2 Dynamic Analysis of Public and External Debt Sustainability[*]

Ante Babić[**]
Ivo Krznar[***]
Danijel Nestić[****] and
Sandra Švaljek[*****]

Abstract

This study builds the framework for the analysis of external and public debt sustainability aimed at providing an objective assessment of the outstanding debt stock and forecasting its evolution over time. The analysis incorporates projections of key macroeconomic variables and projections of debt developments as well as analysis of sensitivity of the projected debt ratio to various macroeconomic shocks. The results of sensitivity analysis can then be used to make qualitative judgements on debt sustainability and to recognize major risks.

Key words: public debt, external debt, sustainability analysis
JEL classification: E60, F34, H60, H63

1   Methodology

The framework for analysis of external and public debt sustainability prepared in this research is meant to provide an objective assessment of the outstanding debt stock and its evolution over time. The analysis proceeds in three steps. The first step involves projections of key macroeconomic variables and projections of debt developments. The second step is an examination of the sensitivity of projected debt development to various macroeconomic shocks. These results are then used in the third step to make qualitative judgments on debt sustainability and to recognize the major risks involved in borrowing.[1]

It should be underlined at the outset that this approach does not explicitly determine the threshold at which debt becomes unsustainable, rather it provides a series of indicators, information and implications for alternative scenarios which may form the basis for a professional assessment of whether and under which conditions a given situation and tendencies are sustainable. In this manner, a large number of elements vital to assessment of sustainability are placed within a consistent, common framework which, we believe, may assist in quality political and economic decision-making.

1.1   Framework for Analysis of Public and External Debt Sustainability – Common Elements

The basic framework for analysis is based on an approach applied by the International Monetary Fund in its most recent work (IMF, 2002). The framework consists of two separate sets of tables – one set pertains to analysis of *public* debt sustainability, while the other pertains to testing *external debt* sustainability. Although separate, these two frameworks are similar and contain many common elements. Both sets of tables contain two analytical blocks. The first articulates the baseline medium-term projection, with the assumptions and implications clearly

---

[1] *The IMF (2002, p. 4.) defines sustainability as a situation in which a borrower is expected to be able to continue servicing its debts without an unrealistically large future correction to the balance of income and expenditure. Such a definition may apply to both public and external debt. It also clearly indicates the time-dimension of the problem, so it follows that projections of future developments will play a considerable role in assessments of sustainability.*

laid out. The second block consists of a set of sensitivity tests around the medium-term projection, examining the implications of alternative assumptions about economic policy variables, macroeconomic developments and costs of financing.

Although the sustainability of *public* debt and the sustainability of *external debt* are generally interrelated, the links between them are not explicitly modelled in this analytical framework. The coordinated development of baseline projections represents an attempt to secure consistency of the sustainability assessment of both debt categories. Therefore, both sets of tables employ identical, or rather mutually consistent input data, which encompass past trends for the relevant variables and projections of their future development.

Our research is primarily concentrated on the development of a framework to test the impact of a number of various risks tied to the baseline projection (second block), while the framework for the overall medium-term projection (first block) was not formally modelled. The projections so far prepared are based on a framework similar to financial programming with the as-yet not firmly linked blocks. The formal development of medium-term projections is a relatively complex task that surpasses the scope of this research.

Analysis of sustainability is based on the central medium-term projection, which is in turn based on assumptions that we believe reflect possible developments. The "reality" of assumptions in this case is indicated by a) professional judgment of the most likely scenario for future developments, and b) absence of assumptions on activation of drastic measures that are normally implemented when a crisis already emerges. A summary of assumptions and results of the central projection for basic macroeconomic variables, the balance of payments and fiscal developments, is given in the following section.

The input data used to analyze stability pertain to past developments and the central medium-term projection for approximately 15 relevant variables. In the proposed analytical framework, these data are automatically transferred by the system of links and equations into specific number of debt indicators (debt/GDP, debt/revenues (exports)), or into basic trends that can generate/reduce the debt (deficit, exchange rate fluctuations, interest rates, growth rates). The decomposition of debt dynamics is meant to show the basic causes of change in the debt level and

vital information on the nature of debt dynamics already at this level. Debt indicators and decomposition of debt dynamics are computed for approximately ten different scenarios.

The first (baseline) scenario pertains to the central medium-term projection and its implications. The feasibility of the medium-term projection will be under the influence of numerous risks, and a consideration of the implications of alternative scenarios represents an attempt to quantify their impact. Such scenarios encompass, for example, baseline variable trends at the level of historical averages, significant interest rate hikes, unexpected downturns in GDP growth, etc.

Alternative scenarios therefore constitute sensitivity tests for the baseline scenario. Besides the status quo scenario and the historical average scenario, the other scenarios assume the occurrence of certain shocks, i.e. short-term adverse developments, for certain key variables. Thus it is assumed that the shocks last for two years (specifically, 2004 and 2005), or that it is a single one-time shock (e.g. depreciation in 2004), where after variables move in the direction foreseen by the baseline scenario. Shocks have a size of one to three standard deviations in relation to the historical average.[2] The period to which the historical average refers is 1997 to 2002.

A qualitative sustainability assessment is made on the basis of the debt size and dynamics in the baseline and alternative scenarios. Namely, the sustainability assessment is deemed probabilistic and professional judgements play a key role therein.

The quality of sustainability projections and analyses largely depends on the reliability of statistical input. Unfortunately, in Croatia a problem is the lack of more extensive data which would be comparable within each series, but also consistent with data from other temporal series, and which could serve as the basis for higher quality forecasts of future developments. For example, it required

---

[2] *The IMF (2002) explains the reasons for selecting precisely these sensitivity tests by the probability of occurrence of shocks greater than expected, even as attempts are made to keep this probability at a low level. Thus, for transition countries, it has been estimated that the probability of individual shocks larger than two standard deviations for, e.g., growth in GDP, interest rates, GDP deflator or balance of payments when assessing the sustainability of external debt ranges between 0 and 3 percent.*

considerable effort to reconstruct comparable data on receipts and outlays at the general government level from 1997 to 2002. However, even when this series of data is gathered, it is not comparable to data on public debt, which pertains to the consolidated central government (data on consolidated general government public debt have only existed since the end of 2002). Similarly, some data are simply lacking, such as the maturity of debt at the general government level. The research has also demonstrated the need for the coordination of data between the Ministry of Finance, the Croatian National Bank (CNB) and the Central Bureau of Statistics (CBS). For example, data on the balance of payments are revised relatively often, wherein data on imports and exports of goods and services are revised, but these revisions are only entered into the statistics of the CBS's national accounts and quarterly gross domestic product estimates with considerable delays.

What follows is a more detailed description of the sustainability analysis framework, first for public debt, followed by external debt.

1.2 Assessment of Public Debt Sustainability

The framework for analyzing public debt sustainability in Croatia consists of:

 I - Baseline medium-term projections of public debt (including key macroeconomic and fiscal assumptions for projections and decomposition of public debt dynamics) and
 II - Sensitivity tests for the public debt ratio.

Baseline medium-term projection

The baseline medium-term projection of public debt must secure the following input for sustainability analysis:

- public debt,
- consolidated general government deficit,
- consolidated general government expenditures,
- consolidated general government interest payments,

- total consolidated general government revenues and grants,
- nominal GDP,
- retail price index,
- HRK/€ exchange rate, end of period,
- HRK/€ exchange rate, period average,
- GDP deflator,
- foreign-currency denominated public debt,
- privatization revenues,
- recognized implicit or explicit general government contingent liabilities,
- amortization on medium- and long-term public debt, and
- short-term public debt.

These variables were incorporated into the analysis of public debt sustainability in Croatia. It is apparent that the fiscal variables used here cover the general government level (except for debt pertaining to the consolidated central government). Consideration of the general government ensues from efforts to cover the broadest possible extent of the government in the analysis. Unfortunately, it is relatively difficult to find a consistent series of data at this level. This is why we used the results of our own consolidation of data for general government revenues, expenditures and deficit. Once official data become available, they will have to be incorporated and the analysis repeated. For now, we had no reliable series for medium- and long-term public debt servicing at the general government level, nor recognized contingent liabilities, so that these variables were not included in the analysis.

Fiscal data are shown based on the cash principle, because a far larger set of original data is available using this principle. Although we considered what would be an appropriate way to include accrued expenses in public debt, for now we have forgone such efforts.[3]

Guarantees were not included in this variant of work on public debt. Our assessment is that consideration of public debt without guarantees is

---

[3] *It should be noted that this decision will have a palpable impact on computed deficit and debt dynamics due to the size of such liabilities. A Ministry of Finance estimate shows that in 1999, for example, there were approximately HRK 7.7 billion in accrued expenses, which was 5.4 percent of GDP.*

methodologically more correct because they are *de facto* not a component of debt, they can only contingently become so. If we want to conduct an analysis by applying the full amount of public debt, including guarantees, it would be correct to include only that portion of guarantees that actually became public debt into the measure of public debt. In similar fashion, a projection of public debt should also contain a projection of guarantees, formed on the basis of the likelihood of activation of issued guarantees. However, the available data on guarantees are insufficient for an estimate of the likelihood of their activation. We believe an additional reason for excluding guarantees from measurement of public debt is the fact that data on issued guarantees have only been available since 1998. If data on activated government guarantees were available, then these paid-out sums could be incorporated into recognized contingent liabilities in the sustainability analysis.

The amount of public debt denominated in foreign currency was obtained as the sum of foreign public debt and the share of foreign-currency denominated domestic public debt. A part of domestic debt denominated in foreign currency was obtained by adding the value of frozen foreign currency deposits and the value of issues of almost all bonds on the domestic market, because they are denominated in foreign-currency. This entailed DAB (Deposit Insurance and Bank Rehabilitation Agency) deposit insurance bonds, HZZO (Croatian Health Insurance Institute) bonds, series 01, 02 and 03 bonds, series JDA and JDB bonds, big bonds, reconstruction bonds, and series I, II, V-A, V-B and VI bank rehabilitation bonds. Series III and IV bank rehabilitation bonds were not included, pursuant to information from the Annual Statements of the Ministry of Finance for 1994–1997 (Ministry of Finance, 1998).

The series of data used to describe prior developments covers the 1997-2002 period, while projections were drafted for the 2003-2007 period. It is difficult to obtain comparable data for most of the necessary variables for the period prior to 1997, which is why this year was selected to commence the series. A projection period of five years seemed reasonable to make a realistic forecast. Since expectations are that Croatia may become a member of the European Union by 2007/2008, entirely different circumstances to consider public debt would apply for subsequent years. Five year projections comply with the practices employed by the IMF for the transition countries of Central Europe.

The prepared analysis framework automatically transforms input data into a larger set of information on debt dynamics in compliance with predetermined scenarios. In each scenario, the percentage of public debt in GDP is computed, while the annual change in public debt is decomposed into the flows that created it.

Changes in the share of public debt have been decomposed into four basic flows that created it:

a)   primary deficit,
b)   automatic debt dynamics,
c)   other identified flows, and
d)   residual (unidentified flows).

It is self-evident that the primary deficit (the difference between revenues and primary expenditures (expenditures without interest payments)) leads to increased debt. With reference to automatic debt dynamics, change in the share of debt in GDP can emerge due to changes that occur outside of the fiscal sphere. Thus the share of public debt in GDP changes due to changes in real interest rates, real GDP growth rates and exchange rate depreciation. Other identified flows of debt generation/reduction include privatization revenues (which reduce the need for borrowing) and recognized implicit or explicit contingent liabilities (which increase debt). If real debt change cannot be explained by the dynamics of these identified flows, a residual appears which can be relatively large in individual years (in our case up to 10 percent of GDP). These are obviously unidentified debt creation flows that can be deemed a statistical error[4] or an oversight in records-keeping on debt and debt creation flows.

Sensitivity analysis for public debt as a share of GDP

The sustainability assessment of public debt involves an examination of eleven different scenarios for future developments:

---

[4] *Statistical errors are particularly customary when monitoring the changes in the ratio between stock and flow variables, and they emerge due to changes in estimated value of stocks. These changes in estimated value of stocks can be caused by changes in the value of fixed assets (due to depreciation, revaluation, etc.) or by the impact of changes in the structure of foreign currencies in which individual components of stocks are expressed and by the impact of changes in the exchange rates of these currencies on the value of stock variables expressed in a single currency.*

1) baseline (central) projection,
2) historical average scenario,
3) status quo scenario,
4) "5 percent" scenario,
5) interest rate shock scenario,
6) GDP growth shock scenario,
7) public expenditure shock scenario,
8) revenue shock scenario,
9) combined shock scenario,
10) depreciation shock scenario, and
11) contingent liability shock scenario.

The baseline scenario is based on developments in compliance with the central medium-term projection for the 2003-2007 period. The assumptions and results of this projection are provided in the next section.

The historical average scenario assumes that the real GDP growth rate, real interest rates and primary balance are maintained at the level of the average for the 1997-2002 period, while the development of other variables is taken from the baseline projection.

Under the status quo scenario, real interest rates and revenue and expenditure (without interest) ratios of the general government during 2004-2007 are maintained at the level projected for 2003 in the baseline scenario, while the remaining developments are taken from the central projection.

The "5 percent" scenario foresees a general government deficit (defined as the difference between total revenues and total expenditures, with privatization revenues "under the line") of 5 percent of GDP during the 2004-2007 period, while developments from the baseline scenario are assumed for other variables.

The interest rate shock scenario assumes that in 2004 and 2005 the real interest rate compounded on the public debt will acquire a value equal to the historical average (1997-2002) increased by three standard deviations computed on the basis of historical developments. In 2006 and 2007, the real interest rate returns to the

level foreseen by the baseline projection. All other variables adhere to the baseline projection.

The growth shock scenario assumes that in 2004 and 2005 the real GDP growth rate will be less than the historical average by two standard deviations, while thereafter the growth rate returns to the value foreseen by the baseline projection.[5] All other variables adhere to the baseline projection.

The public expenditure shock scenario encompasses unexpected increases in general government outlays in 2004 and 2005, whereby the primary balance assumes the value of the historical average minus two standard deviations.[6] In the remaining years, public expenditures and the primary balance return to the level foreseen by the baseline projection. All other key variables adhere to the baseline projection.

The revenue shock scenario assumes that in two consecutive years, 2003 and 2004, the share of general government revenues in GDP falls by two standard deviations in relation to the historical average, and thereafter returns to the value foreseen by the baseline projection. All other variables in this scenario adhere to the baseline projection.

The combined shock scenario assumes that in 2004 and 2005 there are negative growth and primary balance shocks by one standard deviation (instead of two standard deviations as in individual shocks), and the real interest rate shock of two standard deviations (instead of three as in individual shocks), while in other years these variables adhere to developments foreseen by the baseline projection. All other variables remain unchanged in relation to the baseline projection.

The depreciation shock scenario foresees a one-off real depreciation in the HRK/€ exchange rate of 30 percent in 2004, while in the following years the exchange rate

---

[5] *The average growth rate in 1997-2002 was 3.4 percent with a standard deviation of 2.6 percentage points. This means that the growth shock scenario assumes that in 2004 and 2005 the growth was negative, at -1.8 percent (historical average minus two standard deviations).*

[6] *In our case this means a primary deficit in an amount of 3.5 percent of GDP.*

would be the same as in the baseline projection.[7] All other variables adhere to the baseline projection.

Contingent liability shock leads to a momentary debt increase of 10 percent of GDP in 2004 (in relation to the size of the debt foreseen by the baseline scenario). Such a surprising increase in debt may occur due to recognition of certain implicit contingent liabilities (e.g. public and private company debts to maintain employment levels) and their transformation into debt. After the one-off increase in debt level, it is assumed that it will thereafter adhere to the dynamics specified by the variables from the baseline scenario.

The baseline projection scenario can be deemed the core scenario for all of the other scenarios cited above, i.e. the remaining scenarios can be seen as modifications of the baseline projection scenario. Thus, the development of the public debt share in GDP can be observed in all other scenarios and compared to the developments foreseen by the baseline scenario. Debt creation flows are also clearly shown for each scenario within the analytical framework. A comparison of the results of various scenarios is used to assess the sustainability of public debt in the observed time horizon. The sensitivity of the baseline projection to selected shocks indicates the primary risks surrounding debt sustainability.

The results of the sensitivity analysis crucially depend on the baseline projection. If it is excessively optimistic, even the foreseen shocks may not succeed in indicating the actual risks. If it is too pessimistic, the sustainability assessment may exaggerate the problems and result in economic and political actions that are actually unnecessary. This is why it is beneficial to once more stress that the presented framework for analyzing sustainability demands the most "realistic" possible baseline projection. This can only be achieved by developing forecasting methods.

---

[7] *Although at first glance this seems to be an unrealistically drastic shock, it is worthwhile to remember that moderate exchange rate corrections (devaluation of 10-15 percent) often provoke powerful responses by the market whereby the exchange rate very quickly "slides" considerably more than would be required under stable conditions to resolve the initial imbalance (overshooting effect). This is why a shock in the form of a 30 percent devaluation is an analytically relevant test.*

1.3 Assessment of External Debt Sustainability

The framework for analyzing external debt sustainability consists of:

I - The baseline medium-term projection of external debt (including key assumptions for projections and decomposition of external debt dynamics)

II - Sensitivity tests for the share of external debt in GDP.

Baseline medium-term projection of external debt

The baseline medium-term projection of external debt must secure the following input for sustainability analysis:

- external debt,
- current account deficit,
- deficit in balance of goods and services,
- exports of goods and services,
- imports of goods and services,
- net foreign direct investment, equity,
- net portfolio investment, equity,
- nominal GDP (in HRK),
- retail price index, year-on-year, end period,
- exchange rate, HRK/US$, end of period,
- exchange rate, HRK/US$, period average,
- GDP deflator,
- external interest rate,
- amortization on medium- and long-term external debt, and
- short-term external debt.

All input data pertaining to the balance of payments and external debt are expressed in US dollars. The variant presented incorporates data based on the balance released as at 15 September 2003. So far we have not had a reliable series of medium- and long-term external debt servicing, so this variable was not encompassed by the analysis.

The series of data that describe prior developments encompasses the 1997-2002 period, while projections were made for the 2003-2007 period. This choice appears reasonable from the standpoint of availability of reliable data and the possibility of a "realistic" projection.

Using the prepared input data, external debt indicators were computed for the baseline scenario and for several alternative scenarios that modify specific components of the baseline scenario. The share of external debt in GDP is computed for each variant as the key indicator, while the annual change in debt is decompressed to the flows that generated it.

Flows that lead to changes in external debt have been classified into four categories:

a)   current account deficit, without interest payment,
b)   net equity inflow,
c)   automatic debt dynamics, and
d)   residual (unidentified flows).

All flows are expressed in terms of GDP.

By definition, the current account deficit (excluding interest payments) leads to growth in external debt. The most important flow leading to current account deficits/surpluses is generally the balance of international exchange in goods and services, i.e. the difference between goods and service exports and imports.

Net equity inflow implies net foreign direct equity investment and net equity portfolio investment which, if positive, reduce the need for foreign borrowing. In transition countries this can be a very important "levelling" flow for the current account deficit and other debt generating flows.

Automatic debt dynamics involves an examination of the contribution of changes in nominal interest rates, price and exchange rate changes and GDP growth rates to total changes in the share of external debt in GDP. Interest rate growth in itself leads to increases in the share of external debt in GDP, while GDP growth leads to its reductions. Exchange rate depreciation will increase the share of debt in GDP,

while appreciation will lower it. The mutual relationship between these three factors will have an impact on automatic debt dynamics expressed relative to GDP.

The residual is equal to the difference between actual registered changes in debt and identified debt creation flows. The residual represents unidentified debt creation flows, i.e. the statistical difference between data on total debt and data on basic debt creation flows.[8] Since this residual is relatively large for Croatian external debt data, this indicates the need to refine the statistical base for monitoring debt and the flows that generate it.

Sensitivity analysis for external debt as a share of GDP

Assessment of external debt sustainability examines eight future development scenarios:

1) baseline (central) projection scenario,
2) historical average scenario,
3) interest rate shock scenario,
4) GDP growth shock scenario,
5) GDP deflator shock scenario,
6) current account deficit shock scenario,
7) combined shock scenario, and
8) depreciation shock scenario.

The baseline projection scenario assumes development of key macroeconomic variables in line with the central medium-term projection for 2003-2007.

The historical average scenario assumes that the real GDP growth rate, nominal interest rate, GDP deflator (in US$), current account deficit (without interest payment) and equity inflow during the 2004-2007 period will assume the value of the historical average (average of their values in the 1997-2002 period).

---

[8] *Here the currency structure of external debt (development of the relationships between the currencies in which external debt is denominated) exerts a crucial impact on the residual level.*

Under the interest rate shock scenario, the basic projection is modified so that the nominal interest rate on external debt in 2004 and 2005 assumes the average value for the 1997-2002 period increased by three standard deviations. After this it returns to the level foreseen by the baseline projection.

Under the GDP growth shock scenario, the impact of a sudden drop in economic activity is tested, wherein real GDP growth is assumed for 2004 and 2005 which is two standard deviations smaller than the historical average.[9] The growth rate thereafter returns to the value foreseen by the baseline projection. The remaining variables adhere to developments foreseen by the baseline projection for the duration of the period.

Under the GDP dollar deflator scenario, it is assumed that the change in the deflator in 2004 and 2005 equals the historical average for 1997-2003 minus two standard deviations.[10] The remaining variables crucial to the projection are taken from the baseline medium-term projection. After a two-year shock, the GDP dollar deflator continues to change in line with the baseline projection rates. The deflator shock encapsulates the impact of exchange rate and inflation rate changes on development of external debt share in GDP.

Under the balance of payments current account shock scenario, the baseline projection is altered such that the current account balance (excluding interest payments) in 2004 and 2005 is foreseen at the historical average level for 1997-2002 minus two standard deviations.[11] After a period marked by a worsening balance, in 2006 and 2007 the balance returns to the level foreseen by the baseline medium-term projection.

---

[9] *Specifically, this means negative growth of -1.8 percent.*

[10] *The gross domestic product deflator denominated in US dollars is computed as the ratio between nominal GDP in US dollars (obtained by dividing nominal GDP in HRK by the current US$ exchange rate) and real GDP in US dollars (obtained by dividing GDP in fixed 1997 prices with the US$ exchange rate for 1997). GDP deflator shock specifically represents a situation in which nominal GDP denominated in current US dollars declines by 16.1 percent in 2004 and by the same percentage in 2005. This is a relatively powerful shock that considerably increases the share of external debt in GDP.*

[11] *This results in a balance of payments current account deficit (excluding interest payments) of 8.3 percent of GDP in 2004 and 2005.*

Simultaneous disorders as specified in scenarios 3-6 (concurrent interest rate, growth, GDP deflator and current account deficit shocks) are assumed under the combined shock scenario, but with an intensity of one standard deviation, and two standard deviations for interest rates. The remaining variables remain unchanged in relation to the baseline projection.

The depreciation shock scenario foresees a one-off real depreciation of the Croatian kuna in relation to the US dollar of 30 percent in 2004, while in the remaining years exchange rate changes would be the same as in the baseline projection.[12] All other key variables comply with the baseline projection.

In each of these eight scenarios, the share of external debt in GDP is computed as the key indicator. The principal comparison pertains to consideration of debt developments in the baseline scenario and in various "shock" scenarios. Such a comparison can be used to evaluate the sensitivity of results obtained by the baseline projection to various risks. Debt-generating flows are also computed for each scenario. A comparison of the results of different scenarios leads to an evaluation of external debt sustainability and points to developments to which the size of the external debt is particularly sensitive.

2   Projections

The central medium-term projections for the needs of both analytical frameworks (analysis of public and external debt) ensue from a consolidated set of key macroeconomic variable projections: gross domestic product and its components, prices and exchange rates. Both analytical frameworks are thus linked via the consolidated medium-term projection. It ought to be pointed out that the assumptions upon which the formulation of the projections for these variables are based on the common expectation of Croatia's accession to the European Union in 2007/2008.

---

[12] *In this case, as in the analysis of public debt sustainability, the note on the "reality" of assumptions on depreciation of 30 percent is valid due to the over-sensitivity of the market (overshooting effect).*

Gross domestic product

Projections of gross domestic product and its components are based on the following assumptions:

- **real GDP growth at a rate of 4.5 percent annually in 2003-2007.** Such growth is expected on the basis of the current economic activity developments, and on the basis of the current world economy and European transition country growth projections released by several leading international institutions (Consensus Economics, EBRD, William Davidson Institute, World Bank). Although relatively modest growth is expected in European Union member states, the more developed recently-acceded countries may grow somewhat more rapidly (3-4 percent) due to the impact of convergence, while the less developed transition countries and candidate countries (Romania, Bulgaria) could experience even higher growth rates (4-5 percent). In our view, this is also a relevant value for Croatia. Furthermore, the Government, Ministry of Finance and domestic analysts cite a similar or the same growth rate in their own reports.

- **maintaining the share of personal consumption in GDP at 59 percent.** This assumption is based on the belief that the share of personal consumption will remain at approximately the average for the last four years (1999-2002) which was 59 percent. Such developments reflect a situation in which export and investments are expected to be the drivers of GDP growth, while personal consumption would provide a stable base for it. The share stability pertains to the GDP structure expressed in current prices. Since the personal consumption deflator is expected to be lower (approximately 2 percent) than the GDP deflator (3 percent) in the projected period, this means that growth in personal consumption in constant prices will actually be greater than GDP growth in constant prices. Furthermore, this means that the share of personal consumption in GDP expressed in constant prices will gradually grow.

- **stable share of public spending of approximately 20.5 percent of GDP in 2003-2007.** Due to the stagnation of real public spending since 2000, its share in GDP is gradually falling. In 2003 a share of 20.5 percent of GDP is

expected. Since the public spending deflator during 2003-2007 is expected to be greater than the GDP deflator and amount to approximately 4 percent annually, a stable share in current prices means a decline in the share in constant prices. This is why the real growth in public spending would be smaller than the GDP growth, and should total an average of 3.5 percent annually. This should meet the State's increased demand for goods and services as a part of preparations for accession to the European Union and the need to enhance the qualification structure of civil servants and public officials.

- **constant investment share during 2003-2005, and gradual reduction of this share thereafter.** After a period of marked investment growth spurred by government investment, the share of investments in GDP in 2004 and 2005 should remain at a level of approximately 28.2 percent, which is what it is expected to reach in 2003. In 2006 and 2007, its share should fall to approximately 27.5 or 27 percent. Reduction of this share is a result of expectations that intense road construction will be completed.

- **enhanced exports of goods and services.** Relatively high investments will lead to increased export potential and growth in the share of exports in GDP from 46 percent in 2002 to 50 percent in 2007. In other words, annual growth in goods and services exports is expected to be 8 percent based on a stable HRK/€ exchange rate, or slightly more, if growth is expressed in current prices due to the expected slight exchange rate depreciation.

- **goods and service export growth higher than GDP growth up to 2005, followed by stabilization at a rate roughly the same as overall economic growth.** In a period of high investment, accelerated growth and relatively vigorous overall economic activity, which is foreseen for the coming years, exports will certainly grow considerably. Its share in GDP could grow from 54.8 percent in 2002 to 56-57 percent in 2005, after which this percentage is expected to stabilize, primarily due to a slowdown in investment growth.

Prices and exchange rates

Projections of price and exchange rate trends from 2003 to 2007 are based on the following assumptions:

- **GDP deflator change rate of 3 percent annually during 2003-2007 period,** which is what it was in the last two years. The assumption is that inflation pressure on the domestic market will be relatively weak, while import inflation, given the expected HRK exchange rate trends, should not create any significant pressure.

- **stable real HRK/€ exchange rate.** This means that the Croatian kuna should nominally depreciate by the amount of difference between the GDP deflator in Croatia and EMU member states. Since a GDP deflator change rate of 3 percent is expected in Croatia, and a rate of 2.4 percent is expected in the EMU (which is also the historical average over several years), nominal depreciation of the HRK/€ exchange rate should be approximately 0.6 percent annually.

- **stable real €/US$ exchange rate during the 2004-2007 period,** wherein it would remain at a level of approximately US$1.14/€1 on average. Such expectations comply with the forecast US$/€ exchange rate trends released in autumn 2003 by Consensus Forecast
(source: http://www.consensuseconomics.com/). In 2003, the average exchange rate is expected to be US$1.12/€1.

Based on these assumptions regarding developments in gross domestic product and its components, and prices and exchange rates, values of individual variables in the period from 2003 to 2007 have been projected. Actual values for 1997-2002 and the values obtained for the 2003-2007 projections are shown in Table 1.

Table 1. **Gross domestic product and its components, prices and exchange rate**

	1997	1998	1999	2000	2001	2002	2003p	2004p	2005p	2006p	2007p
GDP; in HRK mil., current prices											
1 Gross domestic product	123,811	137,604	141,579	152,519	162,909	176,429	190,808	205,376	221,057	237,934	256,101
2 Personal consumption	77,028	81,067	81,545	89,637	97,768	106,027	112,577	121,172	130,423	140,381	151,099
3 Government consumption	34,078	33,048	32,621	30,860	35,685	47,734	53,808	57,916	62,338	65,432	69,147
4 Investments	32,183	36,642	39,341	39,816	38,496	38,280	39,116	42,102	45,317	48,777	52,501
5 Exports of goods and services	50,873	54,546	57,920	71,899	80,015	81,136	91,093	98,971	107,530	116,829	126,932
6 Imports of goods and services	70,351	67,700	69,848	79,693	89,056	96,748	105,785	114,785	124,551	133,484	143,579
7 Real GDP (% change)	6.8	2.5	-0.9	2.9	3.8	5.2	5.0	4.5	4,5	4.5	4.5
Prices and exchange rate											
8 GDP deflator (%)	7.4	8.4	3.8	4.7	3.0	2.9	3.0	3.0	3.0	3.0	3.0
9 HRK/US$ exchange rate, mid-period	6.157	6.362	7.112	8.277	8.339	7.864	6.750	6.671	6.711	6.752	6.792
10 HRK/€ exchange rate, mid-period	6.960	7.137	7.580	7.635	7.469	7.407	7.560	7.605	7.651	7.697	7.743
11 US$/€ exchange rate, mid-period	1.130	1.122	1.066	0.922	0.8960	0.942	1.120	1.140	1.140	1.140	1.140

Note: p – authors' projection.
Source of data: Croatian Bureau of Statistics, Croatian National Bank and authors' projections

Dynamic Analysis of Public and External Debt Sustainability

**Consolidated general government revenues
and expenditures, and public debt**

Consolidated general government revenue and expenditure projections and public debt projections are based on specific general assumptions, and on individual assumptions for each individual component of general government budget revenues and expenditures.

The general assumptions are as follows:

- **gradual reduction of the general government deficit and achievement of the target deficit level of approximately 3 percent of GDP in 2007.** This assumption is based on the long-term fiscal policy orientation and Croatia's efforts to meet the Maastricht convergence criteria by 2007, and possible year of its accession to the European Union (even though this is not explicitly sought from candidates for European Union membership).

- **deficit reduction will be based on a decline in the share of government outlays accompanied by an unaltered share of public spending in GDP, and a slight drop in general government revenues in GDP.**

- **in the period leading to 2007 there will be no major changes in the tax system.**

Assumptions associated with other projection elements are shown in Box 1.

Actual values and projection values for general government revenues and expenditures are shown in Table 2, while development of revenues, expenditures and the general government deficit, i.e. public debt, are shown in Figures 1 and 2.

Box 1. **Assumptions for projection of general government budgetary components**	
Projection element	**Assumption**
personal income tax	Personal income tax elasticity of 1.1 with respect to GDP has been assumed, and this should lead to a slight increase in the share of this tax in GDP. After several years of consecutive reduction of tax burden on income due to increased personal allowances and introduction of a series of tax incentives, the assumption is that in the period up to 2007 there will be no new changes made to the income tax system.
social security contributions	Elasticity of social security contributions of 0.8 with respect to GDP has been assumed, which ensues from the fact that the base for computation of social security contributions is still relatively narrow, and a large number of insured persons still compute their contributions on the minimum mandatory base which remains unchanged over a longer period. Based on this assumed elasticity of contributions, their share in GDP would fall from 12.5 percent in 2002 and 12.7 percent in 2003 to 12 percent in 2007.
corporate income tax	Corporate income tax elasticity is normally over one with respect to GDP. In this projection its assumed value is 1.25. Based on this assumed elasticity, the share of the corporate income tax in GDP from 2003 to 2007 will grow from 1.9 percent to 2.1 percent.
taxes on goods and services (VAT and excise taxes)	The elasticity of indirect taxes in Croatia over the preceding period was slightly higher than one, but it is assumed that over an extended period it will fall to 1. This assumption is based on the empirically proven rule of the unit income elasticity of excise taxes and on development of the implicit base of this tax in Croatia.
taxes on international trade	Due to preparations for the EU accession, continued adjustment of customs rates to those of the EU are expected, as well as the ensuing gradual reduction of the share of revenues from taxes on international trade in GDP from 1.2 percent in 2002 to 0.9 percent in 2007.
other tax and non-tax revenues	It is assumed that their share in GDP will remain unchanged throughout this period. This assumption is based on the fact that since 1999 the share of these revenues in GDP has generally not changed and it has been approximately 5 percent.
expenditures for goods and services	It is assumed that during the 2003–2004 period, i.e. during implementation of fiscal adjustments, their share in GDP will reach its lowest level since 1997 and total approximately 20 percent of GDP. From 2005 onward it is assumed that these expenditures will stagnate in GDP terms, i.e. that they will remain at approximately 20 percent of GDP. Here the share of salary expenditures in GDP will constantly be slightly above 10 percent, while the share of expenditures for other goods and services purchases will be slightly under 10 percent.

Dynamic Analysis of Public and External Debt Sustainability

interest payments	Interest payments have been projected on the basis of the assumption that there will be a decline in privatization revenues to finance the general government deficit, although net borrowing due to a declining deficit will remain between 2.5 percent and 3 percent of GDP. A rise in interest rates on the world market has been assumed, accompanied by a relatively low level of interest spread for Croatia (from 125 to 150 bp), which is why interest rates in Croatia would be 6 percent in 2004, 6.5 percent in 2005, and 7 percent in 2006 and 2007.
subsidies and other current transfers	A decline in the share of subsidies and other current transfers in GDP is expected, due to the somewhat slower growth of pensions in relation to GDP growth, and due to the impact of health-care and health insurance system reforms. Based on such expectations, the share of subsidies in GDP would decline from 2.7 percent in 2003 to 2.3 percent in 2007, while the share of transfers in GDP would decline from 16.5 percent in 2003 to 16.2 percent in 2007.
capital expenditures	After the 2002-2005 period, marked by intense public investment, a drop is expected in capital expenditures share in GDP of 0.5 percentage points in both 2006 and 2007.
privatization revenues	A further decline in privatization revenues is expected, i.e. 20 percent on a year-to-year basis. With such a declining trend in privatization revenues, their share in GDP would decline from 2.2 percent in 2003 to 0.7 percent in 2007.

Table 2. **Consolidated general government budget, 1997–2007, in % of GDP**

	1997	1998	1999	2000	2001	2002*	2003p**	2004p	2005p	2006p	2007p
Revenues and grants	**47.6**	**50.8**	**48.1**	**46.5**	**45.2**	**44.8**	**44.7**	**44.6**	**44.4**	**44.3**	**44.1**
Current revenues	47.6	50.8	48.1	46.5	45.2	44.8	44.7	44.6	44.4	44.3	44.1
Tax revenues	43.0	46.9	44.1	42.7	41.4	40.8	40.5	40.4	40.2	40.1	39.9
Personal income tax	5.4	5.9	5.3	4.9	4.3	3.9	3.7	3.7	3.8	3.8	3.8
Social security contributions	14.3	14.0	13.7	13.3	13.3	12.5	12.7	12.6	12.4	12.2	12.0
Corporate income tax	2.0	2.5	2.4	1.6	1.8	2.0	1.9	2.0	2.0	2.0	2.1
Taxes on real estate transactions	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Taxes on goods and services	16.7	20.5	18.7	19.6	19.2	20.6	20.4	20.4	20.4	20.4	20.4
Value-added tax	0.0	14.7	14.0	14.3	14.3	14.7	14.4	14.4	14.4	14.4	14.4
Excise tax	4.4	4.3	4.4	5.1	4.8	5.6	5.6	5.6	5.6	5.6	5.6
Other	12.3	1.5	0.3	0.2	0.1	0.3	0.4	0.4	0.4	0.4	0.4
Customs	3.7	3.0	3.0	2.5	2.0	1.2	1.1	1.1	1.0	1.0	0.9
Other	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Non-tax revenues	4.6	4.0	4.0	3.8	3.8	4.0	4.2	4.2	4.2	4.2	4.2
Capital revenues	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grants	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Dynamic Analysis of Public and External Debt Sustainability

Table 2. - continued

	1997	1998	1999	2000	2001	2002*	2003p**	2004p	2005p	2006p	2007p
Expenditures and net borrowings	**49.8**	**52.4**	**54.9**	**53.7**	**50.6**	**49.9**	**49.7**	**48.9**	**48.7**	**48.0**	**47.3**
Expenditures	49.3	51.5	53.8	52.9	49.8	49.1	48.7	48.1	47.9	47.2	46.5
Current expenditures	43.3	43.8	45.0	47.5	45.5	42.5	42.0	41.4	41.2	41.0	40.8
Expenditures for goods and services	23.2	24.5	24.1	25.1	22.1	21.3	20.1	20.0	20.0	20.0	20.0
Wages including employer contributions	11.0	11.7	12.6	12.7	11.5	11.0	10.3	10.3	10.3	10.3	10.3
Wages	11.0	11.7	12.6	12.7	11.5	11.0	10.3	10.3	10.3	10.3	10.3
Employer contributions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other purchases of goods and services	12.2	12.8	11.5	12.5	10.6	10.3	9.8	9.7	9.7	9.7	9.7
Interest payments	1.5	1.5	1.7	1.9	2.1	2.1	2.4	2.3	2.3	2.3	2.3
Subsidies and other current transfers	18.7	17.7	19.2	20.4	21.2	19.0	19.5	19.1	18.9	18.7	18.5
Subsidies	2.1	2.7	2.8	2.9	2.6	1.9	2.7	2.6	2.5	2.4	2.3
Current transfers	16.5	15.0	16.4	17.6	18.6	17.1	16.8	16.5	16.4	16.3	16.2
Capital expenditures	6.0	7.7	8.8	5.4	4.4	6.7	6.7	6.7	6.7	6.2	5.7
Lending minus repayments	0.5	0.9	1.1	0.8	0.8	0.8	1.0	0.8	0.8	0.8	0.8
General government budget balance	**-2.2**	**-1.6**	**-6.9**	**-7.2**	**-5.4**	**-5.1**	**-5.0**	**-4.3**	**-4.2**	**-3.7**	**-3.2**
Financing	**2.2**	**1.6**	**6.9**	**7.2**	**5.4**	**5.1**	**5.0**	**4.3**	**4.2**	**3.7**	**3.2**
Privatization receipts	1.0	2.0	4.9	2.5	3.7	1.8	2.3	1.7	1.2	0.9	0.7
Net borrowing	1.2	-0.4	2.0	4.8	1.7	3.3	2.8	2.6	3.0	2.8	2.5
Memo:											
Public debt as share of GDP	27.3	26.3	33.0	39.5	41.3	41.8	40.8	39.1	38.2	37.7	37.4

Source: Ministry of Finance of the Republic of Croatia, Croatian Bureau of Statistics, Croatian National Bank, authors' calculations and projections.

*Notes: *revenues and expenditures for 2002 computed with the data on local government budgets; **revenues and expenditures for 2003 computed on basis of data on central government budget, extra-budgetary funds and local government.*

Figure 1. **General government revenues, expenditures and deficit, in % of GDP**

in % of GDP

Revenues & grants   Expenditures & net lending   Balance

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

60 50 40 30 20 10 0 -10 -20
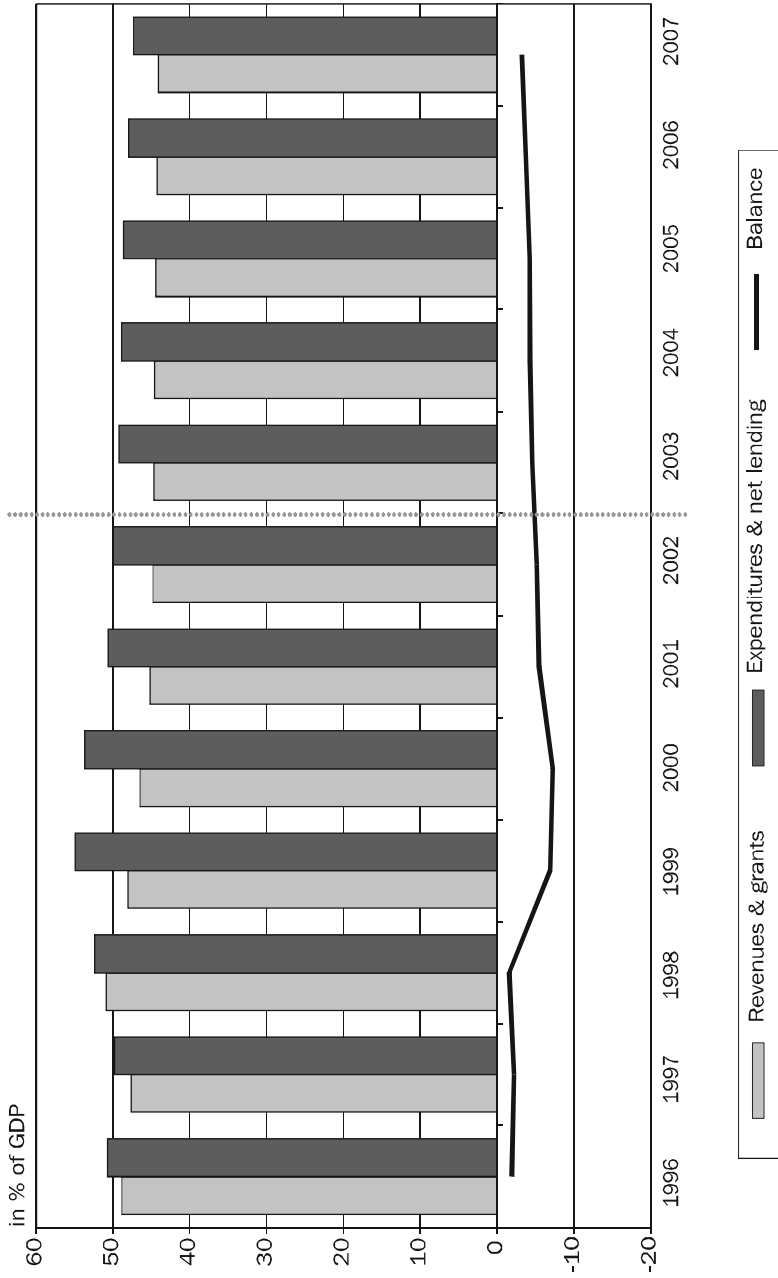
Source: Ministry of Finance, Croatian Bureau of Statistics, authors' computations and projections.

Dynamic Analysis of Public and External Debt Sustainability

Figure 2. **Current account deficit, current account deficit without interest, and goods and service balance deficit, in % of GDP**
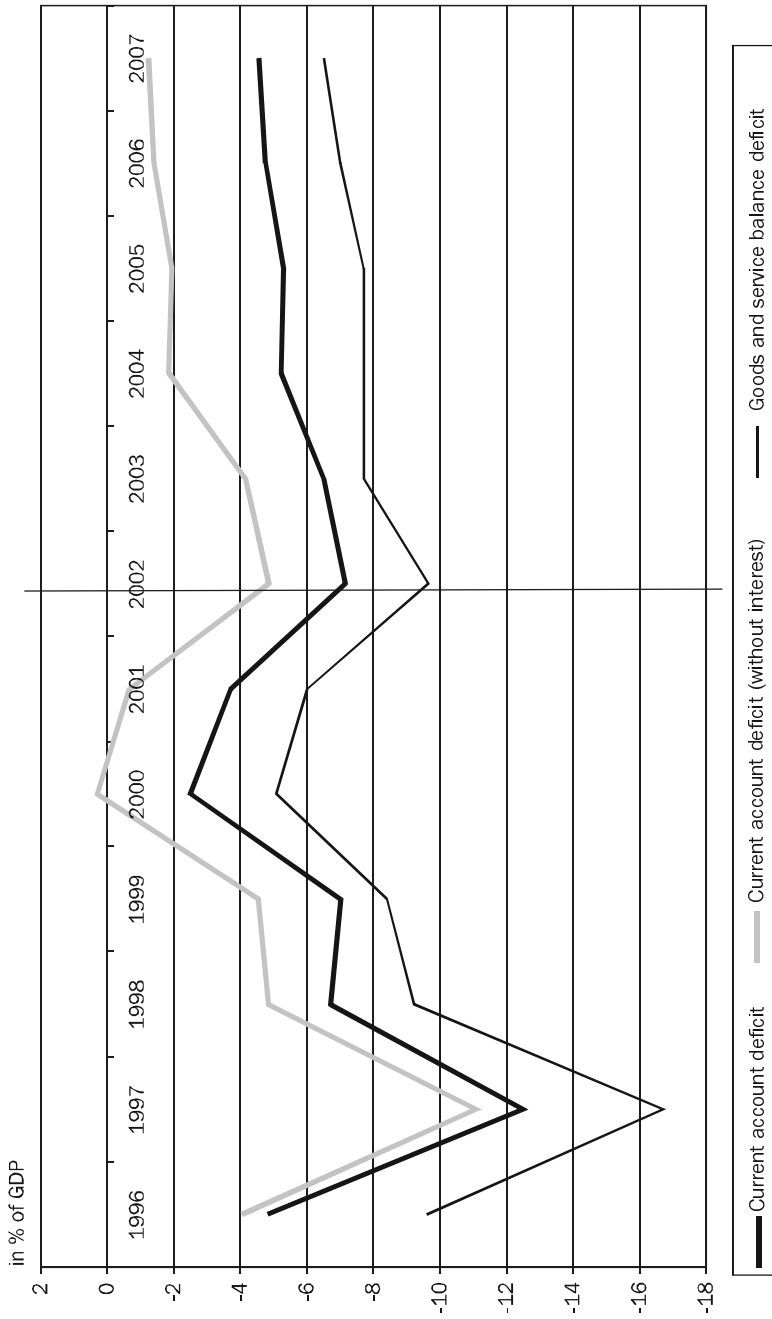
Balance of payments

The assumptions shown in Box 2 served as the basis for balance of payments projections in the 2003-2007 period.

Box 2. **Assumptions for projection of balance of payments components**	
Projection element	**Assumption**
exports of goods and services	Relatively high investments will lead in an increase in export potential, i.e. to an annual growth in goods and services exports of 8 percent at constant HRK/€ exchange rate. Herein the assumption is that the share of goods and services reached in 2003 will be retained, so exports of goods and services will thus grow by 8 percent at constant HRK/€ exchange rate. Goods exports have been projected based on the previous share in total goods and services exports, while the remaining share was allotted to services.
imports of goods and services	The share of imports in GDP over the preceding seven years was 53 percent on average with a growing tendency. It is assumed that this share will remain relatively high, but not exceed 54 percent for the duration up to 2007. Herein the assumption is that the share of goods and services reached in 2003 will be retained, so goods and services imports will thus proceed at an equal pace during the projection period. Goods imports have been projected based on the previous share in total goods and services imports, while the remaining share was allotted to services.
balance of income	The balance of income was less than US$500 million up to 2001, while in 2001 and 2002 it exceeded this amount. It can be assumed that from 2003 onward there will be increased servicing quotas for external debt due to increased external debt. Since this is the principal debit item on the Croatian income account, it is assumed that the deficit on the income balance will grow by approximately US$100 million annually and that in 2007 it will reach a level of US$1 billion.
balance of current transfers	The current transfer balance continually increased with the retirement of workers temporarily employed abroad, so we assume that this trend will continue until the final contingent of the "baby boom" generation retires, i.e. the final major contingent of workers employed abroad (which should be by 2010). Therefore, the current transfer balance is expected to grow from US$1.4 billion in 2003 to US$1.8 billion in 2007.

Dynamic Analysis of Public and External Debt Sustainability

current account balance	Due to the assumed developments in the balance of goods and services, income and current transfers, it is assumed that the current account balance will continue to show a deficit. Based on assumptions of import growths, this deficit of over US$1.8 billion in 2003 (or 6.5 percent of GDP) will fall between US$1.6 and 1.7 billion in the 2004-2007 period, which together with the assumed GDP growth in this period will lead to a fall in the deficit share in the balance of payment current account from approximately 5.3 percent in 2003 to approximately 4.6 percent in 2007.
capital and financial transactions	The large current account deficit will lead to further external debt growth, as privatization revenues from foreign direct investment are expected to "run dry." It is assumed that foreign direct investment of approximately US$700 million will fall to US$500 million in 2005 and stay at the level until the end of the projection period. It is assumed that the Government will issue US$750 million in bonds each year (US$500 million in Eurobonds and US$250 million in samurai bonds) to procure hard currency to service external debt. At the same time, we also assume that residents (primarily pension and investment funds) will begin to invest abroad, so that each year the net investment portfolio will decline by 50 million. Based on such trends, the net investment portfolio would fall from US$750 million in 2003 to US$550 million by the end of the projection period. As a result of these trends in the capital and financial account and together with the assumed expenditure of international reserves to cover the foreseen stable development of the Croatian kuna vis-à-vis the euro, other investments, which are the prime flow for external debt growth together with the credit balance in the portfolio investment, would increase (over and above the extraordinary US$2 billion in 2003) from approximately US$900 million in 2003 to approximately US$1.5 billion in 2007.

Balance of payments projections formulated on the basis of such assumptions with a view to development of individual balance of payments components enable forecasts of overall external debt. In the upcoming five-year period, therefore, cumulative overall external debt growth of approximately US$7 billion in relation to 2002 is expected.

Actual values and projection values for the balance of payments are shown in Table 3, while basic developments in the balance of payments are shown in Figure 2.

Table 3. **Balance of payments, 1997–2007, in US$ mil.**

	1997	1998	1999	2000	2001	2002	2003p	2004p	2005p	2006p	2007p
A. CURRENT TRANSACTIONS	-2,512	-1,453	-1,397	-459	-725	-1,606	-1,838	-1,608	-1,747	-1,676	-1,720
1 Goods and services	-3,359	-1,995	-1,673	-936	-1,174	-2,164	-2,177	-2,370	-2,536	-2,467	-2,451
1.1 Revenues	8,025	8,545	8,118	8,663	9,634	10,545	13,495	14,835	16,022	17,304	18,688
1.2 Expenditures	-11,384	-10,539	-9,791	-9,599	-10,809	-12,709	-15,672	-17,206	-18,558	-19,771	-21,139
2 Income	-22	-164	-356	-407	-516	-518	-1,076	-764	-834	-933	-1,060
3 Current transfers	869	706	632	883	966	1,076	1,414	1,526	1,623	1,724	1,791
B. CAPITAL AND FINANCIAL TRANSACTIONS	2,652	1,469	1,946	1,339	1,317	2,655	1,838	1,608	1,747	1,676	1,720
1 Capital transactions	22	19	25	21	133	443	21	20	20	20	20
2 Direct investments	347	835	1,420	1,085	1,407	466	550	700	500	500	500
3 Portfolio investments	577	15	532	708	601	-260	1,060	700	650	600	550
4 Other investments	2,134	752	347	108	490	2,702	2,085	905	1,361	1,412	1,544
5 Foreign currency reserves (CNB)	-428	-152	-378	-582	-1,313	-697	-1,878	-717	-784	-856	-894
C. NET ERRORS AND OVERSIGHTS	-140	-16	-549	-880	-592	-1,049	0	0	0	0	0
Memo:											
GDP (mil. US$, current prices)	20,109	21,628	19,906	18,427	19,536	22,436	28,268	30,785	32,937	35,241	37,705
Current account deficit /GDP (in %)	-12.5	-6.7	-7.0	-2.5	-3.7	-7.2	-6.5	-5.2	-5.3	-4.8	-4.6

Note: p – authors' projections
Source: Croatian National Bank, Croatian Bureau of Statistics and authors' projections

Dynamic Analysis of Public and External Debt Sustainability

3 Results of Sustainability Analysis

3.1 Results of Public Debt Sustainability Analysis

Public debt sustainability was analyzed using the described methodology. Input data for the period from 1997 to 2002 are the actual values of macroeconomic and fiscal variables, while the projections described in Section 2 are used for the period from 2003 to 2007. The key input data are shown in Table 4. The projections from Table 4 were the basis for the central medium-term projection, while pursuant to the previously explained methodology, the sensitivity of the public debt share in GDP is tested in the remaining scenarios with the assumption of shocks to selected key variables. Average values and standard deviations of historical values for key variables in the 1997-2002 period – provided in Table 5 – serve as the basis for calibrating these shocks.

Under the scenario that follows from the central medium-term projection and our baseline scenario, the share of public debt in GDP falls from 41.8 percent in 2002 to 37.2 percent at the end of 2007 (see Table 6). Such a fall in the debt ratio is primarily a result of the expected reduction of the general government deficit, and the relatively high rates of projected real GDP growth. Deficit levels that are lower in the projection period than the levels achieved in the past four years enable achievement of a relatively low negative primary budget balance in the baseline projection, which guarantees stabilization of the share of public debt in GDP. Figure 3 shows actual changes in the share of public debt in GDP in 2002 and the changes that would ensue afterwards in case of fulfilment of the assumptions upon which the central medium-term scenario is based.

The same Figure stresses the basic flows that generate changes in public debt and their contribution to changes in debt ratio in the baseline scenario. It is clear from the Figure that projections indicate a tempering of all flows that lead to changes in the public debt ratio in the future. Simultaneously, the assumptions that form the basis for the baseline medium-term projection implicate more intense flows that lead to reduction in the share of public debt in GDP (privatization revenues, differences between interest rates and economic growth rates) in relation to flows which may lead to its growth (depreciation of exchange rates and primary deficit).

Table 4. Key macroeconomic and fiscal assumptions for analysis of public debt sustainability

	1997	1998	1999	2000	2001	2002	2003p	2004p	2005p	2006p	2007p
Real GDP growth rate (in %)	6.8	2.5	-0.9	2.9	3.8	5.2	5.0	4.5	4.5	4.5	4.5
Average nominal interest on public debt	6.0	6.2	6.5	6.2	5.7	5.6	6.3	6.1	6.3	6.8	7.0
Average real interest rate (nominal rate less GDP deflator change, in %)	-1.4	-2.2	2.7	1.5	2.8	2.7	3.3	3.1	3.3	3.8	4.0
Nominal appreciation of domestic currency (HRK/€ exchange rate, in %)	-1.2	-5.2	-4.6	1.1	3.1	-1.0	-1.6	-0.6	-0.6	-0.6	-0.6
Inflation rate (GDP deflator, in %)	7.4	8.4	3.8	4.7	2.9	2.9	3.0	3.0	3.0	3.0	3.0
Growth of real primary spending (deflated by GDP deflator, in %)	4.1	7.9	3.8	0.0	-2.8	3.8	2.9	4.0	3.9	3.0	2.9

Source: Ministry of Finance of the Republic of Croatia, Croatian Bureau of Statistics, Croatian National Bank, authors' computations and projections.

Table 5. Historical values of key variables for public debt sustainability analysis, for 1997–2002 period

	Historical average	Standard deviation
Primary deficit (in % of GDP)	0.3	1.6
Real GDP growth rate (in %)	3.4	2.6
Nominal interest rate (in %)	6.0	0.4
Real interest rate (in %)	1.0	2.2
Inflation rate (GDP deflator, in %)	5.0	2.3
Public revenues in GDP (in %)	49.8	2.6

Source: Ministry of Finance of the Republic of Croatia, Croatian Bureau of Statistics, Croatian National Bank and authors' calculation.

Dynamic Analysis of Public and External Debt Sustainability

Table 6. **Central medium-term projection of developments in public debt as share of GDP, in % of GDP**

		Actual					Projection				
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1	**Public debt***	**27.3**	**26.3**	**33.0**	**39.5**	**41.3**	**41.8**	**40.8**	**39.1**	**38.2**	**37.7**	**37.2**
	in this: foreign-currency denominated debt	25.0	24.0	29.5	32.4	35.9	36.7	33.0	30.6	27.9	25.5	23.6
2	Change in public debt	-1.2	-1.0	6.7	6.5	1.8	0.5	-1.0	-1.7	-0.8	-0.5	-0.6
3	Identified debt-creating flows (4+7+12)	-3.1	-3.8	-2.5	-0.4	-5.5	-1.3	-2.5	-1.7	-0.8	-0.5	-0.6
4	Primary deficit	-0.3	-1.9	0.3	2.9	-0.4	1.2	-0.1	0.3	0.7	0.5	0.2
5	Revenues and grants	48.6	52.8	53.0	48.9	48.9	46.6	46.9	46.3	45.7	45.2	44.8
6	Primary expenditure	48.3	50.9	53.3	51.8	48.5	47.8	46.8	46.6	46.4	45.7	45.0
7	Automatic debt dynamics	-1.9	0.1	2.1	-0.8	-1.4	-0.7	-0.2	-0.4	-0.3	-0.1	-0.1
8	Contribution from interest rate/growth differential	-2.2	-1.2	0.9	-0.5	-0.4	-1.0	-0.7	-0.6	-0.5	-0.3	-0.2
9	in this: contribution from real interest rate	-0.5	-0.6	0.7	0.4	1.0	1.0	1.2	1.1	1.2	1.3	1.3
10	in this: contribution from real GDP growth rate	-1.7	-0.6	0.2	-0.9	-1.4	-2.0	-1.9	-1.7	-1.6	-1.6	-1.6
11	Contribution from exchange rate depreciation	0.3	1.3	1.2	-0.3	-1.0	0.3	0.6	0.2	0.2	0.2	0.2
12	Other identified debt-creating flows	-1.0	-2.0	-4.9	-2.5	-3.7	-1.8	-2.2	-1.7	-1.2	-0.9	-0.7
13	Privatization receipts (minus)	-1.0	-2.0	-4.9	-2.5	-3.7	-1.8	-2.2	-1.7	-1.2	-0.9	-0.7
14	Recognition of implicit or contingent liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Other (e.g. bank recapitalization)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Residual, including asset changes (2-3)	1.9	2.8	9.2	6.9	7.3	1.8	1.5	0.0	0.0	0.0	0.0
	Public sector debt-to-revenue ratio (in %)	56.2	49.8	62.3	80.8	84.5	89.8	87.0	84.5	83.7	83.5	83.0

*Note: *Data does not contain government's contingent liabilities*
Source: Authors' calculation.

Figure 3. **Contribution to change in public debt as share of GDP[1] in central medium-term projection of public debt as share of GDP**

in % of GDP

Contribution from primary deficit
Contribution from exchange rate depreciation
Contribution from privatization revenues
Contribution from interest/growth rate differential
Residual
Change in public debt ratio

Note: [1] data does not contain government's contingent liabilities.
Source: Authors' calculations.

Dynamic Analysis of Public and External Debt Sustainability

The Figure very clearly highlights that residual developments exerted a very powerful impact on relative debt dynamics in 1997-2002. Their contribution to developments in the public debt ratio has been constantly positive, and in some years (1999, 2000 and 2001) it was even dominant. In this case, residual flows are deemed anything that contributes to changes in debt ratio, but cannot be unambiguously explained by statistically registered macroeconomic flows that lead to public debt. In Croatia's case, one can assume that growth in the share of public debt in GDP that cannot be explained is a result of the general problem with the statistical monitoring of the public sector, as well as problems that emerge due to incomplete coverage as well as pursuing the cash principle in governmental financial statistics. Additionally, residuals probably also result from the fact that a majority of public debt in Croatia is denominated in foreign currency, and changes in the exchange rates of currencies that compose public debt may lead to changes in public debt denominated in a given currency, without being preceded by the corresponding change in so-called identified flows that lead to emergence of public debt.

In projections that form the basis for the central medium-term projection of the public debt, the assumption that residual flows would disappear (be incorporated in to documented flows) in the future was implicit. Such an assumption was applied for two reasons. First, there is no firm basis for foreseeing them in subsequent years. Second, such an optimistic assumption can be justified by the fact that residuals over the last two years (2002 and 2003) have been eased, and they have reached levels of 1.8 percent and 1.5 percent of GDP. Nonetheless, one should note that precisely such expectations in the sense of "inexplicable" development of relative indebtedness are largely the cause of the favourable outcomes of sustainability analysis in the baseline scenario. Namely, even under the baseline scenario, assuming that year-to-year residuals remain the same and equal 1.5 percent of GDP, the share of public debt in GDP grows from 40.8 percent in 2003 to 43.2 percent in 2007.

Table 7 shows the results of all "stress" tests, and the contribution of shocks in individual key variables to changes in the share of public debt in GDP.

Table 7. Analysis of sensitivity of public debt in GDP[1] to shocks in key variables, in % of GDP

Scenarios and contribution of shocks to developments in public debt as share of GDP	Actual		Projection			
	2002	2003	2004	2005	2006	2007
1 Historical average scenario	**41.8**	**40.8**	**38.1**	**35.8**	**33.9**	**32.2**
2 Status quo	**41.8**	**40.8**	**38.7**	**37.1**	**35.8**	**34.7**
3 Deficit, 5% of GDP	**41.8**	**40.8**	**39.8**	**39.7**	**40.5**	**41.7**
in this: contribution from primary deficit	1.2	-0.1	1.0	1.5	1.8	2.0
4 Interest rate shock	**41.8**	**40.8**	**40.9**	**40.8**	**40.3**	**39.7**
in this: contribution from real interest	1.0	1.2	2.9	2.0	1.4	1.4
5 Growth rate shock	**41.8**	**41.2**	**42.0**	**43.8**	**43.2**	**42.5**
in this: contribution from difference between real interest and GDP growth rates	-1.0	-0.5	2.0	2.2	-0.3	-0.3
6 Public expenditure shock	**41.8**	**40.8**	**42.3**	**44.3**	**43.7**	**43.2**
in this: contribution from primary deficit	1.2	-0.1	3.5	3.5	0.5	0.2
7 Tax revenue shock	**41.8**	**41.1**	**40.2**	**39.5**	**38.2**	**37.1**
in this: contribution from primary deficit	1.2	-0.1	1.9	1.7	0.5	0.2
8 Combined shocks	**41.8**	**40.3**	**41.6**	**43.4**	**39.4**	**35.5**
in this: contribution from difference between real interest and GDP growth rates	-1.0	-0.7	1.8	1.8	-0.3	-0.2
in this: contribution from primary deficit	1.2	-0.6	1.1	1.1	-2.9	-3.1
9 Depreciation shock	**41.8**	**40.8**	**49.6**	**48.7**	**48.2**	**47.6**
in this: contribution from exchange rate depreciation	0.3	0.6	10.7	0.2	0.2	0.2
10 Contingent liability shock	**41.8**	**40.8**	**49.1**	**48.2**	**47.6**	**47.0**
in this: contribution from contingent liabilities	0.0	0.0	10.0	0.0	0.0	0.0

Note: [1] Not including government's contingent liabilities.
Source: Authors' calculation.

Dynamic Analysis of Public and External Debt Sustainability

The first scenario in the public debt share sensitivity analysis tests its development based on the assumption of retention of real GDP growth rates, real interest rates and the primary balance at the level of the historical average of these variables. Under such a scenario, thanks to the lower average real interest on the public debt and the primary surplus, the share of public debt in GDP falls with even greater intensity. Despite the lower real growth rates, the share of public debt in GDP in 2007 declines to only 32.2 percent.

The second scenario indicates how the public debt share in GDP would develop if the primary balance, the general government revenue and expenditure share in GDP and real interest rates remained at the 2002 level, accompanied by the economic growth and inflation rates foreseen by the baseline scenario. This scenario is an attempt to reflect what would happen to the public debt share in GDP under circumstances of complete fiscal policy inertia. Analysis shows that under these conditions the share of public debt in GDP would also drop, so in 2007 it would be 34.7 percent.

The third scenario shows development of the public debt share in GDP at a deficit level of 5 percent of GDP (which corresponds to 2002 and 2003 levels), and with other assumptions unaltered in relation to the baseline scenario. Due to interest rate levels higher than in the second scenario, under this scenario there is apparent resistance to reduction of debt ratio and its maintenance of levels above 40 percent of GDP.

The fourth scenario analyzes sensitivity of the public debt share in GDP to interest rate shock, i.e. to a jump in average real interest on public debt up to the historical average level increased by three standard deviations in 2004 and 2005. With such a shock, real interest on public debt would be 7.6 percent, or nominally 10.6 percent, while it would result in maintaining the public debt share in GDP at a level close to 41 percent in 2004, with a gentle decline thereafter, to a level of 36.2 percent by the end of 2007.

The fifth scenario introduces the assumption of economic growth shock in 2004 and 2005, i.e. a negative growth rate of 1.8 percent, which corresponds to the historical average level less two standard deviations. The results of sustainability analysis show that such negative growth rates would most likely lead to

maintenance of debt ratio at a level above 43 percent up to 2006, while thereafter, together with economic recovery, the public debt share in GDP would begin to decline so that it would reach the level of 42.5 percent by 2007.

The sixth scenario examines the impact of public expenditure shock on the share of public debt in GDP. Under this scenario, there is deterioration of the primary balance in 2004 and 2005, and it declines by two standard deviations in relation to the historical average. Under this scenario, the assumed primary balance deficit of 2.9 percent of GDP, caused by unexpected growth in general government expenditure share in GDP, would cause growth in the public debt share in GDP in 2004 and 2005. Despite a considerable decline in the share of expenditure in GDP in 2006 and primary balance equilibrium, the share of public debt in GDP would remain above 43 percent to the end of the period under consideration.

The seventh scenario tests the sensitivity of public debt in GDP to shocks caused by a fall in budgetary revenues to the historical average level less two standard deviations, i.e. to 44.7 percent in 2004 and 2005. Since the baseline scenario also assumes gradual reduction of the share of tax revenues in GDP, this shock causes no particular disorders to the debt ratio. Nonetheless, this scenario shows that emergence of problems in tax revenue collection would jeopardize the possibility of reducing public debt as a share of GDP.

The next, eighth, scenario, monitors the reaction of public debt as a share of GDP to a simultaneous decline in real GDP growth rates and the primary balance to a level that is one standard deviation below the historical average, and to growth of average real interest rates to a level two standard deviations above the historical average in 2004 and 2005. This situation, in which the rate of real economic growth falls to 0.8 percent, and the primary balance to -1.1 percent, while the real interest rate reaches 5.5 percent, initially leads to growth of debt ratio to a level of approximately 43 percent in 2005, but thereafter it declines, falling to approximately 35.5 percent of GDP in 2007.

The ninth scenario shows the exceptional sensitivity of public debt as a share of GDP to a shock prompted by a one-off 30 percent real depreciation of HRK/€ exchange rate. Due to the high share of public debt denominated in foreign currency, this shock leads to a jump in public debt as a share of GDP to 49

percent in 2004. Thereafter the share of public debt in GDP declines, but in 2007 it remains 6 percentage points higher than in 2002.

The transformation of contingent liabilities into public debt has, as suggested by the tenth scenario, a powerful negative impact on the debt ratio. This scenario shows that a one-time acknowledgement of contingent liabilities at a level of 10 percent of GDP in 2004 raises the share of public debt in GDP to 49 percent. Thereafter the share of public debt falls to an ultimate 47 percent in 2007.

The analysis of public debt sustainability has shown that with the expected fiscal policy, the share of public debt in GDP is relatively insensitive to GDP growth rate shocks and deterioration of the primary balance (see Figure 4). Due to the high share of debt denominated in foreign currency and foreign-currency indexed domestic debt, debt ratio is most sensitive to depreciation of the Croatian kuna vis-à-vis the euro. In line with expectations, public debt as a share of GDP is also highly sensitive to transformation of contingent liabilities into direct government liabilities, i.e. public debt.

The assumption of growth in nominal interest rates has been incorporated into the baseline scenario due to the assumed relatively high economic growth rates should not lead to significant automatic deterioration in the debt ratio, while privatization revenues should also provide some public debt relief. Although the latter are expected to decline, during the period up to 2007 they are still expected to enable the government to finance a portion of the budget deficit without the need for additional borrowing. To be sure, prudent fiscal policy and deficit reduction, which have been assumed in the baseline sustainability analysis scenario, will have a crucial impact on public debt sustainability in the period from 2003 to 2007.

Figure 4. **Public debt ratio[1] in various scenarios**

in % of GDP

Legend:
- Baseline scenario
- Primary balance shock
- Tax revenue shock
- Historical average scenario
- Combined shocks
- Status quo scenario
- Interest rate shock
- Depreciation shock
- 5-percent deficit scenario
- Growth rate shock
- Contingent liability shock

Note: [1]*Without government's contingent liabilities.*
Source: Authors' calculation.

3.2   Results of External Debt Sustainability Analysis

Analysis of external debt sustainability was also conducted by applying the methodology described above. Input data for the 1997-2002 period are the actual values of macroeconomic variables and values from the balance of payments, while the projections described in Section 2 were employed for the 2003-2007 period. The key input data are shown in Table 8. The projections from Table 8 form the basis for the central medium-term projection, while - in compliance with the explained methodology - in other scenarios the sensitivity of public debt as a share of GDP is tested, assuming shocks in selected key variables. Average values and standard deviations from historical values of key variables during the 1997-2002 period, provided in Table 9, serve as the basis for calibrating these shocks.

According to the central medium-term projection, the share of external debt in GDP initially grows from 68.5 percent in 2002 to 73.6 percent in 2003, and declines thereafter. At the end of the period to which the projection pertains, it falls to 70.3 percent of GDP (see Table 10). The cause for the decline of external debt in GDP as the period comes to a close is primarily the reduction of the balance of payments deficit, which is expected to emerge as a result of significant exports of goods and services. Figure 5 shows the actual change of external debt as a share of GDP up to 2002, and the changes that would occur afterward if the assumptions upon which the central medium-term scenario is based are borne out.

The same Figure also highlights the basic flows generating change in external debt, and their contribution to changes in debt ratio under the baseline scenario. As with analysis of external debt sustainability, the baseline projection in the central medium-term scenario leads to an easing of the flows generating change in the share of external debt in the future, and their interaction should lead to a halt in growth trends in external debt as a share of GDP. In other words, the baseline projection leads to the conclusion that external debt is sustainable.

Table 8. **Key macroeconomic variables and assumptions for public debt sustainability analysis**

	1997	1998	1999	2000	2001	2002	2003p	2004p	2005p	2006p	2007p
Real GDP growth rate (in %)	6.8	2.5	-0.9	2.9	3.8	5.2	5.0	4.5	4.5	4.5	4.5
Inflation rate (GDP deflator, in %)	7.4	8.4	3.8	4.7	2.9	2.9	3.0	3.0	3.0	3.0	3.0
Nominal HRK/US$ exchange rate (change, in %)	-13.3	-3.3	-11.8	-16.4	-0.8	5.7	14.2	1.2	-0.6	-0.6	-0.6
GDP deflator (in US$, change, in %)	-5.3	4.9	-7.2	-10.0	2.2	9.1	20.0	4.2	2.4	2.4	2.4
Nominal interest rate on external debt (in %)	5.3	5.5	5.1	5.2	5.4	4.6	4.3	5.0	5.0	5.0	5.0
Growth of exports of G&S (in %)	0.6	6.5	-5.0	6.7	11.2	9.5	28.0	9.9	8.0	8.0	8.0
Growth of imports of G&S (in %)	15.2	-7.4	-7.1	-2.0	12.6	17.6	23.3	9.8	7.9	6.5	6.9

Source: Croatian Bureau of Statistics, Croatian National Bank, authors' computations and projections

Table 9. **Historical values of key variables for analysis of external debt sustainability, 1997–2002 period**

	Historical average	Standard deviation
Current account deficit (in % of GDP)	4.3	4.0
Non-debt creating inflows (in % of GDP)	2.8	2.3
Nominal interest rate on external debt (in %)	5.2	0.3
Real GDP growth rate (in %)	3.4	2.6
GDP deflator (in US$, change, in %)	-1.0	7.5

Source: Croatian Bureau of Statistics, Croatian National Bank and authors' calculation.

Dynamic Analysis of Public and External Debt Sustainability

Table 10. **Central medium-term projection of developments of external debt as share of GDP, in % of GDP**

		Actual						Projection				
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1	**External debt**	**37.1**	**44.8**	**50.1**	**60.0**	**57.9**	**68.5**	**73.6**	**72.0**	**71.8**	**71.1**	**70.3**
2	Change in external debt	10.3	7.7	5.4	9.9	-2.1	10.6	5.1	-1.5	-0.2	-0.7	-0.8
3	Net debt-creating external flows (4+8+11)	11.1	1.6	5.3	3.3	-3.4	0.9	-7.0	-1.5	-0.2	-0.7	-0.8
4	Current account deficit, excluding interest payments	11.1	4.8	4.5	-0.3	0.7	4.9	4.2	1.8	1.9	1.4	1.2
5	Deficit in balance of G&S	16.7	9.2	8.4	5.1	6.0	9.6	7.7	7.7	7.7	7.0	6.5
6	Exports of goods and services	39.9	39.5	40.8	47.0	49.3	47.0	47.7	48.2	48.6	49.1	49.6
7	Imports of goods and services	56.6	48.7	49.2	52.1	55.3	56.6	55.4	55.9	56.3	56.1	56.1
8	Net non-debt creating inflows	-1.0	-2.6	-6.1	-3.7	-3.7	0.5	-1.8	-1.0	-0.9	-0.9	-0.8
9	Net foreign direct investment, equity	0.9	2.6	6.2	3.7	3.6	-0.4	1.8	1.0	0.9	0.9	0.8
10	Net portfolio investment, equity	0.1	0.0	-0.1	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0
11	Automatic external debt dynamics	1.1	-0.7	6.9	7.4	-0.3	-4.5	-9.4	-2.4	-1.3	-1.2	-1.2
12	Nominal interest rate contribution	1.4	1.7	2.7	3.0	2.9	2.0	1.9	3.1	3.1	3.1	3.1
13	Contribution from real GDP growth rate	-1.8	-0.8	0.5	-1.7	-2.0	-2.3	-2.2	-2.8	-2.8	-2.8	-2.8
14	Contribution from change in prices and exchange rate	1.5	-1.6	3.8	6.0	-1.2	-4.2	-9.1	-2.7	-1.6	-1.6	-1.5
15	Residual, including changes to gross foreign assets (2-3)	-0.8	6.1	0.0	6.5	1.3	9.7	12.0	0.0	0.0	0.0	0.0
	External debt/exports of goods and services (in %)	92.9	113.3	122.9	127.6	117.5	145.8	154.1	149.5	147.6	144.8	141.9

Source: Authors' calculation.

Figure 5. **Contribution to change in external debt ratio in central-medium term projection**

in % of GDP

Contribution from current account deficit (excl. interest payments)
Contribution from net non-debt creating inflows
Contribution from nominal interest rate on external debt
Change in external debt ratio

Contribution from real GDP growth rate
Contribution from GDP deflator changes
Residual

Source: Authors' calculation.

Dynamic Analysis of Public and External Debt Sustainability
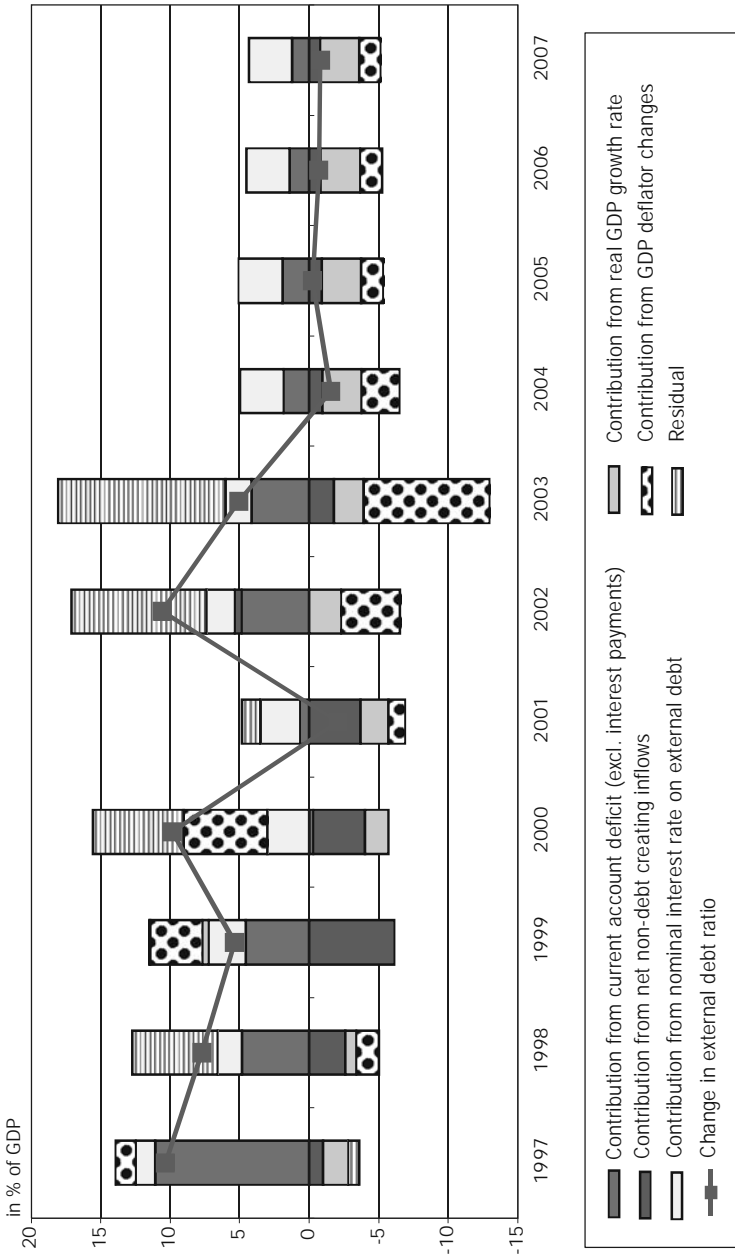
However, even with external debt, as apparent in the figure, the conclusion of sustainability becomes relative because of high levels of residual developments during the 1997-2002 period. With reference to external debt, one cannot speak of a consistent positive contribution of residuals to external debt development, but one nonetheless must notice that over the past two years (2002 and 2003) it has grown exceptionally and accounted for 9.7 percent in 2002 and even 12 percent of GDP in 2003. On average, residual, i.e. unidentified public debt developments during the 1996-2003 period were positive, and accounted for approximately 5 percent of GDP. As with public debt, residuals pertaining to external debt can be explained by statistical problems and changes in inter-currency relationships.

Another assumption in the analysis of external debt sustainability is that such residuals will abate, or disappear, in future years. Such an assumption is based on the fact that residual external debt developments are largely a consequence of changes in relationships between the currencies in which external debt is denominated and, due to the expected stabilization of the exchange rate between the two principal currencies (€ and US$), this flow should have a declining impact on developments in external debt as a share of GDP. It is nevertheless interesting to conduct an experiment that introduces an assumption that residuals in the coming years will remain at the level of the historical average. As a result of this experiment, even in the baseline medium-term scenario we get a growing trend in external debt as a share of GDP, i.e. external debt by 2007 would grow to 89 percent of GDP.

The results of all stress tests are shown in Table 11, as are the contributions of shocks in individual key variables to changes in external debt as a share of GDP.

According to the first scenario for testing the sensitivity of external debt as a share of GDP (interest on external debt, real GDP growth rate, GDP deflator growth in US$, current account deficit excluding interest payments and flows that do not generate external debt as a percentage of GDP are shown based on their historical values in 1997-2002), external debt as a share of GDP grows in each year of the projection period, and in 2007 it reaches 87.9 percent of GDP. A GDP growth rate lower than that denoted in the baseline scenario is the primary cause for such developments in external debt.

Table 11. **Analysis of sensitivity of external debt as share of GDP to shocks in key variables, in % of GDP**

Scenario and contribution of shocks to development of external debt in GDP	Actual		Projection			
	2002	2003	2004	2005	2006	2007
1 Historical average scenario	**68.5**	**73.6**	**77.1**	**80.7**	**84.3**	**87.9**
2 Interest shock scenario	**68.5**	**73.6**	**72.7**	**73.2**	**72.5**	**71.7**
in this: contribution from interest rates	2.0	1.9	3.8	3.9	3.1	3.1
3 Growth rate shock	**68.5**	**73.6**	**76.4**	**81.0**	**80.2**	**79.3**
in this: contribution from real GDP growth rate	-2.3	-2.2	1.3	1.4	-3.2	-3.2
4 GDP deflator shock (in US$)	**68.5**	**73.6**	**91.3**	**113.1**	**112.4**	**111.6**
in this: contribution from GDP deflator (in US$)	-4.2	-9.1	16.1	19.6	-1.6	-1.5
5 Current account deficit shock	**68.5**	**73.6**	**82.5**	**92.7**	**92.0**	**91.2**
in this: contribution from current account deficit	4.9	4.2	12.3	12.3	1.4	1.2
6 Combined shocks	**68.5**	**73.6**	**92.0**	**111.6**	**111.7**	**111.9**
in this: contribution of interest rates	2.0	2.0	4.6	5.1	3.4	3.3
in this: contribution from real GDP growth rate	-2.3	-2.3	-0.6	-0.7	-3.0	-3.0
in this: contribution from current account deficit	4.9	4.2	8.3	8.3	2.4	2.3
in this: contribution from GDP deflator (in US$)	-4.2	-9.5	7.2	8.1	-1.7	-1.7
7 Depreciation shock	**68.5**	**73.6**	**102.8**	**102.5**	**101.5**	**100.5**
in this: contribution from GDP deflator (in US$)	-4.2	-9.5	27.5	-2.1	-2.1	-2.1

Source: Authors' calculation.

The subsequent scenarios of external debt change projections show the consequences of shocks provoked by higher interest on foreign debt and a lower real GDP growth rate in 2004 and 2005. The shock of individual variables is described as three standard deviations of these variables from the average. The change in the interest rate in the second scenario, in which nominal interest rate would increase from the 5.2 percent average to 6.1 percent should not have a greater impact on development of external debt as a share of GDP in relation to the baseline scenario. According to this scenario, the share of external debt in 2004 and 2005 should be 72.7 percent and 73.2 percent of GDP respectively, and fall to 71.7 percent in 2007.

The third scenario shows the implications of reductions in the real GDP growth rate by two standard deviations from the historical average, or actual real GDP growth of –1.8 percent in 2004 and 2005. The analysis shows that in such a situation, external debt as a share of GDP would grow by approximately 12 percent as compared to the share at the end of 2002. After this year, external debt as a share of GDP would begin to decline, but even up to the end of the observed period it would not fall below a level of 80 percent of GDP.

An isolated shock to which the GDP deflator would be exposed, expressed in US dollars (combined effect of depreciation of the Croatian kuna in relation to the US$ and inflation in Croatia of 16.1 percent in 2004 and 2005) would have a powerful impact of increases in external debt as a share of GDP. Under this scenario, external debt as a share of GDP would grow by as much as 17.7 percent in relation to external debt share in GDP in 2003, and by 21.8 percent in 2005 in relation to 2004.

A similar result in the sense of greater changes in external debt under conditions of two years of disorders in the economy is given by the fifth scenario, in which the share of the current account deficit (which does not exclude interest payments on external debt) grows from the average 4.3 percent of GDP to 12.3 percent of GDP in 2004 and 2005. The share of debt in GDP would increase from 73.6 percent in 2003 to 93 percent in 2005, after which it would stabilize to approximately 91 percent by 2007.

The sixth scenario combines the shocks of all aforementioned scenarios, wherein it begins with a disorder in growth rates, the GDP deflator and the current account deficit at a level of one standard deviation from the historical average, and a level of two standard deviations as regards the interest rates. This scenario therefore assumes that in 2004 and 2005 the real growth rate will decline by 0.8 percent from the value of the historical average real GDP growth rate of 3.4 percent, that the combined effect of the Croatian kuna's depreciation against the US dollar and a lower inflation rate in Croatia will cause a reduction of the GDP deflator in US$ of 8.6 percent (from the value of the historical average growth rate of the GDP deflator in US dollars of –1.0 percent), that interest will grow to 5.5 percent (from the historical value of interest of 5.2 percent), and that the current account deficit (excluding interest payments) as a share of GDP will increase to 8.3 percent (from the historical average of 4.3 percent). In such a situation the share of external debt in GDP grows over the entire projection period accompanied by an increase in the share of debt, so that by 2007 it reaches of level of 112 percent of GDP.

Under the seventh scenario, a single real depreciation of kuna with respect to US$ of 30 percent in 2004 would lead to growth in debt as a share of GDP to approximately 102.8 percent in 2004, after which external debt as a share of GDP would gradually decline to 100 percent of GDP in 2007.

The central medium-term projection and sensitivity tests of external debt as a share of GDP have shown that developments in this share in GDP are exceptionally sensitive to shocks in the relevant macroeconomic variables: the current account balance, nominal interest, GDP growth rates, GDP deflator changes, exchange rate changes, etc.

Together with the already high initial share of external debt in GDP of 68.5 percent, debt growth tendencies will continue in all scenarios involving variable shocks. External debt shows the least sensitivity to nominal interest rate shock of three standard deviations in relation to the historical average (see Figure 6). The highest growth of debt would occur under the GDP deflator shock scenario and the scenario of combined shock in all key variables. Under these scenarios, external debt as a share of GDP could grow to over 110 percent.

Figure 6. **Shares of external debt ratio under various scenarios**

in % of GDP
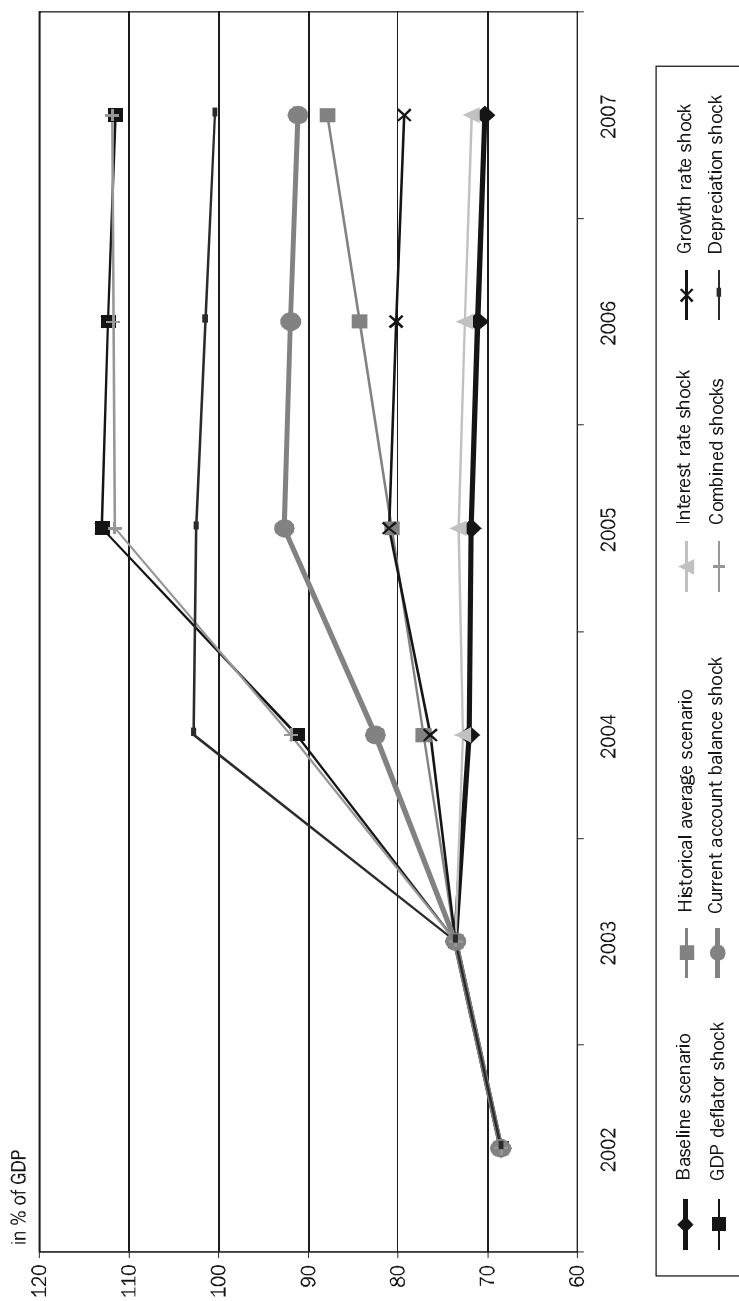
Source: Authors' calculation.

The extremely high sensitivity of external debt to macroeconomic variable shocks is a consequence of the high initial deficit in the goods and services balance of 9.6 percent of GDP in 2002, and the fact that together with the objective assumptions associated with imports/exports of goods and services, it will not succeed in dropping to a level below approximately 6.5 percent. Therefore the current account balance (excluding interest) during the period under observation will be negative. The potentially very high growth of external debt will be alleviated by net foreign investment over the entire period. The latter will probably decline in a relative amount but remain near a level of approximately 1 percent of GDP. Automatic development of the external debt share, developments influenced by nominal interest, real GDP growth and price and exchange rate changes will have the same effect. Since nominal GDP growth expressed in US dollars will surpass nominal interest rate, the ratio between GDP developments and interest rates will lead to alleviation of growth in external debt as a share of GDP.

A stable level of external debt, measured by its share in GDP, in the target year of 2007 in relation to 2002 is only guaranteed by the scenario in which relatively high real economic growth and reduction of the current account deficit from the initial 7 percent to 5 percent of GDP are achieved in the subsequent medium-term. We consider this scenario realistically possible, and it forms the basis for our central medium-term projection.

3.3   Comparison of Results of Public and External Debt Sustainability Analyses

Based on the results of sustainability analyses presented in the preceding two sections, one can ascertain that these two analyses lead to different conclusions with regard to sustainability of public in relation to sustainability of external debt.

Analysis of public debt sustainability based on the central medium-term projection showed that public debt as a share of GDP, with the assumptions upon which this projection is based, could decline by 2007. This decline could account for 4.5 percent in relation to 2002.

Growth in external debt as a share of GDP already occurs in the central medium-term projection in the analysis of external debt sustainability. This growth, however, is very slight and in 2007 it would lead to growth in that share of less than 2 percent in relation to the initial year, 2002.

As opposed to the central medium-term projection which did not reveal any great danger of unsustainable debt development for either external or, especially, public debt, the "stress" tests warn of greater risk of unsustainability for external rather than public debt.

First, it is notable that the level of public debt in all conceivable scenarios proceeds under the level which is normally deemed critical.[13] On the other hand, the external debt levels exceed this critical value in almost all scenarios.[14]

Furthermore, the range of the debt share in 2007 in relation to 2002 with reference to external debt is essentially greater than for public debt. While the observed scenario indicates a change from –9.6 percent to 5.8 percent of GDP with reference to public debt, for external debt it shows a greater probability of its growth, and that this growth could be very high, ranging from 3.2 percent to 43.4 percent of GDP.

From the above it is obvious that none of the alternative scenarios in the external debt sustainability analysis generates a result that is lower than the initial one, so that external debt sustainability can only be considered provided that the assumptions from the baseline scenario are fulfilled (which is a "realistic" scenario in our view). In contrast, the baseline and six of the total of ten scenarios suggest the sustainability of public debt. This conclusion is additionally backed by Figures 4 and 6, from which it is apparent that decline trends predominate in public debt after the shocks, while on the basis of the charts depicting the results, we can expect stabilization of the share of external debt at palpably higher levels.

---

[13] *Here we take public debt of 60 percent of GDP as a generally accepted critical value for public debt sustainability.*

[14] *Due to a lack of agreement with regard to critical values for external debt sustainability, here we refer to the empirically ascertained value of 40 percent of GDP, with which the probability of a crisis occurring is 15 to 20 percent (see: IMF, 2002).*

The common feature of the analyses of public and external debt sustainability is that they both result in the conclusion on an exceptionally high sensitivity of the debt share in GDP to real depreciation. Also, they have in common a very high dependency of results on assumptions that in the future unidentified debt developments will disappear.

Although independent assessment of public and external debt sustainability do not provide a direct basis for conclusions about interrelation between public and external debt, based on the preceding results we could conclude that in the future the share of public debt in external debt will decline, and that the government will be increasingly less accountable for external debt development and sustainability. Obviously, the analysis conducted here does not take into account the level of various forms of indirect impact of fiscal activities on the country's affinity for borrowing from abroad.

References

Consensus Economics, 2003, Consensus Forecasts, http://www.consensuseconomics.com.

Ministry of Finance, *Godišnja izvješća Ministarstva financija* (Annual Statements of the Ministry of Finance) – various issues.

Ministry of Finance, *Mjesečni statistički prikazi Ministarstva financija* (Ministry of Finance Monthly Statistical Reports) – various issues.

IMF, 2002, *Assessing Sustainability*, Prepared by the Policy Development and Review Department, http://www.imf.org/external/np/pdr/sus/2002/eng/052802.htm.

IMF, 2003, *First Review under the Stand By Arrangement and Request for Waiver of Nonobservance and Applicability of Performance Criteria*, Prepared by the Policy Development and Review Department, http://www.imf.org/external/pubs/ft/scr/2003/cr03252.pdf.

IMF, 2003, *Request for Stand By Arrangement*, Prepared by the European I and the Policy Development and Review Departments, http://www.imf.org/external/pubs/ft/scr/2003/cr0327.pdf.