

# Alternative Paths to Structural Adjustment in Uzbekistan in a Three-Gap Framework

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## Abstract

Ranaweera presents an internally consistent macroeconomic framework that could be used as a first step toward a more comprehensive quantitative and qualitative assessment of the adjustment alternatives facing Uzbekistan. The three-gap framework focuses on the major imbalances of the economy for evaluating policy choices facing Uzbekistan. It emphasizes the domestic and external factors that determine economic outcomes and welfare. The author attempts to quantify two policy scenarios—gradual as against an accelerated

policy implementation strategy. He finds that an aggressive adjustment policy would indeed improve most performance and welfare indicators. Two major ingredients of such an aggressive adjustment strategy are the unification of the exchange rate and implementation of current account convertibility in the balance of payments. The author also draws attention to the relative importance of external financing and the sustainability of the balance of payments under alternative structural adjustment paths facing Uzbekistan.

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## **Alternative Paths to Structural Adjustment in Uzbekistan in a Three-gap Framework**

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## 1.0. Introduction

Since its independence in 1991, Uzbekistan, a successor state of the former Soviet Union (FSU) in Central Asia, has followed a unique path to economic transition. At the time of independence, the country's relatively rich resource endowment, low degree of over-industrialization and trade dependence, large share of agriculture in aggregate output, and the predominance of cotton and other raw materials in exports, pointed to a relatively better transition path (in comparison with other FSU countries) to a market-based system. Rather than embracing the "shock" therapy favored by the "Washington consensus" that has been tried in other Eastern European countries such as Poland, Uzbekistan has adopted a unique transition strategy of promoting stability and equality through a state-controlled gradual transition strategy. This goal is pursued by subsidizing employment, controlling prices on essential items, privatizing large enterprises gradually, and attempting to attain self-sufficiency in energy and food supplies. Although no clear characterization of this strategy exists, it could be broadly considered as some form of "gradualism" to economic transition.<sup>2</sup>

Following this path in recent times, Uzbekistan was able to achieve modest growth and a modicum of macroeconomic stability by 1999 with inflation down to about 45 percent per year, the budget deficit reduced to about -2.5 percent of GDP, and the current account deficit under -2 percent of GDP. In the year 2000, Uzbekistan started to address its fundamental imbalance in the foreign exchange market by devaluing its currency by 50 percent in May and by announcing a series of other measures to ease the supply and demand for foreign exchange. Having made this turnaround, the policymakers faced a choice between (i) accelerating the pace of foreign exchange liberalization with the intention of unifying the

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<sup>2</sup> For example, in comparison with China and Hungary, this strategy is perceived to be relatively less orthodox gradualism.

exchange market and introducing current account convertibility as soon as possible or (ii) continuing with a slower and more deliberate pace of foreign exchange liberalization, deferring convertibility to some future year. The policy makers seem to have chosen the latter path as evidenced by piecemeal changes that have been made to the existing foreign exchange system periodically. It turns out that this decision is central to the choice of macroeconomic, social, and structural policies, which would need to be implemented to complement foreign exchange liberalization. The path that Uzbekistan chooses would determine the extent to which it is able to capitalize on many of its inherent economic strengths, accelerate growth, and improve living standards of its people.

This study provides an internally consistent macroeconomic framework that focuses on the major imbalances of the economy for evaluating some of the policy choices facing Uzbekistan. It lays emphasis on both the domestic and the external factors that determine economic performance. The study also attempts to quantify the relative importance of external financing and the sustainability of the balance of payments under alternative structural adjustment paths facing Uzbekistan. The three-gap framework presented here is intended as a first step toward a more comprehensive qualitative and quantitative assessment of the adjustment alternatives facing Uzbekistan.

The study is organized as follows: In section 2, the major developments in Uzbekistan are described with particular emphasis on developments since the breakdown of the USSR. Section 3 is devoted to the discussion of the three-gap model used in the study. In section 4, two main adjustment scenarios are analyzed. Section 5 draws together some conclusions of the study.

## 2.0 Major Macroeconomic Developments Since Independence

The transition process in Uzbekistan has so far been rather uneven (see, EBRD (1998), Fischer, Sahay, and Vegh (1997), De Melo, Denizler, Gelb, and Tenev (1997), Spechler (2000), World Bank (1999)). Beginning in early 1992, Uzbekistan has evolved through three different transition phases, which are very different from each other in terms of macroeconomic policies followed by the government, progress made in the implementation of market-oriented reforms, and stability of the macroeconomic situation.

During the first phase, covering the period 1992-93, the government seemed to have followed rather loose macroeconomic policies, the implementation of market-oriented reforms was limited in scope and slow, and the macroeconomic imbalances inherited from the FSU deteriorated markedly. During the second phase, which covered the period from early 1994 to the 3<sup>rd</sup> quarter of 1996, macroeconomic performance improved considerably perhaps as a result of the tightening of financial policies and the acceleration of many market-oriented reforms. The third phase covers the period from the 4<sup>th</sup> quarter of 1996 to the present, and is characterized by occasional loosening of macroeconomic policies, a reversal of some key reforms while maintaining sustained progress in others, and the worsening of the external imbalances (see table 1 for some key macroeconomic indicators for Uzbekistan during the period 1997-2002).

The macroeconomic situation continued to be difficult during the early years of 2000. Low gold prices, large debt service payments, the restrictive foreign exchange and trade regime, and the overvalued exchange rate continued to put pressure on the balance of payments. The rebound of gold prices in the year 2002 somewhat helped to ease the

country's balance of payments. On the other hand, the decline in cotton prices resulted in the balance of payments remaining tight. Nevertheless, preliminary estimates show that in 2002, the balance of payments current account deficit was marginally lower than in 2001. Government's consolidated budget deficit is estimated to have increased to about -2.1 percent of GDP due largely to an increase in current expenditures (see table 1).

The most significant policy changes so far were in the area of exchange rates. On May 1, 2000, the official and commercial bank exchange rates against the US dollar were unified at the level of the commercial bank rate. As a result, the spread between the new official rate and the curb market rate was reduced by almost 20 percent. In the first half of 2002, access for individuals to the cash foreign exchange market and to the over-the-counter (OTC) market was somewhat liberalized. However, the multiple rate system continues to exist, and the long-awaited full unification of the exchange rate has not been carried out so far (see chart 1 on page 28).

### 3.0 Characteristics and Structure of the Uzbekistan Model<sup>3</sup>

The three-gap model is considered to be particularly useful for analyzing the policy problems faced by the Uzbekistan economy. The three-gap approach emphasizes domestic savings and investment constraints, foreign savings and capital inflows, and fiscal constraints to growth and structural adjustment (see, Bacha (1990), Taylor (1990), Sepheri, Moshiri, and Doudongee (2000), Iqbal (1995, 1997, 2000) for a variety of three-gap models)

The particular version of the three-gap model applied to Uzbekistan belongs to the family of models used by many international organizations and government agencies for macroeconomic work on developing countries. This framework, which is based on a

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<sup>3</sup> For a brief description of the model, see the appendix.



consistent flow-of-funds among multiple economic agents in an economy, facilitates the exploration of different policy options open to a country. The original “gap” models were designed to calculate the need for additional foreign savings to close the so-called savings/investment gap and/or were used to calculate the additional foreign exchange requirements for purchasing the imports that were critically needed in the growth process.

#### **4.0. Simulations with the model<sup>4</sup>**

We use the model to examine two alternative scenarios for the economy of Uzbekistan. In the “base case” scenario, we focus on the continuation of the present policy stance with no significant gains in growth and inflation fronts. In the recent past, this “gradualist” approach to adjustment has been characterized by a “stop-go” cycle of reforms and backtracking to deal with emerging economic problems. This has been the case particularly with the exchange rate system. In the “high case” scenario, it is assumed that indeed the country would resort to a more aggressive adjustment approach of implementing appropriate policies that would encourage investment and growth in the medium term. In particular, the high case assumes the abolition of the multiple exchange rate system currently in place and the unification of the exchange rate in the second half of the year 2003 and early part of 2004, and the achievement of current account convertibility during the same period.

##### **4.1. Base Case Scenario: Gradual Liberalization**

The base case is a scenario of low productivity growth, low GDP growth, increasing pressure on the balance of payments, higher levels of external debt, and moderate to high and variable inflation (see, table 2).

The base case scenario assumes that the policy makers will not implement immediately a broad-based adjustment policy package, but will continue with the “gradualist” strategy followed so far. Under the circumstances, it is likely that macroeconomic and structural policies would not be fully synchronized, which would limit growth and the possibilities to bring down inflation. In the base case scenario, GDP growth not exceeding 2.5 percent per annum and inflation of not less than 25 percent on average during the period 2003-2007 are the most likely outcomes.

A key feature of the “gradualist” approach is the maintenance of the multiple foreign exchange system currently in force. Nevertheless, it is reasonable to expect that given the pressure from international institutions and other donors, the policy makers would build upon recent foreign exchange liberalization measures and continue along a slow and gradual path of further reforms. Because of limited pass-through effects of higher Sum border prices into higher farm gate prices for cotton and wheat, the short-run supply response associated with the “gradual” approach to further foreign exchange liberalization could be limited. Thus, export volume growth is not expected to dramatically pick up during the period in question. Gold and cotton production and exports volumes, where external factors have a dominant influence, are assumed to remain at their current levels. Taking into consideration the developments in trading partner economies and the disincentive effects of the prevailing exchange rate regime, manufacturing and related other exports are likely to remain less buoyant, especially toward the latter part of the period 2003-2007. Given the trends in cotton and gold prices, nominal export growth is projected to stabilize around 4.0 percent per annum after 2005.

Several factors affect the level and composition of merchandise imports under the “gradualist” strategy. On the one hand, relatively lower GDP growth under the base case

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<sup>4</sup> The scenarios and the simulation results are purely exploratory and are intended for illustrative purposes only.

scenario is likely to dampen import demand. On the other, the continuation of the present exchange rate system is likely to somewhat encourage imports. Under these conditions, following recent practice, the policy makers are most likely to resort to administrative measures to contain the level and type of imports. Consequently, import volume growth is assumed to be lower than GDP growth and imports are expected to rise somewhat only towards the latter part of the period. Given the anticipated changes in import prices, nominal imports are projected to increase by about 4 percent per annum after 2005. Thus, the trade balance under the base case scenario is unlikely to improve and will remain around -1.4 percent of GDP during the period. If account is taken of the interest payments on external debt arising from the need to borrow externally to cover the resource gap, the current account of the balance of payments would gradually decline to over -4.0 percent of GDP by 2007. It is also noteworthy that there is no significant reduction in debt service payments until the end of the period in question.

The “gradualist” path is unlikely to attract a great deal of foreign direct investments or significantly abate the current capital flight. Apparently, in the recent past, “gradualism” does not seem to have persuaded bilateral and multilateral donors to commit more resources to Uzbekistan. Relatively lower levels of multilateral and bilateral flows are likely to induce the policy makers to continue to undertake external commercial borrowing at high cost. Even if the multilateral and bilateral flows remain more or less at current levels, there still would remain a need for further external financing, which can come from only commercial sources.

Under the “base case” scenario, the need to provide fiscal relief to fixed income groups, among other things, is likely to result in higher budget deficits. The overall budget deficit is projected to reach a level of -3.5 of GDP in 2005 from a level of -2.1 percent in 2002. It is likely that this deficit will worsen in years after 2005 if the current fiscal stance is

continued. Monetization of this deficit is likely as foreign financing is unlikely to be forthcoming on a large scale, as mentioned before. As a result, monetary growth is expected to be high (about 30 percent on average during the period) and inflation (about 25 percent on average) would be moderate to high and variable as efforts to establish tighter discipline is likely to be undermined by the lack of adequate structural adjustment in the real sectors.

#### 4.2. High Case Scenario: Accelerated Reforms

The High Case scenario is one of accelerated reforms. In particular, it is assumed that the foreign exchange liberalization begun in the year 2000 would be followed at long last by the unification of the exchange rate and implementation of current account convertibility by the end of 2003 and beginning of 2004 (see, chart 1). It is also expected that fiscal and monetary policies would be tight enough in order to rapidly bring inflation under control. The fiscal stance would need to be focused on prudent public sector deficits and borrowing with a view to achieving lasting improvements in debt and debt service ratios. Furthermore, other consistent and complementary accompanying social and structural policies (including, among others, policies related to directed credits, excessive state participation in production and marketing, improving private sector development, etc) are expected to be an integral part of an aggressive policy reform package.

If the a broad-based policy program is implemented, GDP growth rates of 5 percent per annum towards the latter part of the period 2003-2007 are well within the capacity of the Uzbek economy. Improved incentives are expected to raise investments and productivity in agriculture, thus leading to higher incomes for the rural sector. Complementary reforms in the business environment—accelerated privatization, and improvements in the competitive environment—would lead to rapid growth of small enterprises and job growth.

In this scenario, gross domestic investment is assumed to rise gradually from a level of 19 percent of GDP in 2002 to about 23 percent by 2007. Government investment is expected to decline gradually to make room for private sector investment. While the overall investment will be financed by foreign savings in the initial years, national savings will have a relatively larger contribution in the later years of the period.

Exchange market and other structural reforms are bound to unleash “repressed” inflationary pressures. Thus, the Uzbek policy makers would need to tighten fiscal and monetary policies not only to contain but also rapidly reduce inflation. The high case scenario assumes that such fiscal and monetary tightening at the outset (and prudent policy adjustments thereafter) would enable to bring down inflation gradually to a level of 15 percent by 2005 and to about 8 percent per annum by 2007.

Inflation control, among other things, has also an important implication to welfare, which is reflected in this framework in consumption. Under the “gradualist” approach, some improvements in consumption are possible, but these are bound to be erratic and uneven over the years, depending on a variety of considerations, including the policy makers ability to adjust the economy to “smooth” consumption. Under the “high” case, however, a more comprehensive and broad-based coordinated policy stance is likely to result in more consistent and durable gains in consumption, especially after the year 2005.

Accelerated exchange market reforms are expected to provide a big boost to export-oriented sectors and consequently the medium term balance of payments prospects are bound to improve substantially. These prospects are largely determined by cotton, gold, and other exports and interest payments on external debt. Given the cropping cycle in the cotton sector, the supply response to the increased incentives and ensuing increases in exports are likely to

take 1-2 years. Thus, only a moderate increase in cotton exports may be possible during the initial years of accelerated reforms. However, as a result of the improved policy environment, the share of manufacturing and other non-traditional exports in total exports should increase substantially. In sum, export volume growth is projected to increase gradually to nearly 4 percent by the year 2005.

Throughout the period 2003-2007, imports are assumed to grow somewhat faster than GDP largely because of the rise in aggregate investment and the increasing need for intermediate and capital goods imports to sustain higher economic growth. The only probable exception could be the year 2004 when the full impact of the exchange rate unification (at a substantially devalued rate) is likely to constrain import volume growth. With the slower pick up in exports in the initial years of this period largely because of structural constraints, the resource balance and the current account deficit are expected to somewhat deteriorate. However, towards the end of the period, the current account balance would improve relatively to a level of about -2.5 percent of GDP by 2007.

In addition, if progress is made in the area of implementing regional integration, the enhancement of the government's credibility through an accelerated adjustment program is likely to attract a great deal of investor enthusiasm. Higher levels of foreign direct investment would lead to job and productivity growth in new industries. While the higher import competition would lead to some rationalization of the industrial structure with the elimination of non-competitive industries, the net gains from growing sectors of the economy would far outweigh the losses. The full benefits of these reforms would be seen in the medium- to long-run, but noticeable gains would be visible in the short-run as well.

With an improvement in the policy environment, short-term capital outflows (including capital flight) are assumed to stabilize around US\$150 million by 2005. Taking into account the net resource flows from long term borrowing and the need for reserve build-up (the reserve requirements are specified as approximately 2.8 months of imports of goods, services and income), the external financing gap is estimated to be relatively higher in the “high” case than in the “base” case scenario for the years 2003 and 2004 when exchange rate reforms are expected to be implemented. However, in the years after 2005, improvements in exports earnings, direct foreign investment and capital outflows are likely to significantly reduce the external financing gap in the “high case” scenario.

The government budgetary outcomes in the medium-term hinge, among other things, on two crucial considerations: the path and success of the disinflation program and the path and level of the exchange rate adjustment that goes with the latter. Higher than anticipated inflation (for example, arising from a devaluation of the currency) is likely to put pressure on the budget. Even if some revenues go up, higher inflation coupled with increased demands for social protection are likely to increase government expenditures. Furthermore, monetary tightening to control inflation could also work through to higher interest rates, thus pushing up government’s interest payments. In the light of these conflicting factors, the achievement of fiscal targets in the “high” case scenario are contingent on the policy makers ability to maintain a revenue level of roughly over 28 percent of GDP throughout the period and to gradually reduce expenditures from a level of nearly 30 percent of GDP in 2003 (if not maintain that level up to about the year 2005). Fiscal fine tuning on these lines should enable to reduce the budget deficit from a peak of nearly -3.0 percent of GDP in 2004 to about -2.2 percent in 2007. One important implication of this fiscal stance would be relatively higher private borrowing to offset substantial external debt repayments falling due, especially towards the latter part of the period.

The improvements in the budget are expected to come from both revenue and expenditure related sources. On the revenue side, higher growth and expansion of the tax base with the incorporation of the informal sector are two contributing factors. The sustenance of the revenue effort is likely to help defraying expenditures towards transitional social costs of foreign exchange liberalization, which would partly be supported by external aid. The budgetary consolidation on these lines would reduce the need for financing to a level compatible with available non-inflationary financing. The tight fiscal stance would also greatly help monetary management aimed at bringing inflation down to around 15 percent by 2005.

In the medium-term, full macroeconomic stability could be attained with low and stable rates of inflation with relatively low monetary growth.

#### 4.3. Measuring External Sustainability of Alternative Scenarios

The three-gap model can address external sustainability issues of a country as it links domestic output, export, and import growth, the path of the exchange rate, and external debt dynamics in a consistent framework. Furthermore, the model has the capability to handle detailed external debt transactions of different borrowing sectors of the domestic economy from different external lenders. The model can also be used for analyzing the sensitivity of different borrowing strategies available to a country. For example, it can be used to explore the balance of payments implications of borrowing on different concessional and non-concessional terms, from different types of creditors.



Tables 2 and 3 show the non-interest external current account balances for both the “base” and “high” case scenarios in US dollar terms and as a ratio to GDP. The non-interest current account balance in the “base” case is expected to be on average around -95 million US dollars, which is only slightly higher than that for the “high” case. In relative terms, there is a marginal improvement in the non-interest current account balance towards the latter part of the period (2003-2007) due mainly to the relatively higher export growth under the “high” case scenario. The net outcome in the “high” case is a noteworthy improvement in both the non-interest and overall current account balances, especially in the latter part of the period.

Some standard indicators for measuring the sustainability of Uzbekistan’s external debt are given in table 4 and the charts on page 29. Countries with high GDP growth relative to the real interest rate that they face on their external debt can support initial higher external debt relative to GDP and exports. From this perspective, the ratio of external debt to GDP is a critical measure for assessing the solvency and creditworthiness of a country.<sup>5</sup> This ratio can increase for three reasons: increased resource transfers from the rest of the world to the borrowing country, interest payments on past debt at a real interest rate higher than the real growth rate of the economy, or capital losses incurred on outstanding debt as a result of depreciation of the real exchange rate.

The chart 2 (page 29) shows that the external debt to GDP ratio is relatively higher in the “base” case than in the “high” case. The reason for this is that the external financing requirements in the “high” case are relatively lower than in the “base” case, at least in the later years following accelerated reforms. In the “base” case the external debt/GDP ratio rises from 68 percent to 78 during the period 2003-2007. In contrast, in the “high” case, this ratio

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<sup>5</sup> The debt-GDP ratio measures the debt in terms of home goods. If the relative value of home goods falls (increases), as in the case after a real depreciation (appreciation), the debt-GDP ratio will rise (fall). Against that must be set off the favorable (unfavorable) impact of the real devaluation (appreciation) on exports, an important determinant of creditworthiness.

rises to 74 percent at the end of the same period. Compared with ratios for other countries, these figures for both scenarios may not be “alarming”. In the absence of any concrete benchmarks, we compare these ratios with an “internationally” used guideline (around 60 percent).

The debt service to GDP (or exports) indicator helps to identify bunching of repayments and/or liquidity problems that a country faces in repaying its external obligations. The charts given on page 29 show that under both scenarios the debt service to exports ratio is relatively lower than an “internationally” accepted “threshold” (approximately, 25 percent). However, the ratio is relatively higher for the “base” case towards the latter part of the period 2003-2007. Apparently, an accelerated reform program with substantial external financing need not necessarily be accompanied by a significant escalation of external debt service payments. This depends crucially on the mix of such financing as well as its conditionality. The graph on the ratio of debt service to government revenue shows some adverse implications to the government budget of a rise in external debt service payments. In the case of Uzbekistan, the extent of debt service payments would be a significant element that needs to be given consideration in the design of an appropriate economic adjustment program.

While these debt and debt service ratios are not alarming in comparison with other countries in the FSU, they suggest that Uzbekistan’s external debt position will have to be closely monitored, even under a fairly “high” case policy setting.

## 5.0 Some Conclusions

This study reports on an internally consistent macroeconomic framework that focuses on the major imbalances of the economy for evaluating some of the policy choices facing Uzbekistan. It lays emphasis on both the domestic and the external factors that determine economic performance. The study also attempts to quantify the relative importance of external financing and the sustainability of the balance of payments under alternative structural adjustment paths facing Uzbekistan. Two somewhat “polar” policy alternatives are analyzed using the model. The “base” case of “gradual” reforms is associated with low growth, low investment, high and variable inflation, lower inflows of direct foreign investment, and rather low per capita consumption growth. The basic assumption underlying the “high” case is that the country will carry out a comprehensive set of structural adjustment policies to eliminate the distortions in the economy. In particular, under this scenario, exchange market reforms are expected to be a major element of public policy. The “high” case entails a persistence of inflation especially after the exchange market reforms (but a rapid disinflation thereafter) and higher external borrowing in the initial years of the period in question. Nevertheless, the external exposure indicators under the “high” case turn out to be relatively better than those related to the “base” case, especially towards the latter part of the period.

The three-gap framework presented here is rather rudimentary and is intended as a first step toward a more comprehensive qualitative and quantitative assessment of the adjustment alternatives facing Uzbekistan. Even this rudimentary framework is capable of highlighting the policy choices that are critical in the determination of the creditworthiness and external sustainability. It appears that liberalization of the foreign exchange system is a key element of a broad-based reform package to promote growth and development of the Uzbek economy.

## Appendix 1.

### The Accounting Framework of the “Three-Gap” model

The Uzbekistan model consists of two modules: the flow of funds module (FOF), and an external debt module (DM). The basic version contains four economic agents or “sectors”: Central Government, the Monetary System (Central Bank and Deposit Money Banks), the “Private” Sector<sup>6</sup> (or more appropriately, the “Rest of the Economy,” including households and private firms, non-central government agencies, public enterprises, and non-monetary financial institutions) and the Foreign Sector.

### Equations of the model

The savings-investment gap:

$$Y - (C_g + C_p) - (I_g + I_p) = X - IM \quad (1)$$

The foreign exchange gap:

$$X - IM + NFY + NCT + KT_{fg} + DFI + POR + NLT + NST + dRES = GAPF \quad (2)$$

The fiscal gap:

$$\begin{aligned} NTX_{pg} + Td + (Ti - Sub) + NCT_{fg} + NF_{fg} + NF_{gp} + K_{rev} - I_g - NKTR_{gp} = \\ = L_{mg} + L_{pg} + KT_{fg} + NLT_{fg} + NST_{fg} \end{aligned} \quad (3)$$

The monetary sector flows are summarized by equation (4) below:

$$L_{mp} + L_{mg} + dRES = dM + dNOL \quad (4)$$

The model consists of 4 equations and 33 variables.<sup>7</sup> To obtain a numerical solution (33-4) variables should be assigned values. In order to prepare for a numerical solution, we endogenize a number of important variables by specifying several appropriate behavioral equations. Some of these are discussed below in the section on behavioral structure of the

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<sup>6</sup> In this framework, the so-called ‘Private Sector’ should be interpreted as a residual sector consisting households, corporate sector, and public sector institutions not included in the “government” sector defined within the framework.

<sup>7</sup> The 5<sup>th</sup> equation of the system, i.e. that for the private sector is redundant according to Walras’ law.

model. For the remainder, we adopt a number of different methods of exogenously specifying the expected values for the variables.

### Some behavioral equations of the model

The money demand function:

$$M = P y / v \quad (5)$$

The investment/output relation:

$$I(t) = ICOR(t+1) * [y(t+1) - y(t)] \quad (6)$$

Private consumption function:

$$C_p = c * (Y - T + NCTR + NFY) \quad (7)$$

Import functions:

$$IM_i = f(y_e, RER_i) \quad (8)$$

Manufacturing exports function:

$$X_m = f(y_f, RER_m) \quad (9)$$

Other exports:

$$X_i = (1+g_{xi}) * X_i(t-1) \quad (10)$$

The model can be solved using one of two approaches. First, all resource flows could be specified exogenously and the model could then be solved for the implied growth and inflation rates.<sup>8</sup> Second, resource requirements (including the additional foreign exchange needs) could be estimated for given growth and inflation assumptions. We have adopted the latter approach for computational convenience. Either approach could be considered as a first step in an process that converges to a feasible solution to the model.<sup>9</sup>

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<sup>8</sup> This is also referred to as the "availabilities" approach to solution of this type of model.

<sup>9</sup> Since no explicit objective function is used, the solution is best described as a feasible one. The importance of iteration in this process cannot be overemphasized.

To evaluate the external sustainability of the country, a module that incorporates external debt information supplements the flow-of-funds framework. This enables the calculation of the debt servicing capacity of a country taking into account the existing stock of external debt and changes in that stock as a result of new external borrowing.

#### Appendix 2.

##### Symbols used.

Y	-	Gross domestic product at market prices
C	-	Total consumption
I	-	Gross domestic fixed capital formation (investment)
X	-	Export of goods and services
IM	-	Imports of goods and services.
NFY	-	Net factor income
NCT	-	Net current transfers
KT <sub>fg</sub>	-	Capital transfers to government from abroad
DFI	-	Direct foreign investment
POR	-	Portfolio investment
NLT	-	Net long-term borrowing
NST	-	Net short-term borrowing
dRES	-	Change in external reserves
GAPF	-	Financing requirements for closing the balance of payments gap. <sup>10</sup>
Td	-	Direct taxes
Ti	-	Indirect taxes
Sub	-	Subsidies
NCT <sub>fg</sub>	-	Net foreign current transfers to government

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<sup>10</sup> For simplicity, government and private sector flows have been aggregated to show NFY,NCT,NLT,NST on a net basis. Note also that the flow-of-funds matrix in table 2 contain more details than shown in the equations in the text.

NTX <sub>pg</sub>	-	Non-tax revenue of government
NF <sub>fg</sub>	-	Net foreign factor payments by government
NCT <sub>gp</sub>	-	Net current transfers from government to private sector
NF <sub>gp</sub>	-	Net factor payments by government to private sector
NF <sub>gm</sub>	-	Net factor payments by government to monetary sector
C <sub>g</sub>	-	Government consumption
K <sub>rev</sub>	-	Capital revenue
I <sub>g</sub>	-	Government investment
NKTR <sub>gp</sub>	-	Net private capital transfers of government
L <sub>mg</sub>	-	Government sector borrowing from the monetary sector
NLT <sub>fg</sub>	-	Net long-term borrowing from abroad
NST <sub>fg</sub>	-	Net short-term borrowing from abroad
KT <sub>fg</sub>	-	Net foreign capital transfers
L <sub>pg</sub>	-	Net government borrowing from the private sector
L <sub>mp</sub>	-	Private sector borrowing from the monetary sector: i.e. change in the stock of domestic credit to the private sector ( $DC_p$ )
L <sub>mg</sub>	-	Government sector borrowing from the monetary sector: i.e. change in the stock of domestic credit to the government sector ( $DC_g$ )
dNOL	-	Change in net other liabilities of the monetary system (NOL)
M	-	Broad money (M2)
dM	-	Change in broad money stock
P	-	Price level
y	-	Real GDP at market prices
v	-	Velocity of circulation of broad money.
ICOR	-	Incremental capital-output ratio
c	-	Propensity to consume

- NCTR - Net current transfers in real terms received by the rest of the economy from the other sectors
- Imi - Demand for ith import category;<sup>11</sup>
- RERi - Real exchange rate for the ith import category
- Xm - Exports of manufacturing goods
- Yf - Proxy for trading partners income level
- RERm - Real exchange rate for manufactures.
- gxi - exogenously given growth rate of export category i.

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<sup>11</sup> The import components identified in the model are: food, consumer goods, intermediate raw materials, intermediate manufactures, capital goods and fuel and other petroleum based products.



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Table 1: Uzbekistan - Selected Indicators

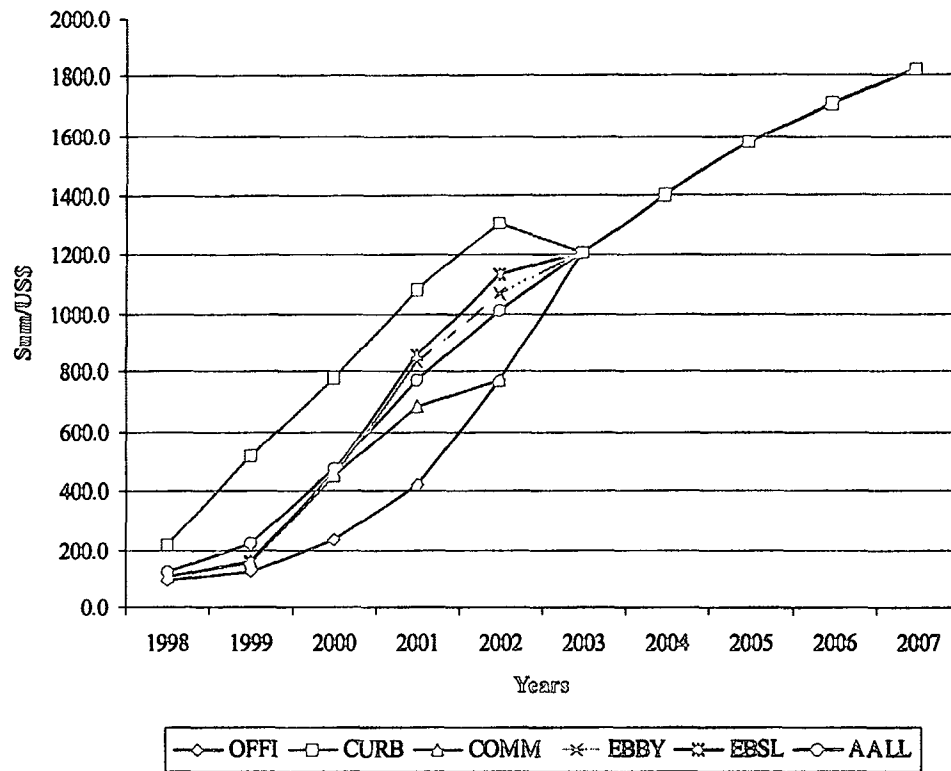
	<i>Estimate</i>					
	1997	1998	1999	2000	2001	2002
<b>Main macroeconomic aggregates</b>						
<i>Annual growth rates (from constant price data)</i>						
GDP (mp) per capita	3.2	2.6	2.8	2.7	3.2	1.6
Total consumption per capita	5.5	13.6	13.7	18.0	15.3	2.4
GDP at market prices	5.2	4.3	4.3	3.8	4.5	3.0
Total consumption	7.5	15.5	15.3	19.2	16.8	3.8
Gross domestic investment (GDI)	..	15.0	2.0	1.0	3.7	3.0
Exports (GNFS)	3.2	-15.4	-8.1	9.2	-5.4	-0.5
of which Goods	3.1	-17.4	-10.9	1.6	-6.9	
Imports (GNFS)	-7.2	-22.8	-8.0	-5.8	6.4	0.5
of which Goods	-10.5	-26.3	-12.4	-3.4	3.7	
<i>Savings-investment balances, as percentage of GDP</i>						
Gross Domestic investment	22.8	16.9	17.8	14.0	19.3	19.4
of which Government investment	7.4	6.7	6.6	5.9	5.0	4.8
Foreign savings	5.5	1.0	1.5	-2.7	1.5	0.8
Gross national savings	17.3	15.9	16.3	16.8	17.8	18.6
Government savings	5.2	4.5	4.7	5.7	5.1	5.5
Non government savings	12.2	11.4	11.6	11.1	12.6	13.1
Gross domestic savings	18.7	16.5	17.3	19.4	19.9	19.8
<i>Other</i>						
GDP inflation	66.1	39.0	44.1	47.3	43.1	39.1
Annual average exchange rate (LCU/US\$)	91.2	132.2	245.6	416.7	652.0	800.0
Terms of trade index (YR97 =100)	113.2	111.7	110.6	116.5	116.2	116.6
Money growth	45.6	28.1	32.1	37.1	54.3	44.6
<b>Government finance indicators</b>						
<i>Percentage of GDP</i>						
Total revenues, of which	30.8	31.3	29.4	28.3	26.5	27.1
Tax revenues	27.7	29.4	27.9	26.4	24.0	25.6
Total expenditures, of which	32.5	34.5	32.0	30.4	27.8	29.2
Consumption	20.5	20.5	20.6	18.7	18.4	18.4
Deficit(-)/Surplus(+)	-1.7	-3.2	-2.6	-2.1	-1.4	-2.1
Total Government Debt	18.5	22.0	24.8	37.2	53.9	60.2
<b>External debt &amp; liquidity indicators</b>						
<i>Total DOD and TDS</i>						
DOD (US\$ millions)	2781.4	3213.2	4773.6	4372.8	4626.3	4708.0
DOD / GDPmp ratio	26.0	30.0	55.1	56.0	62.0	53.9
TDS (US\$ millions)	511.9	348.8	553.6	853.6	833.5	914.7
TDS / exports (XGS) ratio	12.8	10.2	17.5	25.2	25.9	27.7
Total gross reserves (months' imports G&S)	3.0	3.9	4.5	4.8	4.3	4.0
<b>External financing</b>						
<i>(US\$, millions)</i>						
Official capital grants	0.0	-50.0	-14.0	-50.0	-68.0	-65.0
Private investment (net)	167.0	140.0	121.0	75.0	83.0	85.0
Net Long term borrowing excl IMF	166.7	617.8	1112.3	161.3	237.4	69.0
Adjustments to scheduled debt service	0.0	7.0	15.0	-2.0	0.0	0.0
All other capital flows	-230.2	-610.8	-1009.3	-300.8	-161.4	-146.6
Notes: 1. The indicators given here were assembled from a variety of sources, both official and non-official.						
This may have caused consistency problems of figures over the period covered.						
2. Figures for 2002 are based on early estimates that are available in April, 2003.						

Scenario Indicators	Estimate	Base Case				
		2002	2003	2004	2005	2006
GDP Growth(%)	3.0	2.2	2.3	2.4	2.5	2.5
Consumption (per capita) Growth (%)	0.0	0.1	0.7	0.8	0.9	0.9
Gross Domestic Investment (% of GDP)	19.4	19.2	19.2	19.2	19.2	19.2
Inflation (annual GDP deflator change:%)	39.1	30.0	28.0	25.0	25.0	25.0
Broad Money Growth(%)	44.6	48.1	30.9	28.0	28.1	28.1
<b>FISCAL OPERATIONS</b>						
Overall Fiscal Balance (% of GDP)	-2.1	-2.6	-2.8	-3.5	-4.4	-4.9
Primary Fiscal Balance (% of GDP)	-1.6	-2.0	-2.1	-2.8	-3.4	-3.3
Total govt. expenditures (% of GDP)	29.2	29.8	30.3	31.5	32.5	33.0
Current govt. expenditures (% of GDP)	21.5	22.8	23.4	24.5	25.6	26.0
Govt. interest payments (% of GDP)	0.5	0.6	0.7	0.7	1.1	1.5
Govt. total revenues (% of GDP)	27.1	27.2	27.5	28.0	28.1	28.1
Total debt service (BOP)/Gov. Revenue (%)	38.7	42.5	34.7	30.6	33.1	30.2
<b>EXTERNAL SECTOR</b>						
Current Ac Balance (Mln US\$)	-71.0	-202.8	-302.3	-382.9	-431.2	-492.1
Current Ac Balance (% GDP)	-0.8	-2.4	-3.2	-3.6	-3.9	-4.3
Non-interest Current Ac Bal (% GDP)	1.0	-0.4	-1.0	-1.2	-1.0	-1.7
Trade Balance (Mln US\$)	-103.7	-105.1	-102.1	-131.1	-139.1	-147.4
Trade Balance (% GDP)	-1.2	-1.4	-1.2	-1.4	-1.4	-1.4
Gapfill financing requirements (Mln US\$)	0.0	178.0	287.9	342.0	354.5	411.6
Debt Service/Exports GNFS+IR+WR (%) _ a)	27.7	25.8	23.1	22.5	24.5	22.4
Debt Service/GDP (%)	10.5	11.5	9.5	8.6	9.3	8.5
Interest payments/Exports GNFS+IR+WR (%)	4.9	5.0	6.0	7.3	8.5	7.9
Interest payments/GDP (%)	1.9	2.2	2.5	2.8	3.2	3.0
Total DOD/GDP(%)	53.9	68.0	69.2	71.6	78.6	86.1
Export Volume Growth (% , annual) - GNFS	0.0	2.0	2.1	2.1	2.3	2.3
Import Volume Growth (% , annual) --GNFS	0.0	0.2	2.2	2.3	2.5	2.5
Nominal Export Growth (% , annual) --GNFS	0.0	4.9	3.9	3.3	4.0	4.0
Nominal Import Growth (% , annual) --GNFS	0.0	4.8	3.6	4.1	4.1	4.0
<b>Some key Assumptions</b>						
Direct foreign investment (Mln US\$)	85	80	80	82	85	85
Capital outflow (Mln US\$)	-155	-192	-154	-200	-200	-200
Foreign res. (months of imp.of GNFS & income)	2.8	2.8	2.8	2.8	2.8	2.8
Cotton price (cts/lb)_b)	46.2	58.0	62.0	65.0	66.0	67.0
Gold price (\$/troy oz)_b)	310.0	320.0	300.0	280.0	283.9	287.8
Notes:						
a) Exports GNFS+IR+WR include goods, services, income receipts and workers remittances						
b) Source of information on cotton and gold price projections: The World Bank						

Table 3: Uzbekistan - Macroeconomic Scenarios						
Scenario Indicators	Estimate	High Case				
	2002	2003	2004	2005	2006	2007
GDP Growth(%)	3.0	2.5	3.5	4.5	5.0	5.0
Consumption (per capita) Growth (%)	0.0	-0.3	0.3	0.2	3.2	3.0
Gross Domestic Investment (% of GDP)	19.4	20.0	21.0	23.0	23.0	23.0
Inflation (annual GDP deflator change:%)	39.1	30.0	30.0	15.0	10.0	8.0
Broad Money Growth(%)	44.6	48.5	34.5	20.2	15.5	13.4
<b>FISCAL OPERATIONS</b>						
Overall Fiscal Balance (% of GDP)	-2.1	-2.6	-2.9	-2.7	-2.5	-2.2
Primary Fiscal Balance (% of GDP)	-1.6	-2.1	-2.2	-1.8	-1.6	-1.4
Total govt. expenditures (% of GDP)	29.2	29.8	30.4	30.7	30.6	30.3
Current govt. expenditures (% of GDP)	21.5	22.8	23.5	23.7	23.4	23.1
Govt. interest payments (% of GDP)	0.5	0.6	0.7	0.9	0.8	0.8
Govt. total revenues (% of GDP)	27.1	27.2	27.5	28.0	28.1	28.1
Total debt service (BOP)/Gov. Revenue (%)	38.7	42.3	33.6	29.2	30.1	25.4
<b>EXTERNAL SECTOR</b>						
Current Ac Balance (Mln US\$)	-71.0	-228.1	-298.3	-324.1	-313.2	-315.7
Current Ac Balance (% GDP)	-0.8	-2.8	-3.1	-3.1	-2.7	-2.5
Non-interest Current Ac Bal (% GDP)	1.0	-0.7	-1.0	-1.1	-0.8	-1.2
Trade Balance (Mln US\$)	-103.7	-129.3	-89.8	-127.9	-108.7	-75.0
Trade Balance (% GDP)	-1.2	-1.7	-1.0	-1.3	-1.1	-0.7
Gapfill financing requirements (Mln US\$)	0.0	209.1	277.8	215.7	160.5	154.0
Debt Service/Exports GNFS+IR+WR (%) _ a)	27.7	25.8	23.0	20.7	21.6	18.3
Debt Service/GDP (%)	10.5	11.5	9.2	8.2	8.5	7.2
Interest payments/Exports GNFS+IR+WR (%)	4.9	5.0	5.9	5.8	5.8	4.4
Interest payments/GDP (%)	1.9	2.2	2.4	2.3	2.3	1.7
Total DOD/GDP(%)	53.9	68.6	67.7	70.7	72.4	73.6
Export Volume Growth (% , annual) - GNFS	0.0	2.0	2.2	3.9	4.2	4.5
Import Volume Growth (% , annual) --GNFS	0.0	1.0	1.5	4.0	4.0	4.0
Nominal Export Growth (% , annual) --GNFS	0.0	4.9	4.0	5.5	6.3	6.6
Nominal Import Growth (% , annual) --GNFS	0.0	5.7	2.5	6.5	5.5	5.5
<b>Some key Assumptions</b>						
Direct foreign investment (Mln US\$)	85	80	80	102	115	125
Capital outflow (Mln US\$)	-155	-192	-154	-150	-150	-150
Foreign res. (months of imp.of GNFS & income)	2.8	2.8	2.8	2.8	2.8	2.8
Cotton price (cts/lb)_b)	46.2	58.0	62.0	65.0	66.0	67.0
Gold price (\$/troy oz)_b)	310.0	320.0	300.0	280.0	283.9	287.8
Notes:						
a) Exports GNFS+IR+WR include goods, services, income receipts and workers remittances						
b) Source of information on cotton and gold price projections: The World Bank						

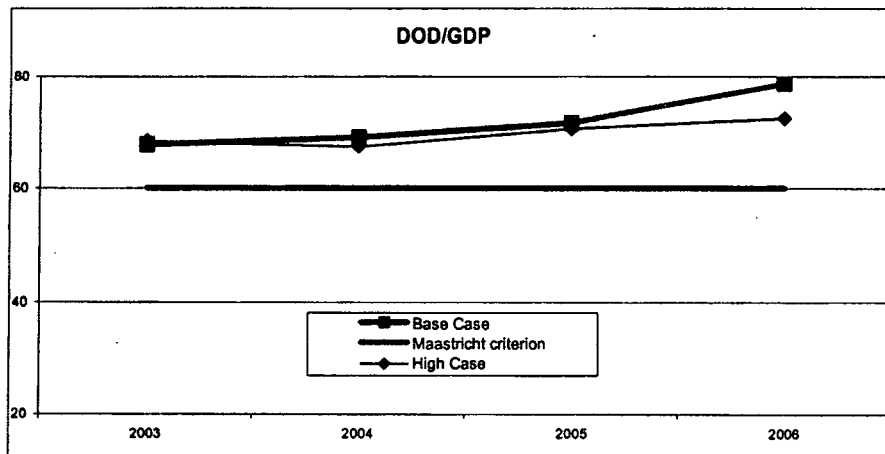
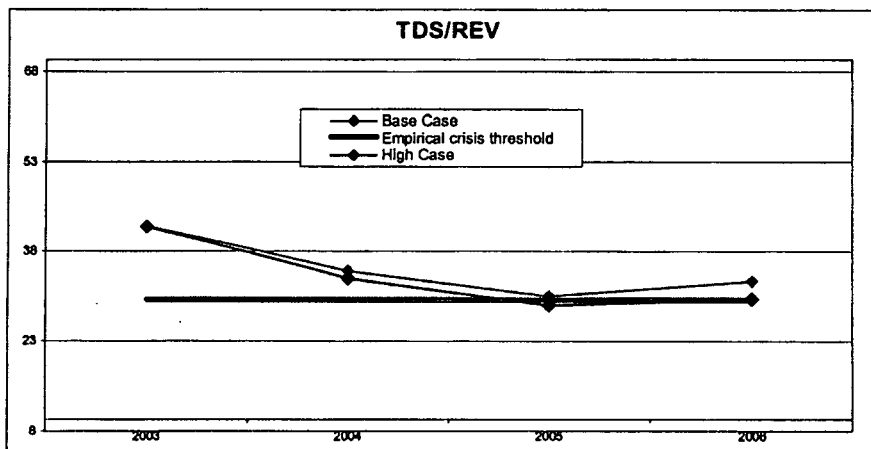
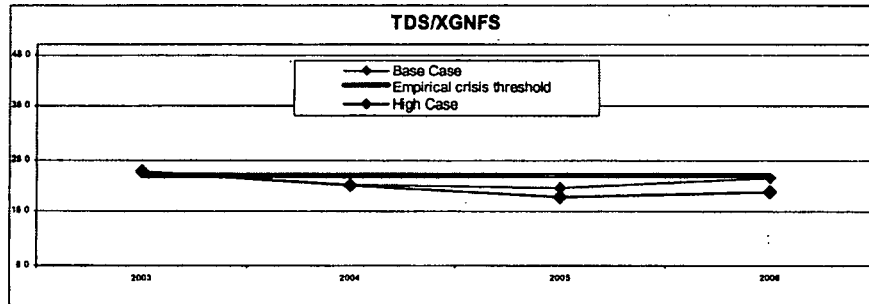
<b>Table 4: Uzbekistan - Debt Exposure Indicators (%), 2003-2006</b>				
<b>Indicators</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
<b>TDS/XGNFS</b>				
Base Case	25.8	23.1	22.5	24.5
Empirical crisis threshold	25.0	25.0	25.0	25.0
High Case	25.8	23.0	20.7	21.6
<b>TDS/REV</b>				
Base Case	42.5	34.7	30.6	33.1
Empirical crisis threshold	30.0	30.0	30.0	30.0
High Case	42.3	33.6	29.2	30.1
<b>DOD/GDP</b>				
Base Case	68.0	69.2	71.6	78.6
Maastricht criterion	60.0	60.0	60.0	60.0
High Case	68.6	67.7	70.7	72.4
<b>Notes:</b>				
TDS - total debt service payments				
XGNFS - exports of goods, services, income and workers remittances				
DOD - debt outstanding and disbursed				

Chart 1: Uzbekistan - Exchange Rate Unification



OFFI – Official exchange rate  
 CURB – Curb market exchange rate  
 COMM – Commercial exchange rate  
 EBBY – Exchange Bureau buying rate  
 EBSL – Exchange Bureau selling rate  
 AALL – Aggregate Average exchange rate

**Chart 2: Uzbekistan - Debt Exposure Indicators, 2003-2006  
(Base & High Case Scenarios)**











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