Introduction of Capital Income Taxation: a Microsimulation Study

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Abstract

This paper analyses the feasibility of introducing capital income taxation in Hungary. The economic reasons, the basic data collection and analysis, the microsimulation model and finally, the model results and validation are discussed in this contribution.

First, the current economic environment and the special Hungarian economic characteristics are shortly described. Next, the data collection and analysis will be presented; predicted (estimated) data of 2005 were used for the microsimulation model to analyze the impact of capital income taxation. Finally, the impact of different taxation policies on different social layers of the population and the macro-economic consequences will be discussed and shortly analyzed.

1 Introduction

Socioeconomic systems are complex, extremely sensitive and of great social and economic importance. *Microsimulation* is a method able to handle complex socioeconomic systems by creating and studying a *model* that makes intensive use of the statistical data of the observed objects. These objects are the so-called *micro units* of the socioeconomic system; the *person*, the *family* or the *household*. Microsimulation models use simulation techniques in order to study the behavior of micro level units in time.

*Microsimulation model*s have different data elements: *initial model data*, *intermediate* and/or *final simulation data;* all of these data are stored for further analysis. *Model behavior* in micro-simulation models is described using algorithms, which reflect the behavior processes of the micro units and represent their environment. By using this method, special care is taken to do the *data analysis* and the estimation of simulation *model parameters*. The microsimulation model is working in an *experimental framework* in order to study the effects of policy changes on the microsimulation model behavior.

Microsimulation is generally accepted by decision-makers and widely used in Australia, Canada, Europe and the USA to prepare political decisions. Highly developed economies, but also economies in transition face many problems, especially in

demography, pension systems, health care and taxation that can be studied with modeling and possibly solved with microsimulation (for the methodology, see [1] and [2]). In the European Union, more and more signs indicate an increasing demand for instruments of macroeconomic analysis and prediction, coupled with a tendency of more willingness to budgetary spending for microsimulation (see [3]).

In Hungary, based on increasing efforts to harmonize the economy with the other member states of the EU and to exploit the positive effect of tax system changes, the possible results of capital income taxation have been investigated using microsimulation.

2 Capital income and its taxation

In Hungary the introduction of a uniform capital income tax rate would be desirable, but taking into account the complexity of the present taxation and the difficulties of income and revenue estimations, the task is challenging. The possible effects of a capital income tax could differ significantly with different consumption patterns. Thus, it is important to first understand the savings and consumption patterns and their dynamics and to base the new tax in the framework of the presently functioning system.

The forms of private savings of the population based on National Bank of Hungary (NBH) statistics are as follows (see Table 1):

Savings forms	**2002**		**2003**		**2004**		**Composition**
	HUF billion	(%)	HUF billion	(%)	HUF billion	(%)	
1. Cash and bank deposits	5177	110	5921	114	6451	109	41%
2. Securities (excl. #4)	1002	107	1104	110	1302	118	9%
3. Credits and loans	0.5	167	N/A		N/A		N/A
4. Stocks, Shares	4391	115	4871	111	5437	112	34%
5. Insurance	1498	129	1924	128	2519	131	14%
6. Other claims	166	125	207	125	283	137	2%

Table 1: Gross savings statistics between 2002 and 2004 (*Source: NBH*)

Comparing the major characteristics of the economic environment and private savings behavior, the following salient features can be observed:

- *The growth of savings related to capital income (mainly forms 1-4) during the last four years was close to exponential.* At the end of 2004, the net savings of the population related to capital income have been estimated as HUF 11,888.5 billion. Insurance related net savings (5) were estimated at HUF 2,394 billion. 50-60% of the savings is related to forms 1 and 5.
- *During the past 5 years, the ratio of consumption in the GDP has been growing continuously, while the society has been undergoing radical restructuring and a significant part of the population has been unable to generate savings, rather incurred debts.* The trend of increasing consumption is in contrast with the "old" EU member states, where during the past 15 years the household consumption

ratio, as a sign of well balanced economic development, has remained basically unchanged.

- *Because a significant part of the population was unable to save, a lion's share of the savings originated in high income households.* Generally, with increasing age, people use more frequently cash and bank deposits (savings form 1); so do members of lower middle class families. Members of the upper middle class and people between 50 and 65 find forms 2 and 4 more favorable. Savings forms, related to title 5 are popular for blue collar workers, people with lower than average income and recent graduates. The behavioral patterns related to the savings dynamics are based on an ECOSTAT survey: half of the people are actively changing their portfolios; well educated individuals under 50 years of age are especially committed.
- *Major parts of savings consist of cash and bank savings, in contrast to most EU member states, where stocks and shares have a far greater proportion*. At the same time, people are migrating towards real estate and other portfolio investments with greater returns or profit rates. However, some savings forms cannot be fully estimated, because no specific information is available for them (this is the case for deposits or real estate investments held abroad).
- *The dynamics of savings **do not** depend strongly on the interest rate (negative correlation) or the income of the population, but can be partially explained by the inflation rate (preemptive spending).* This indifference to interest rates has happened in spite of the emergence in the past 5 years of a competitive financial system resulting in relatively higher interest rates than could have otherwise been expected (the average interest rates in 2004 are presented in Table 2).

Savings form	Interest rate in 2004
1. Cash and bank deposits	8.5%
2. Securities (excl. #4)	12.2%
3. Credits and loans	N/A
4a. Stocks,	54%
4b. Share,	10.8%
5. Insurance	10.2%
6. Other claims	N/A

Table 2: Average interest rates of different savings forms in 2004.

- *A widely accepted international practice is to tax capital income indirectly, by using different forms of asset/property taxes*. The current Hungarian income taxation system levies a tax on real estate rental fees and on realized profits from increased stock exchange investments. According to the Hungarian State Tax and Financial Control Office (APEH), in 2003 an estimated 421,000 individuals paid HUF 90 billion tax, of which 20% has been paid as individual entrepreneurship tax, 10% stock/bonds value increase-related tax, 29% share-related revenue tax, and 20% real estate rental fee related revenue tax.

3 Capital income taxation simulation

Data preparation

The microsimulation model of capital income taxation in Hungary has been developed as a *static* simulation model, which is based on corrected statistical data of 2002.

The *basic* data were selected using the Household Statistical Survey (HSS) of 2002. The survey consisted of household budget data of 10,000 households. The sample was random, representative, layered by type of settlement, and country-wide. However, the income and spending data of the HSS2002 are not able to fully reproduce (match) the macro level statistical data. Because of the central role of the HSS2002 survey in calculations of other economic data, e.g., income elasticity, this data set was selected for further corrections. These corrections aimed to accomplish two series of changes:

1. *Changes of income related data*: Asset and capital related data were corrected by 1,358 billion HUF, 48% of which were salary based and 59% were entrepreneurial income. The changes were based on the 2002 individuals' "tariffs survey" (TS), which has been conducted by the Hungarian Central Statistical Office (HCSO). Data corrections on HSS2002 were determined based on the TS data using the statistical matching method. After the corrections, the net income increased by 23.6% and as a consequence of the changes, the original data set matched the relevant macro data.
2. *Changes of consumption related data*: 75% of the generated income data was imputed as consumption, the remaining 25% was imputed as savings. The number of changes has been marginal (13 corrections), but their statistical importance significant.

The *corrected data* of 2002 of HSS2002 (C2002HSS) has been aged and aggregated as a second step of data preparation. The aging aimed to produce an initial synthetic data set for 2005 using published macro data (e.g., salary data, pension data) and certain statistics provided by the HCSO and the NBH (e.g., the distribution of incomes and assets). The aggregation aimed to generate household level data using the individual data of C2002HSS. As a result of this step, a *synthetic data* set for the capital income taxation microsimulation model has been created. Different cross sections and comparisons with macro level data of years 2003-2005 show that the resulting synthetic data are satisfying for further use in the micro-simulation study.

Microsimulation model

The static microsimulation model executes the simulation for the year 2006, which can be considered as a one year aging on the synthetic statistical data set of 2005. The simulation model uses the same type of macro data as the aging procedure (e.g., salary, inflation, pension). Starting with the households of the synthetic data set, the model generates the savings and calculates the appropriate taxes. For generating savings, further studies of ECOSTAT and TARKI about savings behavior (e.g., household portfolio management) were taken in consideration. Data used for portfolio composition is presented in Table 3.

Income quintiles	**Bank deposits** (%)	**Stocks and government securities** (%)	**Insurance** (%)	**Share** (%)	**Ratio of savers in the quintile** (%)	**Savings in the quintile** (%)
1. quintile	70	0	20	10	20.4	1.2
2. quintile	65	5	20	10	22.5	3.5
3. quintile	65	5	10	20	39.1	9.4
4. quintile	53	7	15	25	50.4	20.3
5. quintile	33	12	15	40	69.4	65.6

Table 3: Portfolio composition and savings characteristics presented by income quintile

For validation of the simulation model and the quality check of synthetic data, tax revenue calculations were used for the time period between 2003 and 2005. The results demonstrated the ability of the model to calculate tax revenues in an acceptable range compared to the measured and/or predicted government tax data.

Microsimulation model experiments

Based on the ECOSTAT survey and to study the expected impacts of capital income taxation, different scenarios and cases were created and analyzed. Two scenarios, each of them with two cases were analyzed. The data of basic scenarios are presented in Table 4, the cases differed only in the behavior of the first and second quintile; there is no behavior change. Experiments were made based on the following different capital income tax rates: 5%, 10%, 15%, 20%, and 25%.

First scenario	**Second scenario**
10% ignorant	10% ignorant
12% more spending	12% more spending
25% starting a business	25% starting a business
53% changing portfolio to: • 75% real estate • 10% valuables and insurance • 15% looking for higher revenue	53% changing portfolio to: • 75% real estate • 7% insurance • 3% valuables • 15% looking for higher revenue

Tax sensibility threshold	
Capital income tax	**% of changes**
5%	29%
10%	59%
15%	84%
20%	91%
25%	100%

Table 4: Data of microsimulation model experiments.

The experiments aimed at giving a clear picture about the range of revenue generated by the capital income taxation and the impact of the new taxes on the population at different income levels. It has also been a goal to recognize tax avoidance problems and their economic impacts (e.g., changing the portfolio may increase the pressure on the real estate market).

Results of the microsimulation model study

The most important results of the microsimulation study:

- Because of the complexity of the current tax system and the difficulties in forecasting, the expected revenue generated by a uniform capital income taxation may vary significantly. The tax revenue generated by the capital income taxation is calculated between 23.1 and 86.8 billion HUF. In the best case scenario, the capital income taxation revenue will amount to 0.4% of the GDP.
- The introduction of capital income taxation would not affect the population dramatically: the income decreases less than 1% in each quintile. People with higher income would pay more taxes, but the most impact is to be expected for the oldest and the youngest. The retired and inactive population would be more affected. Looking at the families, the most impact is to be expected in families without children.
- Based on the static microsimulation model, the long-term behavioral changes cannot be studied. Nevertheless, in case of radical behavior changes of the population, the negative effects could be significant. Cash savings and bank deposits could decrease considerably, while the demand for government securities and stocks would decrease. The danger of a radically increasing consumption and the "exports of savings" cannot be excluded.

Conclusions and final remarks

Microsimulation is a popular and valuable instrument for governments to study the social impact of their decisions, especially impacts that cannot be observed using other methods. There is a clear need to support governmental decision processes with this methodology, consequently there is a significant demand to make the methodology and related technology more available and user friendly. A series of future efforts will aim to improve the quality of statistical data (starting with the data collection phase) and the technical support of data analysis and model validation. However, we believe that the "best of the breed" approach, the continuous methodological and technological improvements will never eliminate the basic disadvantages of static microsimulation models. We will concentrate our future efforts on the development of dynamic microsimulation models for tax policy related decision making in Hungary.

4 References

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