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# CAPITAL STOCK AND ECONOMIC DEVELOPMENT IN HUNGARY

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**Abstract**

Income per capita of Hungary attained 70 percent of the Austrian level by the end of the eighteenth century and fluctuated around this value between the World Wars. As an „achievement" of the last 50 years this ratio — measured at purchasing power parity — has decreased to about 40 percent by the beginning of the nineties. Economic successes since transformation started raised the hope that the Hungarian economy's lot might turn from the process of lagging behind to catching up. This hope is supported by microeconomic factors such as the intellectual skills of labor, entrepreneurial abilities, and the capacity to accommodate new knowledge and technologies. However, the utilization of microeconomic potentials greatly depends on macroeconomic policies. Microeconomic development efforts lead to increase of investments at the aggregate level, therefore, macroeconomic policy must face the problem of balancing needs and resources. This paper tries to quantify the determinants of this balance. The value of the physical capital stock is estimated and on the basis of international experiences investments paths for future income levels are set. Savings prospects of different sectors are confronted with investments needs. Calculations are followed by an economic policy analysis of the fiscal measures needed to catch up to 70 percent of the Austrian level again by 2030.

**CONTENTS**

# 1. Introduction

The Hungarian economy is in a period of rapid growth now. In this study we do not attempt to analyze what will be the rate of growth in the future and whether the human and technological capacities of this country will allow the continuation of the growth already begun. This study attempts to answer the question that, if the possibility of rapid growth is given, what kind of macroeconomic policy is needed to exploit this possibility.

The Central Statistical Office stopped publishing physical capital stock statistics at the beginning of this decade owing to the deficiencies of the methods employed formerly. However, in order to obtain numerical results an estimation of the value of physical capital stock is needed that is one of the main tasks of the paper.

Given capital stock, the second set of our calculations analyzes future growth paths. We assume that as Hungary catches up to EU macroeconomic structures will be more and more similar to that of the EU. This would mean a convergence of the capital/output ratio, price level in common currency, relative prices between different capital goods, household's saving/income ratio, wealth portfolio, etc. These indicators show a great dispersion in developed countries but all these differences are much smaller than the difference depending on the level of GDP. We can therefore approximately determine the state that will be attained at the end of the process of catching up. The reason for the need of calculations is that the structure of expenditures depends not only on the endpoint of the process but also on the speed of approximating this point. This means that a fast increase of output incurs high rate of investment and a fast increase of income leads to high savings rate. In our calculations we determine investments and its sources under different assumptions on potential growth and economic policy.

Although detailed growth paths were calculated until 2030 the lessons are drawn for a much shorter period, the next 3 to 5 years. The aim of the longer-term analysis is only to determine and illustrate tendencies. There is no economic policy proposal that could be maintained in an unchanged form for decades. Nevertheless we must assess where our present decisions will lead under probable conditions. Conditions will certainly change and economic policy must also change in this case but this cannot relieve us from developing a strategy that takes into account longer horizons. The 3-5 years that are in the center of our calculations are the ones proceeding the expected date of our European Union accession. In short, we may say that we analyze the macroeconomic aspects of the preparation of accession to the EU.

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# 2. Capital Stock

## *2.1. The perpetual inventory method*

International statistical recommendations propose the use of the perpetual inventory method (PIM) to measure physical capital stock. The fundamental idea of the method is quite simple: the value of gross capital stock measured at current prices equals the sum of past investments still in use at current prices, i.e.

$$(1) \quad GK_t = \sum_i \sum_{k=0}^{s^{(i)}-1} I_{t-k}^{(i)} P_{t-k,t}^{(i)} \ .$$

where

$GK_t$ is – gross capital stock at current prices at time $t$,

index $i$ denotes various types of capital stock (e.g. machines, buildings etc.),

$I_t^{(i)}$ – is investment of capital good $i$ at time $t$,

$P_{t-k,t}^{(i)}$ – is the price change of capital good $i$ between period $t$-$k$ and $t$,

$s^{(i)}$ – is the service life of capital good $i$.

Net capital stock is the sum of gross investments minus depreciation of various vintages. It is important to stress that the assumptions relating to service life and depreciation of capital are determined along economic concepts. This means that they reflect actual lifetimes and deprecations and not accounting regulations or practices. By similar reason capital stock values do not necessarily coincide with book values.

Various proposals can be made for depreciation profiles. Katz-Herman (1997) shows the methodology employed in the U.S., including detailed tables for depreciation rates and service lives. In the U.S. it was found that depreciation profiles - with some exceptions[1] – may best be approximated by geometric decay. This means that in case of a given investment - disregarding inflation - net value is given by $K_t = I_{t-s}(1-d)^s$ where $d$ is the rate of depreciation. Geometric depreciation rates were determined on the basis of secondary market prices of capital goods. Therefore, the net value of capital equals its repurchase value. US calculations assume that the depreciation rate of a given vintage is constant in time while different rates are possible in case of different vintages of the same type of capital. Since the revision of the methodology only net capital stock data are published in current (repurchase) prices and real (chain-deflated index) terms. No data at constant prices are published.

In order to apply this method investments data series must be at least as long as the longest service life among capital goods. The service life of some kind of residential buildings are about 80-100 years and that of buildings used for productive purposes may in some cases be longer that 50 years.

The limitations of direct application of this method for Hungary are obvious: no

[1] For example, in case of computers different depreciation is applied, and in case of cars and trucks detailed data on stocks and second-hand prices of various vintages and types are available.

acceptably long and reliable investment data are available. Capital stock data could have been compiled for the 1990-ies if stock data were available for the starting year, including a breakdown by types and vintages.[2] In our capital stock calculations we used a shortcut. We created a model to generate (initial) capital stock data for the year 1980 for vintages of three types of capital goods (equipment, structures, others).

### *2.2. Estimation of capital stock*

The Hungarian Central Statistical Office (CSO) published gross capital stock data until 1991 and their net values until 1989. The major conceptual problem with this statistics is that it cumulates investments data of different years at different prices while subtracts book values of deprecation. This way the data have no meaningful unit of measurement[3] that might be a reason why the CSO stopped calculating capital stock in 1991.

In order to estimate capital stock we created a "vintage model" that also determines the initial value of capital stock for 1980. The model is based on the following types of assumptions.

1. Average total factor productivity (TFP) growth between 1980 and 1989.

2. Output is described by a Cobb-Douglas production function with an assumed labor share parameter, $\alpha$=0,65.

3. Constant growth for real investment before 1980.

4. The composition of gross capital stock for 1980 was accepted to be given by the gross capital stock data for 1980 by the CSO.

5. Depreciation rates and service lives were determined on the basis of international standards.

6. At the beginning of transformation physical capital suffered significant one time depreciation and since then service lives decreased and depreciation rates increased for capital installed before transition started.

The first and the sixth of these assumptions are entirely economic ones while the others are either technical or statistical.

The intuition behind the TFP assumption is the following. Consider a constant elasticity of scale Cobb-Douglas production function,

$$(2) \quad Y = A * L^{\alpha} * K^{(1-\alpha)},$$

where $Y$ is GDP,

$L$ is employment,

$K$ is capital stock,

$A$ is the indicator of total factor productivity (TFP).

Official statistical data are available for $Y$ and $L$. Given these data, assuming the percentage change of *TFP* for 1980-89 leads to the *percentage change* of capital stock for the same period. Using investment data and assumptions in 3-4-5 above lead to the *absolute change* of capital stock. Comparison of percentage and absolute changes gives us

[2] CSO of Hungary is preparing a capital stock survey for 1998 and it might publish data regularly later.

[3] The problem is discussed in Sebestyén [1997].

the level of the capital stock. The following equation shows the problem to be solved:

$$(3)\qquad \frac{\sum_{i=1}^{3}\sum_{t=0}^{s^{(i)}-1}\left(1-d^{(i)}\right)^{t} CI^{(i)}_{1989-t}}{\sum_{i=1}^{3}\sum_{t=0}^{s^{(i)}-1}\left(1-d^{(i)}\right)^{t} CI^{(i)}_{1980-t}} = \frac{K_{89}}{K_{80}} = \left[\frac{Y_{89}}{Y_{80}}\frac{A_{80}}{A_{89}}\left(\frac{L_{80}}{L_{89}}\right)^{\alpha}\right]^{\frac{1}{1-\alpha}}$$

$$s.t.: \quad \sum_{t=0}^{s^{(1)}-1} CI^{(1)}_{1980-t} \quad : \quad \sum_{t=0}^{s^{(2)}-1} CI^{(2)}_{1980-t} \quad : \quad \sum_{t=0}^{s^{(3)}-1} CI^{(3)}_{1980-t} = e:s:o \quad , e+s+o=1$$

where

$i$ denotes equipment, structures, other investment goods,

$CI$ is investments in constant prices,

$d^{(i)}$ is the depreciation of capital good $i$,

$e$, $s$, $o$ are shares of equipment, structures, and other investment goods in gross capital stock in 1980.

#### *2.2.1. The vintage model*

The starting point of our calculations is a so-called vintage model. Vintages of the three types of capital goods (equipment, structures, others) are separately recorded in the model employing appropriate service lives and depreciation rates.

To determine the initial values of each vintage we assumed that investments were put into operation in the middle of the years so investments of a given year represent a given vintage. In order to have comparable investment data for 1980-98 some adjustments were needed.

One important consideration for investment data adjustment is relative price changes, since they have an important role in measuring capital stock as can be seen from equation (1). If the relative price of a given capital good changes then the value of all past vintages of the this type of capital will also change. This results in that the share of this capital good in the „constant price" capital stock also change. The term „constant price" has been put into quotation marks because there is little ground for speaking about values expressed at constant prices if relative prices are changing. Nevertheless, we must introduce an indicator independent of the rate of overall inflation that can be used to compare values of capital stock pertaining to different years. These data may be interpreted as data where the effects of inflation are eliminated but the effects of relative price changes are not, or to put another way, data expressed at a constant price level but at a price structure changing from year to year. There is a strong economic rationale to measure capital stock at the price structure of the year. Presumably the relative price of a given type of machinery decreases when the relative price of the product it produces also decreases. As GDP (measured at current prices) is calculated at the (changing) price structure of the current year, the use of such type of data may be considered as appropriate also in case of capital data if capital-output ratios are to be estimated and interpreted. Therefore, we proceeded in two steps.

First, we calculated investment series at 1998 constant relative prices, using investments data for 1998 expressed at current prices and the volume indices of investments goods. Second, relative price multipliers were calculated using the price indices of investment

goods and data calculated in the first step were corrected by these multipliers. The resulting series are expressed in 1998 price level but in the price structure of the current year.

One further correction of the investment data was the deduction of residential construction investments that amount to about 20 percent of investments.[4] Accordingly housing capital is not included in the production function. As GDP includes housing services, this omission distorts our estimation somewhat. However, statistics on housing services is poor anyway and we would not have gained much with its deduction from GDP.

Using data adjustments described above we have determined the values of investments for the years 1980-98. These data, the vintage model, and assumptions 1, 2, and 3 gave us the values of capital stock for 1980-89 expressed at 1998 price level and at changing price structure. For the transition shock we introduced assumption 6, that is, we assumed a significant one time depreciation, shorter service lives and accelerated amortization of investments put into operation before the end of 1990. The main reason for these adjustments are that the loss of CMEA markets left useless productive capacities since products made by them could not be sold at western markets.[5] In order to quantify these effects we had to rely upon our own common-sense estimations. For equipment we assumed larger depreciation than for structures. (Assumed service lives and depreciation rates are detailed in Table 8 of the Appendix.)

#### *2.2.2. Results and sensitivity analysis*

In 1979-94 the growth rate of total factor productivity in developed industrial countries was 1 to 2 percent annually. Considering that the relative position of Hungary in terms of GDP per capita deteriorated in this period, it is fairly safe to assume that for the period 1980-89 growth of TFP in Hungary did not exceed these values. However, we have no specific information to pin down the exact rate within this range. To have some feeling about the sensitivity of the calculated capital stock to our assumption on TFP growth, Table 1 shows the capital/output ratios obtained for 1980, 1988 and 1998 and rates of increases of capital and TFP for 1996-98 on the basis of various assumptions on TFP.

The two extreme assumptions of zero and 2 percent lead to very marked differences of the 1980 and 1988 capital coefficient. The capital/output ratio may have increased or decreased in this 9 years and neither of these results can be excluded either on the basis of the data or on theoretical considerations.

However, there are some arguments supporting the assumption that actual TFP increase might have been 1 to 1.5 percent per year. This assumption means that TFP increased in Hungary at a rate similar to or slightly lower than the rate in developed countries, and that capital/output ratio was practically unchanged. Higher rate of TFP increase could not be justified because of the well-known lack of innovative forces in the system, while the assumption of a lower rate would imply an extremely low capital-output ratio for 1980 and an implausibly rapid increase in 1980-88.

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[4] A detailed description of how residential buildings investments were handled is available from the authors upon request.

[5] Belyácz (1998) presents a number of reasons supporting the view that the loss in capital stock at the time of the transition - called structural cleaning - may be considered as a natural phenomenon.

**Table 1.**

**Sensitivity on TFP growth assumptions**

| **Assumption** | **Results** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TFP growth rate 1980-89 % | *K*/*Y* 1980 | *K*/*Y* 1988 | *K*/*Y* 1998 | Δ(*K*) 1996 % | Δ(*K*) 1997 % | Δ(*K*) 1998 % | Δ(*A*) 1996 % | Δ(*A*) 1997 % | Δ(*A*) 1998 % |
| 0 | 1.08 | 1.50 | 1.58 | 1.90 | 2.86 | 3.96 | 1.20 | 3.54 | 3.21 |
| 0.25 | 1.20 | 1.56 | 1.60 | 1.72 | 2.68 | 3.78 | 1.27 | 3.61 | 3.28 |
| 0.5 | 1.32 | 1.62 | 1.63 | 1.53 | 2.47 | 3.57 | 1.33 | 3.68 | 3.35 |
| 0.75 | 1.47 | 1.70 | 1.65 | 1.31 | 2.25 | 3.35 | 1.41 | 3.76 | 3.43 |
| 1 | 1.64 | 1.78 | 1.69 | 1.07 | 2.01 | 3.10 | 1.49 | 3.85 | 3.51 |
| 1.25 | 1.83 | 1.88 | 1.72 | 0.81 | 1.73 | 2.81 | 1.59 | 3.94 | 3.61 |
| 1.5 | 2.07 | 2.00 | 1.77 | 0.52 | 1.43 | 2.50 | 1.69 | 4.05 | 3.72 |
| 1.75 | 2.35 | 2.14 | 1.82 | 0.20 | 1.09 | 2.14 | 1.80 | 4.17 | 3.85 |
| 2 | 2.69 | 2.32 | 1.89 | -0.16 | 0.71 | 1.74 | 1.93 | 4.31 | 3.99 |

Note: Assumptions regarding service lives and depreciation rates are the same in all cases.

Tables 2 and 3 show estimated capital stocks and the productivity developments.

**Table 2.**

## Capital stock without residential buildings in Hungary

| | Structures up to 1990 | Structures since 1991 | Equipments up to 1990 | Equipments since 1991 | Others up to 1990 | Others since 1991 | Capital stock | Capital stock volume changes | Investments volume index * |
|---|---|---|---|---|---|---|---|---|---|
| | At the price level of 1998 but relative price structure of each years | | | | | | | Previous year = 100 | |
| 1980 | 12248.3 | | 3533.8 | | 1195.8 | | 16977.9 | 105.59 | 94.3 |
| 1981 | 12655.2 | | 3713.4 | | 1323.9 | | 17692.4 | 104.21 | 94.8 |
| 1982 | 12977.7 | | 3855.9 | | 1451.6 | | 18285.2 | 103.35 | 97.8 |
| 1983 | 13221.3 | | 3944.4 | | 1575.8 | | 18741.5 | 102.50 | 97.0 |
| 1984 | 13369.9 | | 4002.9 | | 1666.6 | | 19039.3 | 101.59 | 97.2 |
| 1985 | 13500.6 | | 4060.0 | | 1714.6 | | 19275.3 | 101.24 | 97.7 |
| 1986 | 13633.1 | | 4154.6 | | 1703.4 | | 19491.1 | 101.12 | 102.3 |
| 1987 | 13889.5 | | 4327.5 | | 1681.5 | | 19898.5 | 102.09 | 107.6 |
| 1988 | 14083.4 | | 4402.2 | | 1640.2 | | 20125.8 | 101.14 | 92.3 |
| 1989 | 14230.3 | | 4511.4 | | 1605.7 | | 20347.4 | 101.10 | 104.4 |
| 1990 | 14303.3 | | 4551.3 | | 1551.9 | | 20406.5 | 100.29 | 90.2 |
| 1991 | 12036.4 | 614.4 | 2674.1 | 508.6 | 1027.9 | 122.7 | 16984.1 | 83.23 | 87.7 |
| 1992 | 11080.3 | 1178.8 | 2118.4 | 1009.1 | 821.0 | 247.7 | 16455.3 | 96.89 | 98.4 |
| 1993 | 10494.5 | 1752.1 | 1718.8 | 1464.3 | 652.0 | 357.0 | 16438.6 | 99.90 | 102.4 |
| 1994 | 9932.8 | 2411.3 | 1386.7 | 1929.9 | 515.2 | 471.7 | 16647.6 | 101.27 | 112.3 |
| 1995 | 9394.3 | 2953.8 | 1108.0 | 2322.2 | 397.5 | 559.1 | 16735.0 | 100.52 | 94.8 |
| 1996 | 8878.2 | 3482.2 | 877.4 | 2686.5 | 297.0 | 649.5 | 16870.8 | 100.81 | 105.1 |
| 1997 | 8383.5 | 4069.3 | 685.2 | 3060.7 | 215.5 | 748.8 | 17163.1 | 101.73 | 108.5 |
| 1998 E | 7909.5 | 4658.7 | 522.4 | 3552.3 | 151.9 | 851.1 | 17645.8 | 102.81 | 111.4 |

* CSO data.

After the large-scale investment activity of the seventies even the decreased volume of investments was enough to lead to the increase of the capital stock at the beginning of the eighties, although at a continuously decreasing rate. After the loss of value in 1990-91 investments made possible only a very slow increase of the stock while its increase accelerated gradually in recent years.

**Table 3. Productivity developments in Hungary. Previous year = 100**

| | Whole economy | | | | | | | Manufacturing | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Y* | *L* | *Y/L* | *K* | *Y/K* | *TFP* | | *Y* | *L* | *Y/L* | *K* | *Y/K* | *TFP* |
| 1980 | 100.0 | 99.7 | 100.3 | 105.6 | 94.7 | 98.3 | 1980 | 98.8 | 97.4 | 101.5 | 107.9 | 91.6 | 97.9 |
| 1981 | 102.9 | 99.7 | 103.2 | 104.2 | 98.8 | 101.7 | 1981 | 108.0 | 97.9 | 110.3 | 105.6 | 102.2 | 107.4 |
| 1982 | 102.8 | 99.7 | 103.2 | 103.4 | 99.5 | 101.9 | 1982 | 105.9 | 98.4 | 107.6 | 105.1 | 100.8 | 105.2 |
| 1983 | 100.7 | 99.6 | 101.1 | 102.5 | 98.2 | 100.1 | 1983 | 102.5 | 97.7 | 104.9 | 104.2 | 98.3 | 102.5 |
| 1984 | 102.7 | 99.6 | 103.1 | 101.6 | 101.1 | 102.4 | 1984 | 104.2 | 99.4 | 104.8 | 103.7 | 100.5 | 103.3 |
| 1985 | 99.7 | 99.7 | 100.0 | 101.2 | 98.4 | 99.4 | 1985 | 99.3 | 99.4 | 99.8 | 103.7 | 95.7 | 98.4 |
| 1986 | 101.3 | 99.9 | 101.4 | 101.1 | 100.2 | 101.0 | 1986 | 103.1 | 99.0 | 104.1 | 102.9 | 100.2 | 102.7 |
| 1987 | 104.3 | 99.6 | 104.7 | 102.1 | 102.2 | 103.8 | 1987 | 99.9 | 97.4 | 102.6 | 102.9 | 97.0 | 100.6 |
| 1988 | 100.0 | 99.1 | 100.9 | 101.1 | 98.9 | 100.2 | 1988 | 98.4 | 97.5 | 100.9 | 102.4 | 96.1 | 99.2 |
| 1989 | 100.6 | 99.1 | 101.5 | 101.1 | 99.5 | 100.8 | 1989 | 99.0 | 98.8 | 100.3 | 102.3 | 96.8 | 99.0 |
| 1990 | 96.5 | 98.0 | 98.5 | 100.3 | 96.3 | 97.7 | 1990 | 91.2 | 95.0 | 95.9 | 100.8 | 90.4 | 93.9 |
| 1991 | 87.9 | 93.3 | 94.3 | 83.2 | 105.6 | 98.1 | 1991 | 81.5 | 95.4 | 85.5 | 85.4 | 95.5 | 88.8 |
| 1992 | 97.0 | 90.0 | 107.9 | 96.9 | 100.1 | 105.1 | 1992 | 101.6 | 95.2 | 106.7 | 100.8 | 100.8 | 104.6 |
| 1993 | 99.2 | 92.4 | 107.4 | 99.9 | 99.3 | 104.5 | 1993 | 105.9 | 89.0 | 119.0 | 99.4 | 106.6 | 114.5 |
| 1994 | 103.1 | 96.3 | 107.1 | 101.3 | 101.8 | 105.2 | 1994 | 106.7 | 94.8 | 112.6 | 100.3 | 106.4 | 110.4 |
| 1995 | 101.5 | 98.2 | 103.4 | 100.5 | 101.0 | 102.5 | 1995 | 108.2 | 95.7 | 113.1 | 101.6 | 106.5 | 110.8 |
| 1996 | 101.3 | 99.1 | 102.2 | 100.8 | 100.5 | 101.6 | 1996 | 104.0 | 100.1 | 103.9 | 101.1 | 102.9 | 103.6 |
| 1997 | 104.6 | 100.0 | 104.6 | 101.7 | 102.8 | 103.9 | 1997 | 113.0 | 101.6 | 111.3 | 103.3 | 109.4 | 110.6 |
| 1998 E | 105.1 | 100.7 | 104.4 | 102.8 | 102.2 | 103.6 | 1998 E | 116.0 | 103.3 | 112.3 | 106.1 | 109.4 | 111.2 |
| 1992-98 | 101.7 | 96.6 | 105.2 | 100.5 | 101.1 | 103.8 | 1992-98 | 107.8 | 97.0 | 111.2 | 101.8 | 105.9 | 109.3 |
| 1994-98 | 103.1 | 98.9 | 104.3 | 101.4 | 101.7 | 103.4 | 1994-98 | 109.5 | 99.0 | 110.6 | 102.4 | 106.9 | 109.3 |
| | | | | | | | | **Non-manufacturing** | | | | | |
| | | | | | | | 1992-98 | 100.1 | 96.5 | 103.8 | 100.2 | 99.9 | 102.4 |
| | | | | | | | 1994-98 | 101.5 | 98.8 | 102.7 | 101.2 | 100.4 | 101.9 |

*Y*: value added (GDP), *L*: employment, *Y/L*: labor productivity, *K*: capital stock (without residential buildings), *Y/K*: capital productivity, *TFP*: total factor productivity

Since estimated capital stock does not include residential buildings but GDP does our TFP estimates are distorted. This is a problematic element of our calculations but we could not find suitable statistical information for the housing sector.

Human capital as a specific factor of production was also disregarded in the specification of the production function. Growth in human capital (the increase in the qualification of labor force) appears as an increase of TFP.[6]

Another distortion may influence our TFP results. The high rates in the historical data of Table 3 may be imputed to a great extent to the positive changes in the composition of the labor force. This structural change is probably a one-time event and no similarly high increases in TFP may be expected in the future.

According to our estimates the capital-output ratio (without residential buildings) was about 1.72 in Hungary in 1998. The same ratio was approximately constant in the United States after World War II, and its value oscillated between 2 and 2.5. International statistics show[7] that this value tends to be higher in developed that in less developed countries. This means that, if we accept our estimates for the capital stock and if we assume that the catching up process will make Hungary more similar to the developed countries then a concomitant increase of the capital-output ratio would lead to an increase of the investment/GDP ratio.

### *3. Growth and investment ratio projections*

Economic history presents only a few examples for rapid convergence but more for divergence. The voluminous literature on economic convergence could show up only a rather slow convergence between the OECD countries.[8] Analyses based on a broader sample of countries point to a tendency towards a bimodal distribution of world wealth.[9] Many papers emphasize the hypothesis of „conditional convergence" that is, every country has an equilibrium state determined by its social and cultural heritage towards which it tends to converge but this equilibrium level does not necessarily equals that of the most developed countries.

Per capita income of Hungary was about 70 percent of the Austrian level at the end of the last century and between the two world wars. By 1998 Hungary's performance -

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6 About the difficulties of measuring human capital Mulligan-Sala-i-Martin [1995a]. Problems arising from the inclusion of human capital into the production function is surveyed in de la Funte [1997].

7 Se for example Nehru—Dhareshwar [1993].

8 See for example Barro [1991], Barro—Sala-i-Martin [1991], Barro—Sala-i-Martin [1992a], Barro—Sala-i-Martin [1992b], Sala-i-Martin [1996]. The latter gives a survey of the literature as well.

9 Paap-van Dijk [1998] estimated the joint distribution of per capita incomes and arrived at the conclusion that the bimodal nature of international income distribution has increased strikingly between 1960-89. Countries are successively disappearing from the „middle" and the probability of falling behind is greater than that of catching up to the rich group.

Maddison [1995] has shown on the basis of a broad sample of countries that the inequalities between countries and regions has increased in the last two centuries and that the relative position of groups of countries and regions did not change. (Wars might have changed relative positions transitory even for decades but original positions were restored later.)

measured at purchasing power parity - was about 43.1 percent.[10] We do not discuss whether the 70 percent of the Austrian level represented the long-run equilibrium position of Hungary. In our calculations we have chosen a growth path characterized by rates close to the 4.5-5 percent per year rate experienced in recent years. It may be considered a fortunate coincidence that the attainment of 70 percent of the Austrian level by 2030 leads to the same growth rates for the next couple of years.[11]

Before describing the calculations let us refine the definition of catching up. Possible interpretations might include output per capita (measured at purchasing power parity), output per employed or total factor productivity. The choice of variable has no practical importance as all of them move largely together and, under the assumptions introduced, they correspond to each other. Nevertheless, it is the concept of total factor productivity that can best be used in interpreting the catching up process because catching up means attaining the technical and organizational level of the developed countries. The two other factors of production, the increase of employment and of capital intensity may also be important elements or concomitants of growth but they are not the variables with which the catching up process could be identified with. Therefore, catching up has been defined in terms of TFP. The level of TFP compared with Austria was determined the following way.

Let $N$ denote population and the lower indices $H$ and $A$ indicate variables of Hungary and Austria, respectively. The following values are known

$$\frac{\frac{Y_H}{N_H}}{\frac{Y_A}{N_A}} = 0.431, \tau_H \equiv \frac{K_H}{Y_H}(PPP) = 1.724/1.016 = 1.697, \tau_A \equiv \frac{K_A}{Y_A} = 2.2, \frac{L_A}{N_A} = 0.3678,$$

$$\frac{L_H}{N_H} = 0.3682.$$

Our estimate for the Hungarian capital-output ratio at current prices was 1.724. For comparison purposes this had to be revalued according to Austrian relative prices. As the price level of capital stock in Hungary is relatively higher compared to the general price level, the revaluation mean a downward correction.

Assuming the exponent of labor in the production function to be the same in both countries ($\alpha$=0.65) relative TFP are given by the following expression:

10 The OECD-EuroStat calculations prepared on the basis of latest data gave a higher rating to Hungarian GDP measured at purchasing power parity than earlier calculations did. According to the 1998 World Bank data Hungary stood at 32 percent of Austria in 1996 while according to later OECD-EuroStat data it was 41.3. The value of 43.1 percent for 1998 used by us was calculated on the basis of this latter publication. The higher valuation may at least partly be the consequence of the fact that the relative price level of Hungary was lowered by 13 percent, put at 37.1 percent of the Austrian level in 1996.

11 Tarján [1993] analyzes the trendline introduced by Jánossy and finds that the Hungarian trend is parallel and lies at 70 percent of the Austrian.

$$\frac{A_H}{A_A} = \frac{Y_H}{Y_A}\left(\frac{L_A}{L_H}\right)^{\alpha}\left(\frac{K_A}{K_H}\right)^{1-\alpha} = \frac{Y_H}{Y_A}\left(\frac{L_A}{L_H}\right)^{\alpha}\left(\frac{\tau_A Y_A}{\tau_H Y_H}\right)^{1-\alpha} =$$

$$= \frac{\frac{Y_H}{N_H}}{\frac{Y_A}{N_A}}\left(\frac{\frac{L_A}{N_A}}{\frac{L_H}{N_H}}\right)^{\alpha}\left(\frac{\tau_A \frac{Y_A}{N_A}}{\tau_H \frac{Y_H}{N_H}}\right)^{1-\alpha} = 0.6298 \qquad (4)$$

We used data supplied by the National Bank of Austria for output, employment and population projections in Austria. If Austrian growth follows a growth path where $\tau_A$ is unchanged, productivity change can be derived from output per worker easily as:

$$Y_A / L_A \equiv y_A = A_A * \left(L_A / L_A\right)^{\alpha} * \left(K_A / L_A\right)^{(1-\alpha)} \equiv A_A * k_A{}^{(1-\alpha)} = A_A * \left(\tau_A y_A\right)^{(1-\alpha)}$$

$$\Rightarrow \quad y_A = A_A^{\frac{1}{\alpha}} * \tau_A^{\frac{1-\alpha}{\alpha}} \quad \Rightarrow \quad \left(1+g_{y_A}\right)^{\alpha} = \left(1+g_{A_A}\right), \qquad (5)$$

where $g_i$ denotes growth rate of *i*.

On the basis of the rate of growth of Austrian productivity and demographic parameters we found that the 70 percent catch up in terms of output per capita from its 43.1 percent level is equivalent to catch-up of TFP from 63.0 percent to 79.0 percent. These results give us the total TFP increase up to 2030 that was divided within the period 1999-2030 in the following way.[12] We assumed that the speed of catch up is faster in the beginning while the rate of convergence approaches to zero as we get closer to the Austrian level.[13] This assumption is illustrated in Figure 1. It is assumed that the rate of catch up follows a transformed logistic curve. It can be seen on the right-hand scale that in the first years TFP growth is 0.9 - 1 percent higher in Hungary than in Austria while the difference approaches zero at the end of the period. The left-hand scale shows Hungarian relative TFP starting from 63.0 percent and attaining 79.0 percent by 2030.

We have assumed a similar development for all other parameters. They approximate the Austrian level fast at the beginning and level out at the end of the period. These parameters are the capital-output ratio, the rate of personal savings ratio, the price level, and relative prices of various goods. For example, if TFP catches up from 63.0 to 79.0 then the capital/output ratio catches up from 1.72 to 1.93.

Hungarian population projections were obtained from the analysis prepared for the pension reform in 1995. We assumed a slight increase in participation rate. For example,

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[12] We would like to call the attention that our conclusions regarding economic policy in the next section do no use the data for the years after 2005. Nevertheless, our results implies 4.8 percent average GDP growth for 1999-2005 that are similar to observed recent growth and forecasts of government and most economic institutes.

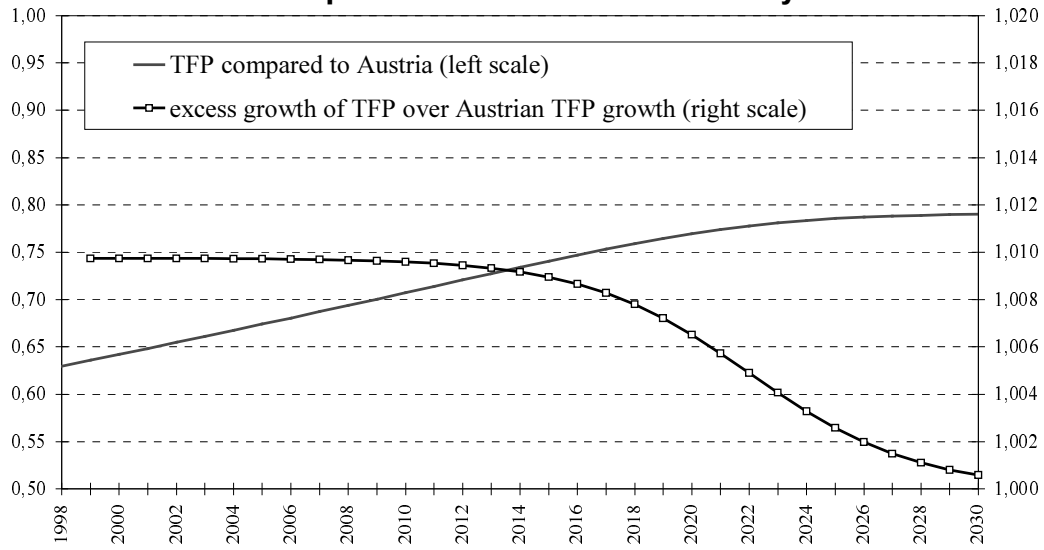
[13] Tarján [1998] presents a neoclassical growth model in which the growth rate is more rapid at the beginning of the reconstruction period and gives empirical illustrations. At the same time he calls attention to the fact that growth rates relapsed in many countries at the end of the reconstruction periods suddenly. These results support our assumption as to the beginning of the period considered - on which our analysis is concentrated - but are contrary to our assumptions as to the end of the period analyzed.

in the case when productivity catches up to 79.0 percent of Austria then participation increase from the present rate of 65.5 percent to 68.0 percent by 2030.

The scrapping rate was assumed to be a function of the speed of growth since faster growth coincides faster development in technology and a faster replacement of machines.

**Figure 1.**

**Catch-up of total factor productivity if GDP per capita reaches 70 percent of the Austrian level by 2030**




These assumptions determine the path of the relevant macroeconomic variables. For example, the level and rate of growth of Hungarian GDP can be determined by the following simple formulas:

$$(6) \qquad Y = A * L^{\alpha} * (\tau Y)^{(1-\alpha)} = A^{\frac{1}{\alpha}} * L * \tau^{\frac{1-\alpha}{\alpha}}$$

$$(7) \qquad Y_t / Y_{t-1} = \left(A_t / A_{t-1}\right)^{\frac{1}{\alpha}} * \left(L_t / L_{t-1}\right) * \left(\tau_t / \tau_{t-1}\right)^{\frac{1-\alpha}{\alpha}} \quad ,$$

Table 4 and Figures 2 and 3 show some details of a growth scenario that implies a catch up in terms of TFP to 79.0 percent of the Austrian level by 2030. Figure 2 shows the growth surplus over Austria in terms of GDP per capita and the relative position as compared with Austria. The last rows of Table 4 show the average rate of growth for sub-periods. Figure 3 presents investment ratios without residential buildings for 1980-98 and projections for 1999-2030. The source of investment data is the investment statistics of CSO which shows investments to be about 2 percentage points lower in terms of GDP than it is given in the national account statistics. Therefore, when compiling the forecasts of savings-investment balance, we will have to adjust these data.[14]

[14] Our GDP variable is measured at purchasing power parity so as it catches up to the level of developed countries real appreciation do not modify the speed of convergence. Although the lapse of time will lead to a real appreciation, i.e. to an increase of the price level compared to Austria, this alerts the catch-up of GDP

As Figure 3 shows the growth process that accelerated recently will be maintained only if recent increase of investment ratio continues until it reaches a level about 4 percent higher than its present value. Then it would stabilize and subside to its present level later at the end of the period. This development is determined by two factors, the change in the capital output ratio and the rate of output growth. At the end of the period the contribution of both factors to the investment ratio decreases.

Our calculations led to the result that the rate of TFP growth will decrease from the average rate of 3.4 percent in 1994-98 to 2.5 percent in 1999-2005. In other words the share of capital contribution in GDP growth will increase at the expense of TFP. The arguments defending this result come from two sources: (1) specific factors related to the transition, (2) international experiences.

(1) In the early nineties both employment and the capital stock decreased sharply. For example, in 1992 employment, capital stock and GDP decreased by 10, 2.2 and 3 percent respectively. These resulted in a 5 percent increase in TFP. We know that a considerable part of drop in employment was due to the elimination of the large-scale over-employment characteristic to state-owned firms. This shake-up in the labor market was probably a one-time event that increased productivity but cannot be counted on in the long run. On the other hand, during transition there was a substantial improvement in the structure of the employed labor stock (unskilled workers have been dismissed to a much greater extent) that cannot be expected to continue in the future. Finally, it may be that the high rate of TFP growth in 1997-98 was partly caused by favorable cyclical factors. In 1995-96, for example, TFP growth was only 2.2 percent.[15]

(2) Calculations of Nehru-Dhareshwar [1994] show that before 1973 some East Asian countries attained 3 to 6 percent annual TFP growth but this did not happen in the last 25 years. For example, the rate of TFP increase was in the range 1-2.5 percent in Korea, Japan

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measured at domestic prices and current exchange rates. Real appreciation may, however, influence the future values of GDP/capital stock indicators if the price convergence of capital goods are different from that of GDP. In case of equipment, e.g., it can be assumed that nowadays the their price level is closer to that of developed countries than in case of other goods, so their price convergence will be less than the general price level convergence. (The reason is that a large part of equipment is imported or competes with foreign equipment.) If there are no volume changes but the change of prices of real assets is different from the change of the general price level then the capital/output ratio changes.

We have introduced some assumptions on relative prices of capital goods and assumed that in case of a 100 percent catch up they attain the international level, while in the intermediate cases they only attain levels that are proportionately lower. As to the distribution in time we have assumed also in this case that it is proportional to the speed of catch up, therefore, revaluation is greater in the time periods of more rapid growth than in the end. All these mean that capital stock indicators computed by us for the future are expressed at 1998 price level but at the price structure of the individual years.

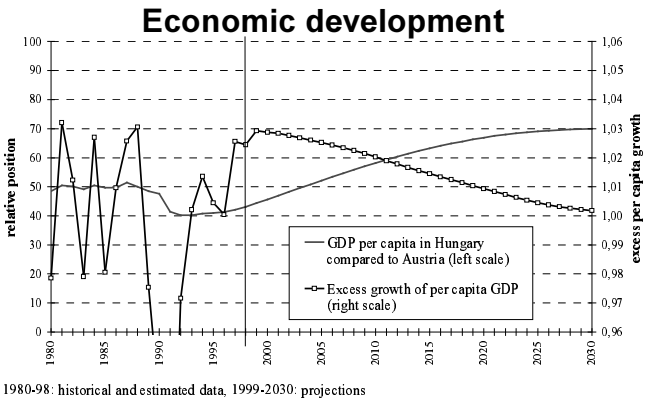
[15] Our production function takes into consideration the development of human capital only as part of the change in TFP. In spite of this it must be emphasized that investment in human capital cannot substitute that into physical capital. The reason for this is that the value physical capital/output ratio must close up to that of the developed countries and the qualification of the labor must also rise to a level that attained already in Europe to be able to operate physical capital in an appropriate way. Scenarios could be assumed, theoretically, where physical capital/output ratio is lower than in Austria but human capital is more qualified (the level of TPF is higher). This case would require less investment into physical and more into human capital but it is clearly impossible to take a stand of their balance.

and Singapore in 1973-87, and a rate of increase of around or above 3 percent was only experienced in Cyprus, China and Egypt. There were some examples for rapid growth but in these cases the increase of capital intensity contributed also to the high rates of growth. Felipe [1997] surveys several dozens of studies dealing with total factor productivity in East Asian countries. Although the estimates of various authors show great dispersion even for the same country, only a few cases of larger than 2 percent TFP increase percent per year can be found, particularly in the eighties and nineties.

**Table 4. Key figures of catch-up**

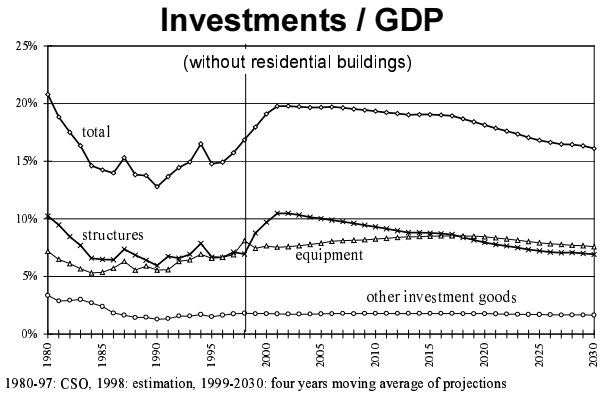
| ***Catch-up (HUN / AUT)*** | ***1998*** | ***2030 proj.*** |
|---|---|---|
| TFP | 0,630 | 0,790 |
| GDP/capita | 0,431 | 0,700 |
| ***Relative Prices (HUN / AUT)*** | ***1998 est.*** | ***2030 proj.*** |
| GDP | 0,400 | 0,660 |
| equipment | 0,650 | 0,802 |
| structures | 0,320 | 0,615 |
| other inv. goods | 0,500 | 0,717 |
| ***Composition of capital stock*** | ***1998 est.*** | ***2030 proj.*** |
| equipment | 0,231 | 0,270 |
| structures | 0,712 | 0,672 |
| other inv. goods | 0,057 | 0,058 |
| ***Capital/GDP*** | ***1998 est.*** | ***2030 proj.*** |
| equipment | 0,398 | 0,520 |
| structures | 1,228 | 1,298 |
| other inv. goods | 0,098 | 0,112 |
| together | 1,724 | 1,930 |
| ***Depreciation rates*** | ***1999 ass.*** | ***2030 ass.*** |
| equipment | 0,1130 | 0,1000 |
| structures | 0,0315 | 0,0250 |
| other inv. goods | 0,1087 | 0,1000 |
| ***GDP and TFP growth*** | **GDP** | **TFP** |
| 1999-2005 | 1,0482 | 1,0253 |
| 2005-2010 | 1,0444 | 1,0258 |
| 2011-2020 | 1,0356 | 1,0245 |
| 2021-2030 | 1,0265 | 1,0192 |

**Figure 2.**




1980-98: historical and estimated data, 1999-2030: projections

**Figure 3.**




1980-97: CSO, 1998: estimation, 1999-2030: four years moving average of projections

## 3. Growth and the saving-investment balance

What are the financing sources of additional investments needed for rapid growth? In this section we analyze savings prospects of different sectors. [16]

### *3.1. Income distribution, household and corporate savings*

It is a commonplace that the propensities to save of the rich and the poor are different. Income available for investments is therefore dependent on income distribution. An important aspect of income distribution is the share of corporate and household income. Recipients of the former behave as „rich" and spend only an insignificant part of their income on consumption while those of the latter spend greater part of their income on consumption.

One of the means of increasing savings might therefore be the increase of the share of corporate income within total income. It seems that present economic policy attempts to make use of this instrument. Government policy sets guidelines to personal income to increase at half of the rate of total income. This guideline however disregards any economic theory. The government might determine its own slice of the cake but it is not able to influence the distribution of the rest of the cake. This distribution is determined by marginal productivities of factors of production. Economic history teaches us that one of the most stable long-term relationships is the ratio of capital and labor income shares. This ratio is about one third to two thirds both in developed and less developed or in rapidly and slowly growing countries. Although the separation of labor incomes from capital incomes is difficult statistically, and therefore we have no firm information about the shares, there is much reason to suppose that the present income distribution is close to the long-term "equilibrium".

At the time of the great recession of the Hungarian economy in 1991-92 wages decreased to a much smaller extent than profits. The share of profits generally happens to decrease in cases of cyclical depression, although the size of the drop was probably influenced by economic policy. However, the share of profits recovered gradually until the late 1990-ies. This may be explained partly by the general economic recovery, partly by the abolishment of consumer price subsidies financed from profit taxes, and partly by the consequences of the 1995 devaluation-based stabilization. By 1998 the ratio of profits seems to stabilize around the 1995 rate[17] (see row „corporate savings" of Table 6). No major importance should be attributed to the fluctuations of this indicator, as the margin of statistical errors is high. Adding capital income of households we may arrive to the one third - two-thirds ratio conform to general international experiences. Therefore, we have no reason to expect major changes in this ratio in the future.

This means that in our forecast of savings we cannot expect a shift in income

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[16] We note that savings mean all kinds of income that its owner does not spend on consumption. This definition differs somewhat from the everyday use of this word according to which the unspent part of income is considered saving. Income spent on investment is therefore saving in the economic sense of the word.

[17] If „stock accumulation" is also considered saving, the rate of corporate savings corrected for inflation was somewhat higher in 1997-98 that in 1995-96 (see Table 6, rows 5+6), but the same rate seems to have stabilized by 1998.

distribution as a factor changing aggregate saving. We have to confine ourselves to analyzing household behavior.

### *3.1.1. Households*

When determining the expected saving rate we follow the same principle that was used in the forecast of capital stock and investment. We assume again that the catching up process makes us more similar to the developed countries. In this case we assume to catch up in terms of the financial assets/personal income ratio.

International data show for the ratio of net financial assets to private income in developed countries a figure of 2. This ratio is now about 0.62 in Hungary. As a result, if we assume catching up, savings have to increase largely. As a baseline scenario we assumed that catching up in terms of the financial assets ratio follows the catch-up in GDP. This means that a 70 percent catch-up in terms of GDP per capita implies a 1.26 financial asset ratio.

As an alternative we might have assumed to reach the asset ratio 2.0 already at the 70 percent catch-up ratio, arguing that in this case we will have attained already the present level of developed countries. This assumption would have led to an extremely large rate of (flow) saving rate, 2 percent per year higher than in the base variant. This would lead to an optimistic variant of the net savings balance provided that our estimate of the capital stock is unchanged. However, we have to take into account, that our capital stock forecast implied a low estimate as well. Finally, we have thought that it will make our results easier to present and to survey if we show only one of the possible outcomes in our table, the outcome that is somewhere in the middle in terms of outcomes in *net* (flow) saving, knowing that the forecast may easily have an error of 2 percent per year in both directions.

Many details were disregarded. Household savings as they appear in the statistics depend on the health and pension insurance system. In the funded system pensions and medical costs are paid by insurance funds, and their financing is part of household saving. In the pay-as-you-go system pensions are financed from taxes and are not considered as savings. Our assumption that the rate of financial assets will double is loose enough to be able to comprise the effects of the reform of the pension system. Nevertheless, it would be desirable to make more specific calculations in this respect.

Some other specific assumptions:

1. The financial asset/income rate will increase as a linear function of the rate of catch-up.

2. Financial assets are subdivided into stocks, foreign currency deposits and others. In case of stocks a 4 percent per year relative increase of value was assumed, i.e. the value of stock increases to such an extent without additional saving. In case of foreign currency deposits we have not assumed any inflation loss.

3. Price changes of interest-bearing securities were disregarded. For longer terms this is a reasonable assumption as return on bonds is volatile in the short run but in the long term it moves parallel with inflation.

### *3.1.2. Corporate savings*

According to our assumptions firms have no personal consumption. This is approximately true in a statistical sense. A firm either invests its gross income into real or financial assets or pays it out in form of dividends. The latter is included in household income; the former is called corporate saving.

Dividend policy of the firms influences consumption as the full amount of retained earnings is saved while a certain part of dividends finances personal consumption. This effect is disregarded in our model meaning that we considered the ratio of retained earnings and dividends unchanged.

Having introduced these assumptions the ratio of corporate savings within GDP can be derived directly from the income distribution between firms and households.

#### *3.1.3. Note on the meaning of „inventory accumulation"*

It is an interesting feature of Hungarian statistics that inventory accumulation seems to be continuously around 5 percent of GDP and in 1998 it even exceeded 7 percent. Statistics of other countries gives values mostly below 1 percent what makes very probable that the Hungarian statistics covers something else. According to information obtained from CSO errors and omissions amount to 0.5-1 percent of GDP and therefore their treatment as inventory accumulation cannot account for these surprising figures. It is considered indisputable as well that there is real production behind inventory accumulation. We might look for a possible solution of the puzzle in creative bookkeeping for tax evading purposes. The question however is still open whether it covers consumption or investment. There are arguments for both assumptions. The value-added tax refund might most probably induce firms to increase the amount of their purchases and to decrease that of their sales as they appear in their books. If this hypothesis is true excess inventory accumulation is in fact personal consumption. On the other hand, there are reasons for assuming that it reflects investments. Presenting investments as inventory accumulation allows a de facto instant amortization that saves taxes, especially in the existing inflationary conditions. None of these arguments explain, however, the large increase of this item in the national income statistics in 1998.

The problem would certainly justify a more detailed analysis but we cannot undertake this here. In our tables we tried to separate inventory accumulation in order to avoid the illusion that it represents some form of capital accumulation that creates assets for future use.

### *3.2. FDI projections*

For a forecast of FDI we have no firm theoretical grip. We may, however, tie FDI to the rate of GDP growth, similarly to the capital stock forecast. For this we have to introduce an assumption about the share of foreign capital in the total stock.

Today the amount of foreign capital including portfolio investments may be about 25 billion dollars. This is about 30 percent of the productive capital stock worth of about 80 billion. Let us assume that foreign capital will not increase its share within total productive capital. This means that foreigners cover only the additional capital needed to keep the capital output ratio abreast with the growth path. Sources of the needed investment are partly reinvested profits and partly FDI in a statistical sense.

Let us assume that foreign know-how produces profit rates 1.5 times higher than rates in domestic firms. By this assumption the net inflow of external resources that keeps the 30 percent share in total capital stock would be 1.5-2 percent of GDP i.e. 0,75-1 billion dollars annually.

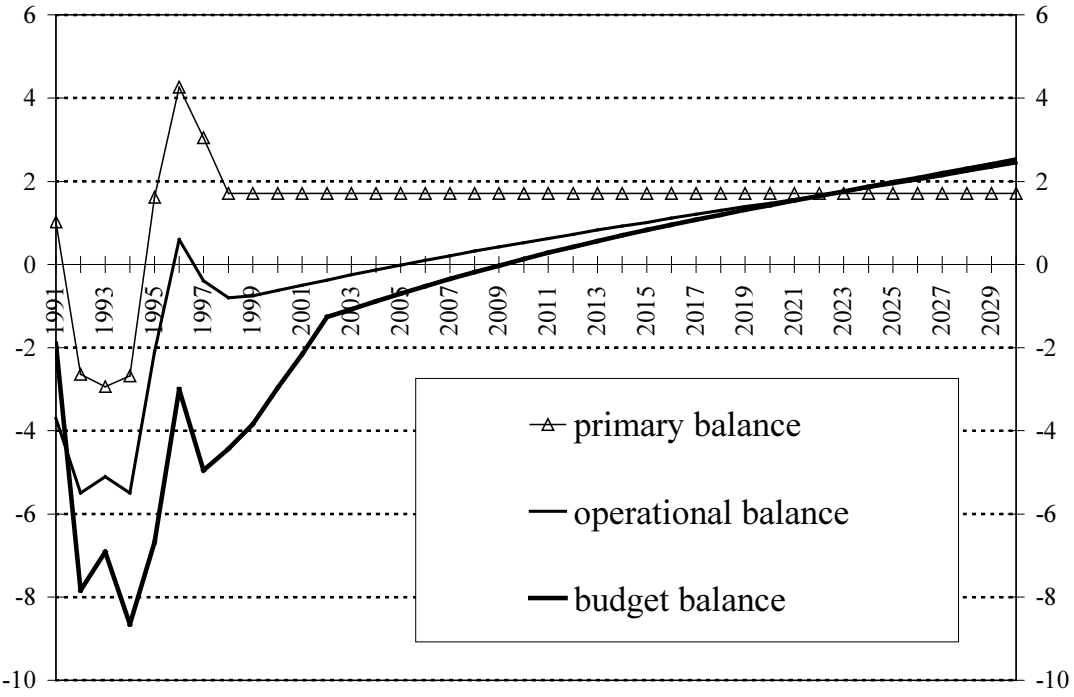
This calculation of course does not give an estimation of external sources, but only the result of an assumption about keeping the 30 percent share. Reasons for accepting this

assumption are only that recent capital flow data are in line with these figures.[18]

### *3.3. A non-feasible growth path*

In the following we will show how much external financing would be needed if growth followed the catch-up path and the rate of domestic saving were determined by the assumptions described above, while fiscal stance were unchanged at the present level. Fiscal stance is interpreted as the primary balance while the government investment rate is assumed to stay at the present level. This assumption serves only for simplifying the problem; it does not reflect any judgement about the desirable structure of government expenditures.

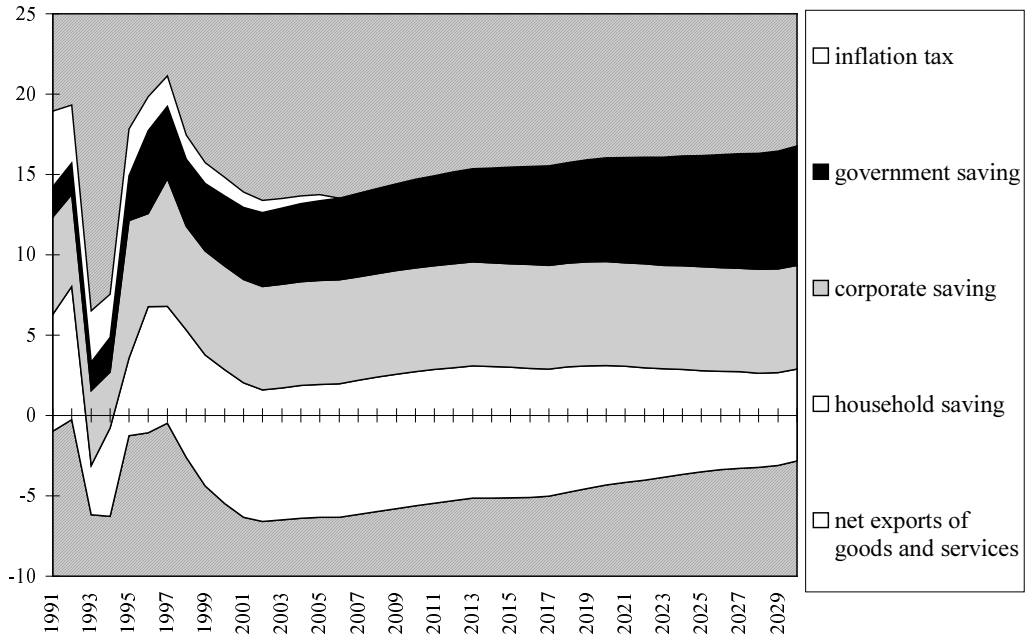
**Figure 4.**
**Government budget balance assuming unchanged fiscal stance since 1999**




With an unchanged fiscal policy the internal debt/GDP ratio would decrease gradually and we could attain balanced budget by 2010. This would not mean excessively great haste in fulfilling the EU recommendations as to balanced budget, but it could be considered as a fiscally sustainable policy. It would turn out however, that fiscal sustainability is not necessarily enough for sustaining economic growth at the desired rate.

[18]The results of the rule of thumb calculations employed here are very close to actual data published by CSO after our calculations.

**Figure 5.**
**Composition of investments by sources of financing, assuming unchanged fiscal stance**




**Household saving: total white area, Net exports: white area below the horizontal axis**

In our calculations the balance of domestic investments and saving appears as external financing. However, this value has to be interpreted only as a mathematical variable and not as an economic forecast. We will see, that its magnitude is higher than the amount that would be wise to take the risks to borrow and probably higher than the world would be willing to lend.

The conclusion is inescapable that a reassessment and adjustment of present fiscal policy is necessary.

One may consider to include EU contributions to resources. The reason for its omission is that the amount of contribution to be expected is negligible compared with the order of magnitude of the deficits appearing here. The support to be expected in the following three years may reach about 0.5 percent of GDP in the most favorable case. These contributions may perhaps increase somewhat after our accession but even in this case (1) they cannot be expected to change the financial balance of the country in a qualitative sense, (2) they will not be available within the next four years when the deficit will be the highest.

**Table 5.**

**GDP Balance**

*Percentage chg*

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|
| Personal Consumption | 1,9 | 4,5 | 5,1 | 5,4 | 4,7 | 4,7 | 4,6 |
| Government Consumption | 4,5 | 5,0 | 5,2 | 4,9 | 4,8 | 4,8 | 4,7 |
| **Total Consumption** | 2,3 | 4,6 | 5,1 | 5,3 | 4,7 | 4,7 | 4,6 |
| Fixed Investment | 13,1 | 10,5 | 8,2 | 4,9 | 4,5 | 4,5 | 4,8 |
| "Inventory Investment" | 4,5 | 5,0 | 5,2 | 4,9 | 4,8 | 4,8 | 4,7 |
| **Total Investment** | 11,0 | 9,3 | 7,6 | 4,9 | 4,6 | 4,5 | 4,8 |
| **Domestic Expenditure** | 4,8 | 6,0 | 5,9 | 5,2 | 4,7 | 4,6 | 4,7 |
| Export | 11,9 | 11,4 | 11,1 | 11,1 | 11,4 | 11,7 | 11,9 |
| Import | 15,1 | 12,9 | 12,0 | 11,0 | 10,7 | 10,9 | 11,3 |
| **GDP** | 4,5 | 5,0 | 5,2 | 4,9 | 4,8 | 4,8 | 4,7 |
| Disposable Personal Income | 4,5 | 5,0 | 5,2 | 4,9 | 4,8 | 4,8 | 4,7 |
| Consumption | 1,9 | 4,5 | 5,1 | 5,4 | 4,7 | 4,7 | 4,6 |
| Saving | 17,9 | 7,2 | 5,4 | 2,6 | 5,4 | 5,3 | 5,1 |

Note: Indices are "inflation-free" as explained in the notes to Table 6.

As Tables 5 and 6 and Figure 5 show, the investment rate (investments/GDP) ought to increase by about 4 percentage points from its present value in the near future. This means a further 10 percent annual growth of investment for the next 3 years until it stabilizes at the 4-5 percent rate. In our scenario domestic sources for financing this growth are not available. As it is shown by the tables in case of an unchanged fiscal stance this path would lead to a net inflow of resources at an annual rate of 5 to 6 percent of GDP. Even in the rather improbable case when factor incomes, interest payments and profit transfers stay at their present level this would mean a 6 to 7 percent deficit in the current accounts for an extended period up to 2005. The build-up of such indebtedness is unreasonable and unfeasible. This would lead both to the collapse of international confidence and to an overstraining of the risk-bearing capacity of Hungarian consumers. The result would be a financial and a subsequent economic crisis.

Our model implies — as can be seen in Table 5 — that the 5.1 percent GDP growth observed in 1998 declines in 1999 and then picks up till 2001. This is the consequence of the European business cycle as reflected in Austrian growth projections that we took as given. The rate of increase of consumption obtained for 1999 is very slow. This is due to the fact that consumption in 1998 was higher than its long-run value. For 1999 the rate of growth of investments is higher than forecasters would accept presently. Nevertheless, we did not adjust our data to take recent information into account as our task was not to prepare forecasts but medium-term structural analysis.

The rows of Table 6 show items of the

*investment + net exports of goods and services = saving*

identity.

Data for operational savings of households and corporations (i.e. savings corrected for inflation) are not equal to data appearing in other CSO publications. This is the consequence of differing definitions. The

reason for this is that two different methods may be employed to correct data for inflation and - depending on the aim of the exercise - both are correct.

1. All losses of real value inflicted by inflation upon financial assets are considered as „inflationary taxation". This sum - as it is taxation - is not part of disposable income and therefore of saving. This is the method employed here. Considering that this form of „taxation" does not appear in the fiscal balance, we have shown it in a separate row with the denomination of „inflationary taxation" as one of the sources of investments.

We note that the other element of seigniorage, the effect of the change in the real stock of money also appears as a source of investments in our bookkeeping as it is part of household and corporate savings corrected for inflation.

2. It is one of the axioms of SNA that changes in the valuation of wealth may not be represented as income. In order to remain strictly consistent with this principle the method described above cannot be followed even though it makes sense from an economic point of view. SNA however is willing to make a compromise between economic reasonability and statistical consistence, going halfway towards taking inflationary losses of asset holders into account. If a financial asset yields measurable income (interests), inflationary losses may be deducted to the extent of this yield, considering this as compensation of losses. Where such „yields" do not appear, as in case of cash and checking accounts, nothing can be done within the framework of this system. This half-solution leads to a concept of "real" saving that is difficult to interpret, but it still can be fitted into the SNA system. Several publications of NBH - following this system - publish data compiled on the basis of these principles as savings „corrected for inflation".

**Table 6.**

## Saving-investment balance with unchanged fiscal stance

| **Saving-investment balance, inflation-free** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| government saving | 1,9 | 1,9 | 1,8 | 2,2 | 2,8 | 5,2 | 4,5 | 4,2 | 4,2 | 4,4 | 4,5 | 4,6 | 4,7 | 4,9 | 5,0 |
| inflation tax | 4,70 | 3,60 | 3,20 | 2,70 | 2,90 | 2,10 | 1,90 | 1,50 | 1,30 | 1,17 | 0,94 | 0,75 | 0,60 | 0,48 | 0,38 |
| household saving | 7,3 | 8,3 | 3,1 | 5,5 | 4,8 | 7,8 | 7,2 | 7,9 | 8,2 | 8,3 | 8,4 | 8,2 | 8,2 | 8,3 | 8,3 |
| corporate saving | 6,0 | 5,7 | 4,6 | 3,5 | 8,6 | 5,8 | 8,0 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 |
| "inventory investment" | -0,5 | -3,8 | 1,1 | 2,1 | 3,9 | 5,4 | 5,7 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 |
| *total saving + "inventory investment"* | 19,4 | 15,8 | 13,8 | 15,9 | 23,0 | 26,4 | 27,3 | 27,2 | 27,2 | 27,4 | 27,3 | 27,1 | 27,1 | 27,1 | 27,2 |
| total investment, out of | 20,9 | 19,9 | 18,9 | 20,1 | 20,2 | 21,4 | 22,1 | 22,7 | 24,5 | 25,8 | 26,6 | 26,6 | 26,5 | 26,4 | 26,5 |
| government investment | 5,6 | 7,4 | 6,9 | 7,7 | 4,9 | 4,6 | 4,9 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 |
| household investment | 4,50 | 4,04 | 4,25 | 3,55 | 4,3 | 4,2 | 4,3 | 3,9 | 4,2 | 4,2 | 4,2 | 4,2 | 4,2 | 4,2 | 4,2 |
| corporate investment (excl. "inventory investment") | 10,8 | 8,4 | 7,8 | 8,9 | 11,0 | 12,6 | 12,9 | 13,7 | 15,3 | 16,6 | 17,4 | 17,4 | 17,3 | 17,3 | 17,3 |
| "inventory investment" | -0,5 | -3,8 | 1,1 | 2,1 | 3,9 | 5,4 | 5,7 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 |
| total accumulation incl "inventory investment" | 20,4 | 16,1 | 20,0 | 22,2 | 24,1 | 26,8 | 27,8 | 29,8 | 31,6 | 32,9 | 33,7 | 33,7 | 33,6 | 33,5 | 33,6 |
| net export of goods and services, out of | -1,0 | -0,3 | -6,2 | -6,3 | -1,3 | -1,1 | -0,5 | -2,6 | -4,4 | -5,5 | -6,3 | -6,6 | -6,5 | -6,4 | -6,4 |
| financed by FDI cash-flow (current and capital)* | | | | | | | | | -1,70 | -2,08 | -2,31 | -2,31 | -2,29 | -2,27 | -2,27 |
| investment of foreign residents (-)* | | | | | | | | | -4,60 | -4,99 | -5,21 | -5,22 | -5,20 | -5,18 | -5,18 |
| saving of foreign residents (+)* | | | | | | | | | 2,91 | 2,91 | 2,91 | 2,91 | 2,91 | 2,91 | 2,91 |
| debt-generating balance* | | | | | | | | | -2,69 | -3,42 | -4,03 | -4,28 | -4,22 | -4,12 | -4,08 |
| * assuming 30 percent share in assets | | | | | | | | | | | | | | | |

| **Net inflation-free financing capacity(+) or claim(-)** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| government operational balance | -3,70 | -5,50 | -5,10 | -5,50 | -2,10 | 0,60 | -0,40 | -0,80 | -0,77 | -0,63 | -0,50 | -0,38 | -0,26 | -0,14 | -0,02 |
| inflation tax | 4,70 | 3,60 | 3,20 | 2,70 | 2,90 | 2,10 | 1,90 | 1,50 | 1,30 | 1,17 | 0,94 | 0,75 | 0,60 | 0,48 | 0,38 |
| household saving | 2,8 | 4,3 | -1,2 | 1,9 | 0,6 | 3,6 | 3,0 | 4,0 | 4,0 | 4,1 | 4,2 | 4,0 | 4,0 | 4,1 | 4,1 |
| cortporate saving | -2,8 | -2,1 | 9,2 | 7,1 | -0,3 | -5,9 | -4,0 | -2,1 | -0,1 | 0,8 | 1,8 | 2,3 | 2,1 | 2,0 | 1,9 |
| net export of goods and services | -1,0 | -0,3 | -6,2 | -6,3 | -1,1 | -0,5 | -0,5 | -2,6 | -4,4 | -5,5 | -6,3 | -6,6 | -6,5 | -6,4 | -6,4 |
| total | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |

| **Saving (including inflation component)** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| government saving | 3,1 | 0,5 | 0,2 | -1,9 | -2,3 | 0,0 | 0,4 | 0,5 | 1,1 | 2,0 | 2,8 | 3,7 | 3,9 | 4,1 | 4,3 |
| household saving | 15,1 | 12,9 | 8,2 | 9,9 | 10,8 | 12,4 | 11,9 | 11,8 | 11,4 | 11,1 | 10,6 | 9,6 | 9,7 | 9,7 | 9,8 |
| cortporate saving | 1,2 | 2,4 | 5,4 | 7,9 | 14,5 | 13,9 | 15,0 | 14,8 | 14,7 | 14,3 | 13,9 | 13,8 | 13,5 | 13,3 | 13,1 |
| total | 19,4 | 15,8 | 13,8 | 15,9 | 23,0 | 26,4 | 27,3 | 27,2 | 27,2 | 27,4 | 27,3 | 27,1 | 27,1 | 27,1 | 27,2 |
| **Net financing capacity(+) or claim(-)** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| government balance | -2,5 | -6,9 | -6,7 | -9,6 | -7,2 | -4,6 | -4,5 | -4,4 | -3,9 | -3,0 | -2,2 | -1,3 | -1,1 | -0,9 | -0,7 |
| household saving | 10,6 | 8,9 | 3,9 | 6,3 | 6,5 | 8,2 | 7,7 | 7,9 | 7,2 | 6,9 | 6,4 | 5,4 | 5,4 | 5,5 | 5,6 |
| cortporate saving | -7,1 | -1,7 | 8,9 | 9,5 | 1,8 | -3,2 | -2,7 | -0,8 | 1,0 | 1,5 | 2,1 | 2,5 | 2,1 | 1,8 | 1,5 |
| net export of goods and services | -1,0 | -0,3 | -6,2 | -6,3 | -1,1 | -0,5 | -0,5 | -2,6 | -4,4 | -5,5 | -6,3 | -6,6 | -6,5 | -6,4 | -6,4 |
| total | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| **General government indicators** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| debt/GDP | | | | | | | | 0,65 | 0,62 | 0,59 | 0,55 | 0,52 | 0,49 | 0,46 | 0,43 |
| debt in current prices | | | | | | | | 6619 | 7256 | 7793 | 8195 | 8387 | 8555 | 8693 | 8797 |
| interest costs | -2,93 | -5,19 | -3,97 | -5,97 | -8,31 | -7,26 | -8,00 | -6,15 | -5,58 | -4,70 | -3,88 | -2,98 | -2,79 | -2,60 | -2,42 |
| primary balance | 1,02 | -2,65 | -2,94 | -2,68 | 1,62 | 4,26 | 3,05 | 1,71 | 1,71 | 1,71 | 1,71 | 1,71 | 1,71 | 1,71 | 1,71 |
| budget balance | -1,91 | -7,83 | -6,92 | -8,66 | -6,69 | -3,00 | -4,95 | -4,44 | -3,87 | -2,98 | -2,16 | -1,27 | -1,08 | -0,89 | -0,71 |
| operational balance | -3,70 | -5,50 | -5,10 | -5,50 | -2,10 | 0,60 | -0,40 | -0,80 | -0,77 | -0,63 | -0,50 | -0,38 | -0,26 | -0,14 | -0,02 |
| inflation component | 1,79 | -2,33 | -1,82 | -3,16 | -4,59 | -3,60 | -4,55 | -3,64 | -3,10 | -2,35 | -1,66 | -0,89 | -0,82 | -0,75 | -0,69 |
| **growth rates** | | | | | | | | | | | | | | | |
| investment | | -7,3 | -2,4 | 12,5 | -4,3 | 6,7 | 8,8 | 8,4 | 13,1 | 10,5 | 8,2 | 4,9 | 4,5 | 4,5 | 4,8 |
| GDP | | -2,6 | 0,0 | 2,8 | 1,5 | 1,3 | 4,6 | 5,1 | 4,5 | 5,0 | 5,2 | 4,9 | 4,8 | 4,8 | 4,70 |
| GDP deflator | | 122,6 | 121,4 | 119,6 | 127,0 | 121,0 | 118,2 | 113,0 | 110,0 | 108,0 | 106,0 | 103,4 | 103,3 | 103,3 | 103,2 |
| seigniorage% | | | | | | | | 1,00 | 0,98 | 0,96 | 0,94 | 0,92 | 0,90 | 0,88 | 0,86 |

Notes. The table - apart from the last three rows - contains data in percentage of GDP. If the volume index of GDP is known it can be used to determine the "inflation-free" rates of growth of the individual elements of GDP. These indices will not be exactly the same as the volume indices of the individual elements as they do not reflect changes in relative prices. This is why we get an 8 percent growth figure of investments for 1998: investments increased by 22.5 percent at current prices and dividing this value by the 13.5 percent GDP deflator we obtain the 8.4 percent growth rate appearing in the table. The investment deflator was, however, only 10.3 percent, and the „effective" volume index was therefore about 11 percent. The same comment applies to data of the GDP balance table. Indexes represent "inflation-free" but not volume indexes. The growth rate of government consumption is equal to the growth rate of GDP in accord with our assumption that the position of the budget is unchanged. The „real" volume index would most probably be smaller than this index as productivity growth in social services is relatively low and consequently relative prices increase in this sector.

### *3.4. The limits to indebtedness*

If the expected growth is fast then it may be reasonable to smooth out consumption by getting indebted at the expense of future consumption. Theory tells that this policy is reasonable if two additional conditions are fulfilled: (1) present consumption is preferred to that in the future, and (2) rapid growth is not only hoped for but it will be realized certainly. If these conditions are fulfilled then "excess growth" within a relatively narrow time period may justify rather large deficits. For example, if we knew with certainty that the rate of growth of domestic productivity would be 1 percent higher for 10 years then it would justify to incur a current account deficit of 7 percent per year on average allowing the debt/GDP ratio to reach 1.[19]

The desirability of this deficit may disappear at once if we take into consideration uncertainty. There are several kinds of risks. (1) We may not be completely sure that the assumed growth potential really exists. Growing fast now does not mean that we will grow fast when the repayment is due. (2) Creditors are generally less informed about the risks of their loans than debtors are. This is particularly true for external creditors. Therefore, herd behavior may lead to excessive fluctuations in the willingness to grant credits. This may lead to output shocks in the indebted country that jeopardize repayment potential. (3) Leverage increases the risk of a project. The same is true for consumption. Debt service increases variability of consumption.

Lessons from the theory give reasons to be cautious in using the consumption smoothing argument as a policy principle.

1. It is rather questionable whether it is ethical to base macroeconomic policy on the assumption of additive and discountable intertemporal preferences.

The Kádár-system[20] is often and rightly criticized that it incurred debts in order to maintain living standards at the expense of the present generation. However, it did nothing else than intertemporal optimizing along the theory of a representative agent facing additive and discounted intertemporal preferences. We do not consider this policy as justified in a moral sense now. Did we the same today, the next generation would be entitled to condemn us.[21]

2. Leveraging a country's consumption may lead to an outcome which is worse than the worst scenario with a no-credit policy. In short, credit-based macroeconomic policy is risky.

It is obviously impossible to measure the propensity of the nation to take risk. Economic

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[19] See Obstfeld–Rogoff (1996), pp. 116-118. for such a model.

[20] Janos Kádár was the general secretary of the Hungarian Socialist Labor Party for three decades.

[21] Some readers may not consider appropriate to compare the indebtedness of the eighties with the present situation saying that borrowing now is used to finance investments, helping in this way future generations. This „refinement" of the reasoning hardly changes its moral content. On the one hand, the present rate of investments is still not higher than the average rate of those years (the efficiency of investments is not part of the questions dealt with here). On the other hand, this „refinement" confounds two different problems of decision. It may be disputed whether a higher rate of investment was needed in the Kádár-system or not, but the decision whether domestic or foreign resources should be used means a decision involving value judgments about choosing between present and future consumption.

policy will therefore reflect the propensity of policymakers to take risk. The policies of various countries with respect to risk taking show a great variance, particularly in case of less developed economies. In the history of economic policies prudent policies change into the most adventurous policies or vice versa. As nations cannot change so rapidly, this proves that policymakers or policies followed by the same policymakers must be changing.

Greater risk means greater expected returns in business. Economic policy however cannot rely on this rule. Higher return is not a result of risk-taking in itself, but of "good", successful risk-taking. The market determines the success of risk-taking, by international investors. Economic policy may attempt to build rapid economic growth on taking up credits, but the market will punish a failure driving the country into a possible disaster.

### *3.5. Economic policy to improve the savings balance*

We have shown that a rate of growth of 4.5-5 percent per year under conditions determined by present saving behavior makes a level of external financing necessary that is neither desirable nor feasible. Two outcomes are possible. Either we accept slower growth - we will see later how lack of finances decreases the rate of growth that can be attained - or we have to provide additional resources through fiscal policy.

The propensity to save of the Hungarian consumer is relatively small. There is no country that could finance rapid economic growth with a low private saving rate and a negative balance of the budget. In most of the rapidly growing countries household and government savings were high at the same time. Some of these countries have recoursed also to external financing but the rapid increase of indebtedness is not a general characteristic of rapidly growing countries. On the opposite, debt usually accumulated in countries with growth problems. The idea of increasing saving by income redistribution in favor of profits is lacking any empirical or theoretical foundation.[22] Macroeconomic policy that considers growth as a preference cannot disregard these experiences and theoretical considerations.

We do not know our growth potential. It is determined by our technological potential that we cannot assess. It can be stated very definitely, however, that whether we exploit this potential will depend on macroeconomic policy. International experiences show that major strategic errors of macroeconomic policy may retard economic development for decades.[23]

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[22] Tax incidence policy favoring capital against labor might have such an effect and is worth to consider, but the room for such a policy is rather narrow.

[23] Chile is almost a copybook example for experiments with macroeconomic policies. It tried the debt/based growth in the seventies with disastrous results. The dominant element of its present spectacular success is high domestic saving supported by a large fiscal surplus.

**Table 7.**

## Saving-investment balance assuming fiscal adjustment

| **Saving-investment balance, inflation-free** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| government saving | 1,9 | 1,9 | 1,8 | 2,2 | 2,8 | 5,2 | 4,5 | 4,2 | 4,5 | 5,7 | 6,9 | 7,0 | 7,1 | 7,2 | 7,3 |
| inflation tax | 4,70 | 3,60 | 3,20 | 2,70 | 2,90 | 2,10 | 1,90 | 1,50 | 1,30 | 1,17 | 0,94 | 0,75 | 0,60 | 0,48 | 0,38 |
| household saving | 7,3 | 8,3 | 3,1 | 5,5 | 4,8 | 7,8 | 7,2 | 7,9 | 8,2 | 8,3 | 8,4 | 8,2 | 8,2 | 8,3 | 8,3 |
| corporate saving | 6,0 | 5,7 | 4,6 | 3,5 | 8,6 | 5,8 | 8,0 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 |
| "inventory investment" | -0,5 | -3,8 | 1,1 | 2,1 | 3,9 | 5,4 | 5,7 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 |
| *total saving + "inventory investment"* | 19,4 | 15,8 | 13,8 | 15,9 | 23,0 | 26,4 | 27,3 | 27,2 | 27,5 | 28,8 | 29,8 | 29,5 | 29,5 | 29,5 | 29,5 |
| total investment, out of | 20,9 | 19,9 | 18,9 | 20,1 | 20,2 | 21,4 | 22,1 | 22,7 | 24,5 | 25,8 | 26,6 | 26,6 | 26,5 | 26,4 | 26,5 |
| government investment | 5,6 | 7,4 | 6,9 | 7,7 | 4,9 | 4,6 | 4,9 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 | 5,0 |
| household investment | 4,50 | 4,04 | 4,25 | 3,55 | 4,3 | 4,2 | 4,3 | 3,9 | 4,2 | 4,2 | 4,2 | 4,2 | 4,2 | 4,2 | 4,2 |
| corporate investment (excl. "inventory investment") | 10,8 | 8,4 | 7,8 | 8,9 | 11,0 | 12,6 | 12,9 | 13,7 | 15,3 | 16,6 | 17,4 | 17,4 | 17,3 | 17,3 | 17,3 |
| "inventory investment" | -0,5 | -3,8 | 1,1 | 2,1 | 3,9 | 5,4 | 5,7 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 |
| total accumulation incl "inventory investment" | 20,4 | 16,1 | 20,0 | 22,2 | 24,1 | 26,8 | 27,8 | 29,8 | 31,6 | 32,9 | 33,7 | 33,7 | 33,6 | 33,5 | 33,6 |
| net export of goods and services, out of | -1,0 | -0,3 | -6,2 | -6,3 | -1,3 | -1,1 | -0,5 | -2,6 | -4,1 | -4,1 | -3,9 | -4,2 | -4,1 | -4,0 | -4,0 |
| financed by FDI cash-flow (current and capital)* | | | | | | | | | -1,70 | -2,08 | -2,31 | -2,31 | -2,29 | -2,27 | -2,27 |
| investment of foreign residents (-)* | | | | | | | | | -4,60 | -4,99 | -5,21 | -5,22 | -5,20 | -5,18 | -5,18 |
| saving of foreign residents (+)* | | | | | | | | | 2,91 | 2,91 | 2,91 | 2,91 | 2,91 | 2,91 | 2,91 |
| debt-generating balance* | | | | | | | | | -2,39 | -2,06 | -1,59 | -1,87 | -1,83 | -1,77 | -1,77 |
| * assuming 30 percent share in assets | | | | | | | | | | | | | | | |

| **Net inflation-free financing capacity(+) or claim(-)** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| government operational balance | -3,70 | -5,50 | -5,10 | -5,50 | -2,10 | 0,60 | -0,40 | -0,80 | -0,47 | 0,72 | 1,94 | 2,04 | 2,13 | 2,22 | 2,30 |
| inflation tax | 4,70 | 3,60 | 3,20 | 2,70 | 2,90 | 2,10 | 1,90 | 1,50 | 1,30 | 1,17 | 0,94 | 0,75 | 0,60 | 0,48 | 0,38 |
| household saving | 2,8 | 4,3 | -1,2 | 1,9 | 0,6 | 3,6 | 3,0 | 4,0 | 4,0 | 4,1 | 4,2 | 4,0 | 4,0 | 4,1 | 4,1 |
| cortporate saving | -2,8 | -2,1 | 9,2 | 7,1 | -0,3 | -5,9 | -4,0 | -2,1 | -0,7 | -1,9 | -3,1 | -2,6 | -2,6 | -2,7 | -2,7 |
| net export of goods and services | -1,0 | -0,3 | -6,2 | -6,3 | -1,1 | -0,5 | -0,5 | -2,6 | -4,1 | -4,1 | -3,9 | -4,2 | -4,1 | -4,0 | -4,0 |
| total | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |

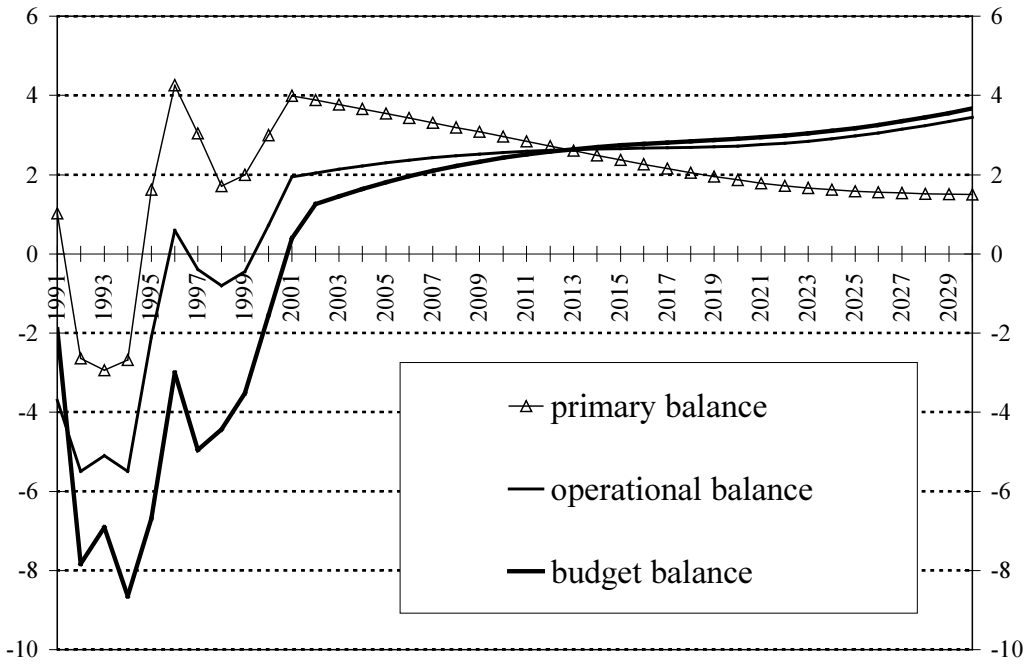
| **Saving (including inflation component)** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| government saving | 3,1 | 0,5 | 0,2 | -1,9 | -2,3 | 0,0 | 0,4 | 0,5 | 1,4 | 3,4 | 5,4 | 6,2 | 6,4 | 6,6 | 6,8 |
| household saving | 15,1 | 12,9 | 8,2 | 9,9 | 10,8 | 12,4 | 11,9 | 11,8 | 11,4 | 11,1 | 10,6 | 9,6 | 9,7 | 9,7 | 9,8 |
| cortporate saving | 1,2 | 2,4 | 5,4 | 7,9 | 14,5 | 13,9 | 15,0 | 14,8 | 14,7 | 14,2 | 13,8 | 13,7 | 13,4 | 13,2 | 12,9 |
| total | 19,4 | 15,8 | 13,8 | 15,9 | 23,0 | 26,4 | 27,3 | 27,2 | 27,5 | 28,8 | 29,8 | 29,5 | 29,5 | 29,5 | 29,5 |
| **Net financing capacity(+) or claim(-)** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| government balance | -2,5 | -6,9 | -6,7 | -9,6 | -7,2 | -4,6 | -4,5 | -4,4 | -3,6 | -1,6 | 0,4 | 1,3 | 1,5 | 1,6 | 1,8 |
| household saving | 10,6 | 8,9 | 3,9 | 6,3 | 6,5 | 8,2 | 7,7 | 7,9 | 7,2 | 6,9 | 6,4 | 5,4 | 5,4 | 5,5 | 5,6 |
| cortporate saving | -7,1 | -1,7 | 8,9 | 9,5 | 1,8 | -3,2 | -2,7 | -0,8 | 0,4 | -1,2 | -2,9 | -2,4 | -2,8 | -3,1 | -3,3 |
| net export of goods and services | -1,0 | -0,3 | -6,2 | -6,3 | -1,1 | -0,5 | -0,5 | -2,6 | -4,1 | -4,1 | -3,9 | -4,2 | -4,1 | -4,0 | -4,0 |
| total | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| **General government indicators** | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| debt/GDP | | | | | | | | 0,65 | 0,62 | 0,57 | 0,51 | 0,46 | 0,41 | 0,36 | 0,31 |
| debt in current prices | | | | | | | | 6619 | 7221 | 7576 | 7604 | 7388 | 7108 | 6756 | 6329 |
| interest costs | -2,93 | -5,19 | -3,97 | -5,97 | -8,31 | -7,26 | -8,00 | -6,15 | -5,55 | -4,57 | -3,60 | -2,63 | -2,32 | -2,02 | -1,74 |
| primary balance | 1,02 | -2,65 | -2,94 | -2,68 | 1,62 | 4,26 | 3,05 | 1,71 | 2,00 | 3,00 | 3,99 | 3,88 | 3,77 | 3,66 | 3,54 |
| budget balance | -1,91 | -7,83 | -6,92 | -8,66 | -6,69 | -3,00 | -4,95 | -4,44 | -3,55 | -1,57 | 0,39 | 1,25 | 1,45 | 1,63 | 1,80 |
| operational balance | -3,70 | -5,50 | -5,10 | -5,50 | -2,10 | 0,60 | -0,40 | -0,80 | -0,47 | 0,72 | 1,94 | 2,04 | 2,13 | 2,22 | 2,30 |
| inflation component | 1,79 | -2,33 | -1,82 | -3,16 | -4,59 | -3,60 | -4,55 | -3,64 | -3,09 | -2,28 | -1,54 | -0,78 | -0,68 | -0,59 | -0,49 |
| **growth rates** | | | | | | | | | | | | | | | |
| investment | | -7,3 | -2,4 | 12,5 | -4,3 | 6,7 | 8,8 | 8,4 | 13,1 | 10,5 | 8,2 | 4,9 | 4,5 | 4,5 | 4,8 |
| GDP | | -2,6 | 0,0 | 2,8 | 1,5 | 1,3 | 4,6 | 5,1 | 4,5 | 5,0 | 5,2 | 4,9 | 4,8 | 4,8 | 4,70 |
| GDP deflator | | 122,6 | 121,4 | 119,6 | 127,0 | 121,0 | 118,2 | 113,0 | 110,0 | 108,0 | 106,0 | 103,4 | 103,3 | 103,3 | 103,2 |
| seigniorage% | | | | | | | | 1,00 | 0,98 | 0,96 | 0,94 | 0,92 | 0,90 | 0,88 | 0,86 |

See notes below Table 6.

We do not wish to take a stand in this paper about the exact magnitude of the fiscal correction needed, about the question whether private or social consumption should be restrained, and – in the former case – whether it should be done by restraining transfers or by increasing taxes. Many variants could be presented, but their common characteristics must certainly be that the net financing capacity of the state budget must be increased. For illustration we present in Table 7 an alternative variant in which fiscal belt-tightening is interpreted as higher taxes than in the base scenario. In this case the primary deficit is improving for the forthcoming years. As Figure 6 shows this scenario means less interest burden in the future that allows a less restrictive primary balance in the long run.

**Figure 6.**

**Government budget balance assuming fiscal adjustment**




### *3.6. Consequences of imbalance*

Until now our approach was to assume a growth path that is determined by microeconomic conditions and independent of financing and then to look for macroeconomic conditions needed to its realization.

We hope that this approach was useful to understand the necessary conditions but it might have led to misunderstanding, as it did not make obvious the difference between *actual* growth and *possible* growth. Actual growth depends to a great extent on the macroeconomic policy followed to provide the financial resources needed to realize the given possibility of growth. In this section we change the order or reasoning to tell how economic growth depends on the lack of financing.

Past international experience supports the reasonability of the following scenario. In the short run the policy of indebtedness may seem to be successful. Growth might be rapid and external confidence might last for a certain period. However, it would turn out within a few years that growth is not built on solid grounds. Any adverse shock may start a wave of

distrust that might increase the price of credits, increasing costs of the debt and setting off a crisis. Lack of stability, i.e. the possibility of larger fluctuations may cause even a maintained drop in business confidence. In this case the distrust will not be a whimsical idea of misinformed investors but the result of the analysis of well-informed domestic and external investors realizing that the market here is uncertain and investments more risky than elsewhere. External capital - not only external credits but also foreign direct investments - will be withdrawn and even domestic firms will be more cautious. Lack of international confidence must necessarily lead to high rates of interest that will decrease even further the inclination of firms to invest. Lowering interest rates would lead to capital flight, depreciation and inflation.

This scenario would mean a boom and bust cycle ending up at a steadily lower rate of growth. Macroeconomic equilibrium would be achieved by lowering investment demand and consequently growth. Some accommodation in monetary policy would probably lead to a revival in inflation.

We must admit that we cannot be certain that this scenario would still be probable. The behavior of capital markets has changed greatly. It may be that we could already avoid the process of upswing and crisis based on a bubble of confidence and its collapse. International capital markets might react immediately to any news that raise doubts about the long-run solvency of the country.

### *3.7. The role of monetary policy*

If fiscal policy is not willing to take the necessary corrective steps monetary policy faces a difficult dilemma. The reason for this is that the problem is of a structural character – the structure of demand must be changed to „make room" for investments within total demand. Monetary policy is clearly unable to do this. Its tasks and possibilities do not extend beyond controlling the quantity of money and thus the rate of inflation in the long run. Long-run equilibrium of savings and investments cannot be controlled by monetary policy.[24]

Monetary policy, however, can influence demand in the short run. It cannot solve the fundamental problem but it may intervene in the short run, for example, to avert the development of a bubble. If the lack of fiscal restraint might trigger a growth process risky enough to cause serious damages later then monetary policy could avert the development of a deep crisis by setting off a recession now. In such a way it may „stifle" the boom before it could develop, but by doing so it could also mitigate the depth of the oncoming recession. However, even if monetary policy decided to do so it is questionable whether it could do it successfully. Namely, a monetary restraint would lead to a real appreciation of the currency and very probably to a worsening of the external balance and deepening the recession when the bubble bursts. It is even possible that a loosening of monetary policy would be the adequate choice. If the problem is viewed as a financing crisis only inflation can lead to a solution if fiscal adjustment is excluded.

[24] The Ricardian equivalence principle denies even the role of government saving policy in aggregate demand. We do not consider the consequences of this principle as practically relevant.

### *3.8. Accession to EU*

It is a popular idea in Hungary that our present problem of financing growth is transitory. We must survive somehow the next few years – either by borrowing or by curbing growth– and our oncoming accession to EU will put an end to all problems of financing. The problems will cease partly because the direct development support that will be available and partly because the access to credits would not be hindered by the low credibility of a non-member country.

This view rests on several implicit assumptions.

The first is that the solution of the problem dealt with in this paper may be postponed. We think that this assumption is injudicious. We do not know when Hungary will access the EU but we surely know that the partners do not think that EU membership ought to establish macroeconomic equilibrium. On the contrary, they would consider balanced growth as a precondition of membership. This means that the idea of postponement – either that of growth or of financial prudence – is simply inconsistent with the strategic aim of accessing to EU.

Another assumption behind the arguments is that the membership of EU will make policy considerations regarding the external balance irrelevant. We think this idea to be unfounded.

Firstly, the order of magnitude of the transfers to be expected from the structural funds – as it has already been mentioned – will be much less than the 2 to 3 percent of GDP that shows up as a savings gap.

A somewhat longer analysis is needed to expound the other argument. The assumption dealt with here is that EU and particularly EMU membership will put an end to the connection between growth and domestic capital formation.[25] In an integrated world growth will only depend on microeconomic conditions as „credits will always be available for good projects with good growth prospect". Growth will therefore be exogenous for macroeconomic policy and the international community will always provide resources for good growth prospects.

Let us see the theoretical bases of this argument.

In a market without transaction costs income of the individual participants can be separated from expenditures completely. It is everybody's private affair whether he consumes his income today or saves it, or whether he borrows today and pays interests on it tomorrow. To interpret the same for regions, the growth of a region does not depend on whether his citizens – either directly or indirectly through the budget – are spendthrift or thrifty.

According to this reasoning the present lack of finances is only the consequence of the fact that world is separated into different countries. Foreigners do not grant the necessary credits as the division of the world into different countries leads to limitations of information and law enforcement. The problem of financing can therefore be attributed partly to transaction costs that exist also within countries and the effects of which are called liquidity constraints, and partly to deficiencies of law enforcement in case of credits given to sovereign states. The more integration will decrease these constraints the greater the role of international credits will be.

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[25] We should stress that EMU membership is even farther than the EU accession.

The decrease of transaction costs and the safety of external property rights are indeed a great advantage of integration. The argument that financing will be simpler and easier after integration is therefore well founded. However, this paper is not dealing with this problem, not as if it were not interesting but because we do not consider it of primary importance in explaining the interdependence between saving and growth.

The reasoning about the separability of expenditures from income is flawless but it contains the implicit assumption that the world is deterministic. This is where our model differs from this reasoning. We must remind the reader of the arguments of our paper stating that excessive indebtedness is disadvantageous both for debtors and creditors as it exposes them to risk costs that are high. This thesis has a fully and completely general character, and it is equally true before and after our EU membership. It is possible that the balance of payments statistics will disappear when Hungary will join the Euro-zone. This will, nevertheless, mean only that external investors – and also domestic policymakers – will lose an important source of information that could inform them of excessive indebtedness. Nevertheless, they will find other sources to be informed about the indebtedness of a person, a firm or a region or a country. The rules of prudent behavior will not change, as they are the direct consequence of the stochastic character of the world. Investors' money will flow to regions where macroeconomic risks are low. Economic policy will always have an important role in effecting this risk.

## 4. Summary

In our paper we have described shortly the perpetual inventory method to measure capital stock and shown why this method cannot be used under present Hungarian conditions. In order to measure capital stock in transition countries we proposed a modification that is based on economic assumptions. We have obtained from our calculations that the capital stock without residential buildings amounts to 1.72 times GDP at market prices now. This value is lower that the 2-2.5 figure of developed countries. As a result, if Hungary embarks a catching up growth path an increase in the capital-output ratio is to be expected.

We have analyzed in more detail the growth path reaching 70 percent of the Austrian level in terms of GDP/capita at purchasing power parity by 2030 starting from the present 43.1 percent. This path implies a rate of growth of 4.8 percent per year in the next five years that is similar to observed recent growth rates and forecasts of most economic institutes. We have come to the conclusion that the rate of investments must be higher than it is at present if this rate of growth is to be maintained, and household and corporate saving will not provide the additional resources needed to its finance. The propensity to save of the Hungarian consumers is relatively low, much lower than the rate generally attained in the rapidly growing Asian countries and Chile. There is no country in the world that could finance rapid economic growth with a low household savings rate and a significant government budget deficit. Most rapidly growing countries have high rates of household and budget savings at the same time. Some of them had also recoursed to external resources but indebtedness characterizes first of all not the rapidly growing countries, but at the contrary, countries with growth difficulties. It cannot be expected that Hungary will be able to attain rapid growth without taking into consideration these experiences and the theoretical considerations analyzed in the paper.

Although the use of external resources may be necessary, indebtedness has its limits. These limits are determined by intergenerational income distribution, by the willingness of international investors to lend, and by our own willingness to take risk. As a result, there remains only one source that can be influenced by economic policymakers and it is the fiscal balance. Sufficient fiscal saving is a precondition of rapid growth. Present fiscal policy is acceptable only from the aspect of internal debt but incompatible with economic growth at a 4.5-5 percent rate. If we believe that our technological potential allows rapid growth then a radical reconsideration of the principles guiding fiscal policy is needed.

In the years of transition the most important task in economic policy was the reversal of the increasing trend of government debt. In those years when the rate of growth was relatively low or even negative cutting government deficit was a cure to the problem of external imbalance as well.

Today, however, economic growth poses a new challenge to fiscal policy. Balanced budget and a slow decrease of government debt do not represent an adequate fiscal policy any more. External debt became the prime concern that may also be private debt with consequences not less destructive for the economy than those of sovereign debt. In a fast growing economy fiscal policy has to take the responsibility of providing sources for accumulation. This new role requires a new approach in determining the desired fiscal balance.

# Appendix

## Table 8.

### Assumptions used to estimate capital stock

| | | | |
|---|---|---|---|
| **Production function** | | | |
| 0,65 | share of labor | | |
| **Equipment** | | | |
| 0,06 | real growth of equipment investments before 1980 | | |
| 14 | service life of equipment up to 1990 | | |
| 12 | service life of equipment since 1991 | | |
| 0,1 | depreciation of equipment up to 1990 | | |
| 0,33 | one time depreciation of equipment in 1991 | | |
| 0,14 | depreciation of OLD equipment since 1991 | | |
| 0,11 | depreciation of NEW equipment since 1991 | | |
| 0,13 | depreciation in 1999 in the case of 100 % catch up | | |
| 0,1152 | depreciation in 1999 in the case of 70 % (GDP/capita) catch up | | |
| 0,10 | depreciation in 2030 | | |
| **Structures** | | | |
| 0,04 | real growth of structures investments before 1980 | | |
| 36 | service life of structures up to 1990 | | |
| 34 | service life of structures since 1991 | | |
| 0,025 | depreciation of structures up to 1990 | | |
| 0,125 | one time depreciation of structures in 1991 | | |
| 0,0375 | depreciation of OLD structures since 1991 | | |
| 0,0300 | depreciation of NEW structures since 1991 | | |
| 0,0400 | depreciation in 1999 in the case of 100 % catch up | | |
| 0,0326 | depreciation in 1999 in the case of 70 % (GDP/capita) catch up | | |
| 0,0250 | depreciation in 2030 | | |
| **Other Investment goods** | | | |
| 0,05 | real growth of other investments before 1980 | | |
| 14 | service life of other investments up to 1990 | | |
| 12 | service life of other investments since 1991 | | |
| 0,10 | depreciation of other investments up to 1990 | | |
| 0,25 | one time depreciation of other investments in 1991 | | |
| 0,14 | depreciation of OLD other investments since 1991 | | |
| 0,11 | depreciation of NEW other investments since 1991 | | |
| 0,12 | depreciation in 1999 in the case of 100 % catch up | | |
| 0,1101 | depreciation in 1999 in the case of 70 % (GDP/capita) catch up | | |
| 0,10 | depreciation in 2030 | | |
| **Other assumptions** | | | |
| 0,0125 | TFP growth between 1980-89 | | |
| 0,6309 | Share of gross structures in 1980 | *implied net shares* | *0,733* |
| 0,2782 | Share of gross equipment in 1980 | | *0,204* |
| 0,0909 | Share of gross other investment goods in 1980 | | *0,063* |

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