg-db'* – domestic borrowing to ensure the financing of the cost related to the achievement of MDGs.

Annex 7. Government receipts in the baseline and MAMS scenarios (% of GDP)

	2005 (base year)	2015 (baseline)	Scenario for health goals with (final year):		
			tax	***fb***	***db***
Direct taxes	9.7	9.4	12.2	9.1	9.4
Import tariffs	0.5	0.6	0.6	0.6	0.6
Export taxes	0.0	0.0	0.0	0.0	0.0
Other indirect taxes	10.6	10.7	14.6	10.6	10.5
Private transfers	9.1	10.8	9.9	10.7	11.0
Foreign transfers	1.2	1.2	1.2	1.2	1.3
Factor income	2.6	3.1	4.0	4.4	4.1
Domestic borrowing	-2.0	-2.0	-2.0	-2.0	6.6
Foreign borrowing	0.7	-0.1	-0.1	7.2	-0.1
Total	**32.4**	**33.7**	**40.4**	**41.8**	**43.4**
	2005 (base year)	**2015 (baseline)**	**Scenario for water and sanitation goals with:**		
			tax	***fb***	***db***
Direct taxes	9.7	9.4	9.7	9.4	9.4
Import tariffs	0.5	0.6	0.6	0.6	0.6
Export taxes	0.0	0.0	0.0	0.0	0.0
Other indirect taxes	10.6	10.7	11.1	10.7	10.7
Private transfers	9.1	10.8	10.7	10.8	10.8
Foreign transfers	1.2	1.2	1.2	1.2	1.2
Factor income	2.6	3.1	3.1	3.2	3.1
Domestic borrowing	-2.0	-2.0	-2.0	-2.0	-1.2
Foreign borrowing	0.7	-0.1	-0.1	0.6	-0.1
Total	**32.4**	**33.7**	**34.3**	**34.4**	**34.6**
	2005 (base year)	**2015 (baseline)**	**Scenario for all goals with:**		
			tax	***fb***	***db***
Direct taxes	9.7	9.4	12.2	12.5	9.1
Import tariffs	0.5	0.6	0.6	0.6	0.6
Export taxes	0.0	0.0	0.0	0.0	0.0
Other indirect taxes	10.6	10.7	14.6	15.0	10.6
Private transfers	9.1	10.8	9.9	9.9	10.7
Foreign transfers	1.2	1.2	1.2	1.2	1.2
Factor income	2.6	3.1	4.0	3.9	4.5
Domestic borrowing	-2.0	-2.0	-2.0	-2.0	-2.0
Foreign borrowing	0.7	-0.1	-0.1	-0.1	7.8
Total	**32.4**	**33.7**	**40.4**	**41.0**	**42.5**

Notes: *mdg-tax'* – adjustment of the tax rates to finance the achievement of the required MDGs; '*mdg-fb*' – foreign borrowing to achieve MDGs; '*mdg-db'* – domestic borrowing to ensure the financing of the cost related to the achievement of MDGs.

Annex 8. Balance of payment in the baseline and MAMS scenarios (% of GDP)

	2005 (base year)	2015 (baseline)	Scenario for health goals with (final year):		
			tax	***fb***	***db***
Outflows:	***34.7***	***35.2***	***33.0***	***35.6***	***32.5***
Imports	31.3	32.2	30.3	32.4	29.5
Private transfers to rest of world	2.4	2.9	2.6	2.8	2.9
Official transfers to rest of world	0.0	0.0	0.0	0.0	0.0
Factor income to rest of world	0.0	0.0	0.0	0.0	0.0
Net interest income of rest of world	1.0	0.1	0.1	0.3	0.1
Inflows:	***34.7***	***35.2***	***33.0***	***35.6***	***32.5***
Exports	39.2	30.5	28.3	23.6	27.5
Private transfers from rest of world	0.0	0.0	0.0	0.0	0.0
Official transfers from rest of world	1.2	1.2	1.2	1.2	1.3
Factor income from rest of world	2.3	2.0	2.0	2.0	2.2
Government borrowing	0.7	-0.1	-0.1	7.2	-0.1
Private borrowing	-10.3	0.0	0.0	0.0	0.0
FDI	1.6	1.6	1.6	1.6	1.6
	2005 (base year)	**2015 (baseline)**	**Scenario for water & sanitation goals with:**		
			tax	***fb***	***db***
Outflows:	***34.7***	***35.2***	***35.0***	***35.2***	***34.9***
Imports	31.3	32.2	32.0	32.2	31.9
Private transfers to rest of world	2.4	2.9	2.8	2.9	2.9
Official transfers to rest of world	0.0	0.0	0.0	0.0	0.0
Factor income to rest of world	0.0	0.0	0.0	0.0	0.0
Net interest income of rest of world	1.0	0.1	0.1	0.1	0.1
Inflows:	***34.7***	***35.2***	***35.0***	***35.2***	***34.9***
Exports	39.2	30.5	30.2	29.8	30.2
Private transfers from rest of world	0.0	0.0	0.0	0.0	0.0
Official transfers from rest of world	1.2	1.2	1.2	1.2	1.2
Factor income from rest of world	2.3	2.0	2.0	2.0	2.0
Government borrowing	0.7	-0.1	-0.1	0.6	-0.1
Private borrowing	-10.3	0.0	0.0	0.0	0.0
FDI	1.6	1.6	1.6	1.6	1.6
	2005 (base year)	**2015 (baseline)**	**Scenario for all goals with:**		
			tax	***fb***	***db***
Outflows:	***34.7***	***35.2***	***32.8***	***35.6***	***32.3***
Imports	31.3	32.2	30.1	32.4	29.2
Private transfers to rest of world	2.4	2.9	2.6	2.8	2.9
Official transfers to rest of world	0.0	0.0	0.0	0.0	0.0
Factor income to rest of world	0.0	0.0	0.0	0.0	0.0
Net interest income of rest of world	1.0	0.1	0.1	0.3	0.1
Inflows:	***34.7***	***35.2***	***32.8***	***35.6***	***32.3***
Exports	39.2	30.5	28.1	22.9	27.2
Private transfers from rest of world	0.0	0.0	0.0	0.0	0.0
Official transfers from rest of world	1.2	1.2	1.2	1.2	1.3
Factor income from rest of world	2.3	2.0	2.0	2.0	2.2
Government borrowing	0.7	-0.1	-0.1	7.8	-0.1
Private borrowing	-10.3	0.0	0.0	0.0	0.0
FDI	1.6	1.6	1.6	1.6	1.6

Notes: *mdg-tax'* – adjustment of the tax rates to finance the achievement of the required MDGs; '*mdg-fb*' – foreign borrowing to achieve MDGs; '*mdg-db'* – domestic borrowing to ensure the financing of the cost related to the achievement of MDGs.