

The Role of Consumption in the Hungarian Economy. Determining Marginal Propensity to Consume and the Multiplier Effect on the Basis of Domestic Statistical Data

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How do people decide how much to consume, how do policy makers decide how much people can consume? We can assume that consumption (and saving) depended mainly on current income. In addition, we can realise that they depend on expectations about the future and other macroeconomic determinants. The behaviour of final consumption has remained an exciting area of research ever since for two reasons: one is the size of consumption as a component of GDP, the other is the understanding of how consumers actually behave and affect the total produced output and income. When we eat a meal, wear clothes, or go to the theatre, we consume some of the output of the economy. All forms of consumption together make up two thirds of GDP in Hungary. Because this consumption ratio is so large, I study how households decide how much to consume in terms of other macroeconomic determinants. I do not examine either the components or the sources of the consumption. Considering the expenditure side of GDP, I explore how the final consumption of households has changed in the past decade. I do not examine the households' consumption components, but investigate how the volume decreased or increased mainly due to the impact of inflation, labour force, GDP base rate and income. I analyse how the increase in income and spending leads, through a multiplier effect, to an increase in output. I compute the marginal propensity to consume to determine the shares of disposable income, so the effect on saving an additional Hungarian Forint (HUF) of disposable income. I use the data of the Hungarian Statistical Office to model the multiplier effect of consumption on the economic performance.

Keywords: consumption, marginal propensity, income, saving, equilibrium

The Consumption Theory

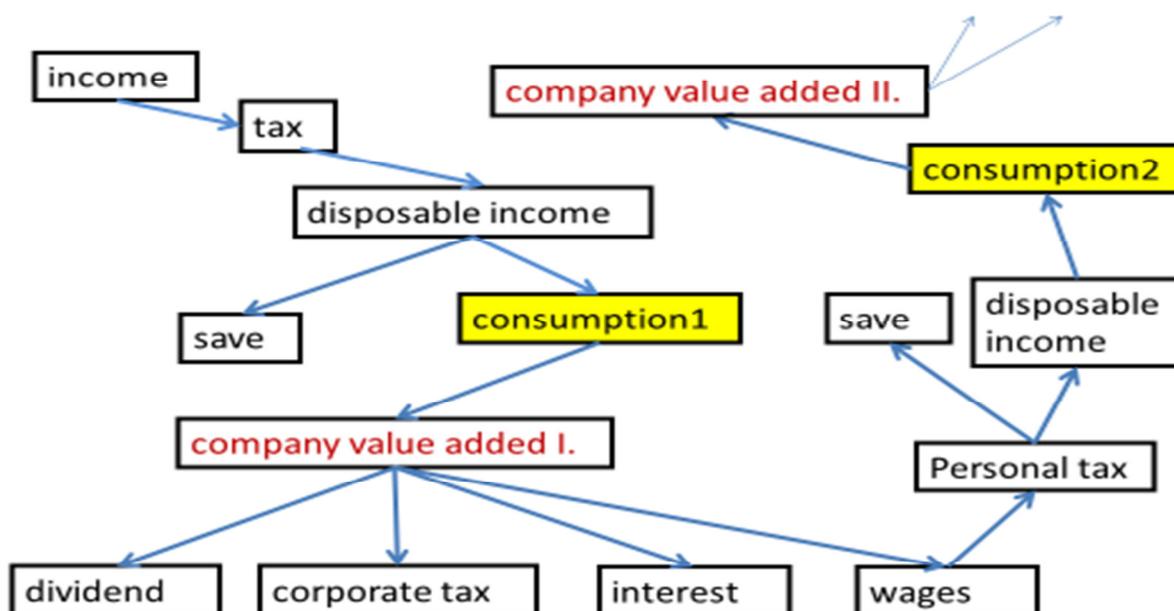
The linkage is a linear one between consumption and disposable income. "The consumption components are then characterised by two parameters, c_0 and c_1 . Parameter c_1 is called the marginal propensity to consume. It gives the effect an additional HUF of disposable income has on consumption". (Farmer R. (2010) If c_1 is equal to 0.4, then an additional HUF of disposable income

increases consumption by $1 \times 0.4 = 0.4$ HUF. We can examine the income elasticity on c_1 , the linkage is positive: so an increase in disposable income results an increase in consumption. If the c_1 is than 1: people are likely to consume only part of any increase in disposable income, that is and the rest. The parameter c_0 has another explanation. This is what people consume in that case if their disposable income would be zero: total consumption is in equation with the base, autonomy part of the consumption ($C = c_0$). People still need to eat, the needs of the bottom line of Maslow pyramid have to be satisfied! "This implies that c_0 is always positive. How can people have positive consumption if their income is equal to zero? They consume either by selling some of their assets, or by borrowing" (Blanchard et.al. 2010). As I mentioned, the relation between consumption and disposable income is a linear relation, it is represented by a straight line which could be determined based on a regression formula. *I calculate the correlations to evaluate the strength of the relationships between macroeconomic variables and consumption figures.* The slope of the consumption function shows how much consumption increases when disposable income increases by one HUF, the slope means the size of the marginal propensity on consumption (MPC).

People get income for their work and their return on investment, pay taxes and then decide how much of their net income to consume and how much to save. *"The income that households finally receive equals the output of the economy (Y), the government then taxes households an amount (T). The marginal propensity to consume c_1 also determines how much changes in fiscal policy shift production"* (Mankiw, 1999).

As we discussed, the slope of the consumption curve depends on the marginal propensity to consume (c_1). What does it mean in practice? The larger the marginal propensity to consume means higher consumption from additional income. The larger change in income could be resulted from a given change in the interest rate, so the larger the change in consumption coming from growth in the income. Let's move on: large marginal propensity to consume leads to a large multiplier for changes in economy. The larger the multiplier, the larger the impact of a change in investment on output and so the value added income on company level and allocated income for stakeholders (figure1). Let's assume: there isn't goods shortage, the tax regime doesn't punish the additional consumption, the interest policy reinforce the investments.

Figure 1. The econometric model of consumption multiplier



In the econometric model the first-round increase in demand, increase in consumption results to an equal increase in production, the more production leads to an equal growth in company value added income, this results in higher distributable income. The second-round again increase in demand, and so on. The multiplier is the ratio of the change in the regional output to a change in the extern independent variable keeping the equilibrium, in our case the income. The ratio of the change in an endogenous variable, such as consumption to the change in an exogenous variable, such as income. The size of the multiplier effect can be calculated in terms of the consumption equation, were the marginal propensity to consume (MPC) is the ratio of the consumption and income changes

- a. $C=c_0+c_1Y=Y$
- b. $C/Y = c_0/Y+c_1Y/Y=Y/Y$
- c. $c_0/Y + c_1=1$ (Move c_1 to the right side and multiply by Y):
- d. $c_0=(1-c_1)Y$ (Move c_1 to the left side and re-organise the equation)
- e. $Y=c_0/(1-c_1)$ (with tax: $Y=c_0/((1-c_1) * (1-t))$)

c_0 = independent consumption

c_1 = marginal propensity to consume

C =consumption

Y =income

As I work through our model of the economy, I focus on understanding movements in consumption and real gross domestic product (GDP), the central measures of macroeconomic activity. I am interested in tracking real changes in the level of economic activity, I examine the variable Y to refer on one side to both aggregate output and aggregate consumption, on the other side the per capita figures.

The theory is wonderful - so far. In practice, policy makers need to consider some restrictions, such as:

- the source of consumption stimulation,
- change of debt level
- the money saved from the disposable income
- the impact of tax changes on central budget
- the impact of interest change on inflation
- the impact of the currency exchange rate on net export
- the Equilibrium Output (Input) and Expenditure
- the Equilibrium of the producing capacity with demand

Without these issues we could increase a country's output practically boundlessly through the multiplier effect, but the Determination of Equilibrium Output (Income) limits it. First of all, let's make it clear what the equilibrium is. A number of definitions of equilibrium are used in economics, they all refer to the idea that at equilibrium, there is no tendency for change (Case et al. 2009). In microeconomics, equilibrium is the price at which the size of demand is equal to the size of supplied quantity. To define equilibrium for macro-economy, I use on one side, the planned aggregate expenditure terminology, by definition, consumption plus planned investment. The aggregate output can also be counted the aggregate quantity supplied because it is the amount that firms supply (produce) during a period (it practically means "real GDP"). If the actual expenditure does not equal the planned output and the equilibrium is tipped over, the economy needs unplanned increases or decreases in inventory (Bénassy- Quéré et al. 2010). That is, the economy is defined to be in equilibrium when aggregate output (Y) is equal to planned aggregate expenditure (AE). I examine what happens if the economy is out of equilibrium.

- a. First, suppose aggregate output is greater than planned aggregate expenditure: firms forecasted to sell of their goods exceeds they actually sold - the result is unplanned inventory investment which means overproduction.
- b. Second, suppose aggregate output is less than planned aggregate expenditure: firms forecasted to sell of their goods are below the consumers actually bought - the result is unplanned inventory investment which means a shortage of products.

The mechanism and the figures by which the level of consumption affect a country economy are discussed in the next section.

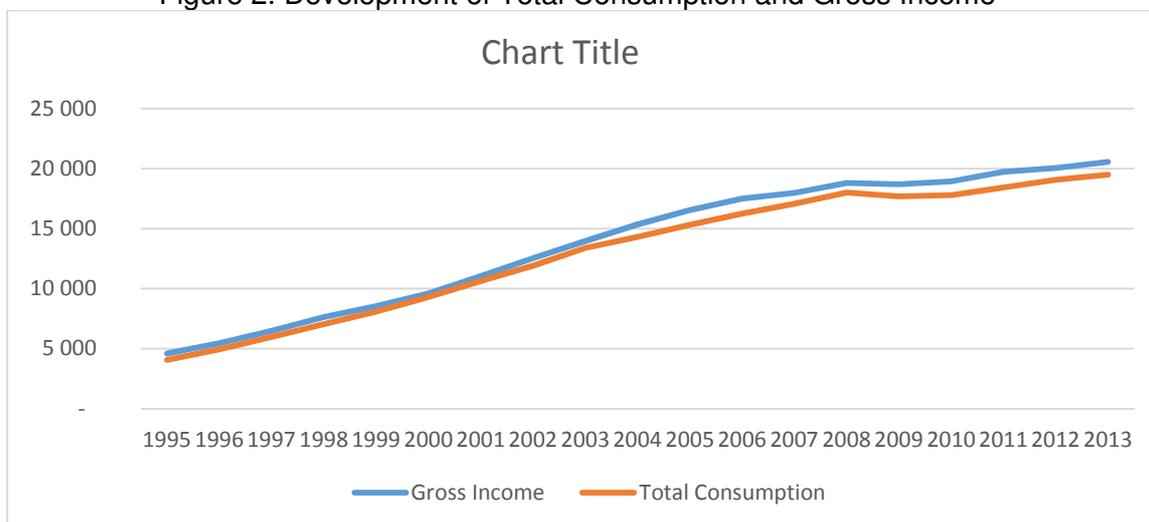
Consumption in the Hungarian Economy

First of all, it is worth clarifying the different terms related to private consumption since the statistical office publishes data of different contents. The final consumption expenditures of households are the consumption expenditures which residents, that is, people living and working in Hungary spend on consuming products and services. We will have to work with different figures if total expenditure, and different ones if the so-called COICOP consumption is

analysed. While the former amount was HUF20.5 billion in 2013, the value of the latter was HUF16 billion COICOP (Appendix 1). The Classification of Individual Consumption by Purpose uniformly used in the European Union can be employed when classifying household expenditures. The categories include food and non-alcoholic beverages, alcoholic beverages, tobacco, clothes and footwear, home maintenance, household energy, furnishing, routine household maintenance, healthcare, and transportation. When interpreting the different groups or comparing them to data coming from other data sources, it has to be borne in mind that the characteristics of the COICOP classification such as some significant consumption items are not included in it. Such items are the expenditures of government consumption which are “the value of all the products and services including expenditures financed by the government regardless the fact whether households consume them individually (in kind social benefits) or collectively (community consumption)” (KSH Methodology Guidelines). (This item itself exceeded HUF16 billion in 2013). In addition, tourism expenditures are also only included in the total consumption category, the balance of this kind of expenditure was HUF -800 billion in 2013. I find it important to explain all these, because when it is examined how the development of income affects consumption, we have to be aware of what the figures exactly mean.

The development of the gross income of the household sector and the use of the income, including that of domestic consumption, supposes a very strong connection (Figure 2).

Figure 2. Development of Total Consumption and Gross Income



The 0.999 correlation value also indicated the connection between the two sets of data. When examining the data from the last 20 years, it is found that 95-96% of the income goes to consumption, and 4-6% to net savings. It should be noted that in addition to consumption, accumulation expenditure, that is, real estate investment, was so high in 2002 that private individuals became net borrowers. As opposed to the discussed income, should consumption categories be examined where almost the total source is spent, the extent of

autonomous consumption cannot be or is hard to determine, so I will examine further consumption data as well.

It is thus worth examining the development of per capita expenditure – by the COIPCOP classification – and compare it to the changes in specific income. Individual consumption was at HUF816,000 in 2012, of which the food and non-alcoholic beverages (23%), home maintenance and household energy (25%) and transportation (12%) product and service groups had the highest shares. I choose this type of statistics as the basis of my further analysis because this is the closest to the average consumption structure of everyday living. At the same time, I also examine the development of income; the net per capita income was HUF995,000 in 2012. The set of data used for the further analysis is shown in Table 1.

Table 1. Per capita income and consumption, Source: Central Statistical Office

Net Income per capita in HUF	Consumption per capita in HUF
573 247	494 273
656 610	557 875
730 103	607 870
804 104	643 535
840 891	673 381
875 837	706 310
874 504	750 309
867 658	747 827
939 396	759 608
988 927	790 883
994 876	815 907

First of all, I prove the closeness of the connection between the two sets of data by calculating the correlation value; since its value is 0.98, which indicates a close correlation between the income and consumption data, the analysis is continued by calculating the linear regression. The values of the $C = a + bx$ regression equation are the following: $a = 69.064,00$, and $b = 0,74$. Value “a” indicates where the point of intersection of axis Y is, that is, how the theoretical value of consumption would develop if income was 0. This value is similar to the term autonomous consumption, which was previously marked by c_0 . Value “b” that is, c_1 was examined when determining marginal propensity to consume. This signifies the rise of the regression line, that is, in the case of a one-unit change (e.g. HUF1) in income, the value of the consumption category increases by 0.74 (.74 HUF).

Let's examine how the multiplier effect works on the basis of these data and the “ $Y = c_0 / (1 - c_1)$ ” equation. Consequently, we examine how specific consumption would develop on the basis of the extra income, and what effects it would have on the total performance of the economy. Certainly, we also have to stipulate here that the increase in income is not accompanied by the worsening of the equilibrium, that is, for example indebtedness does not increase, and the balance of the central budget is not upset. Let's take an example: in the case of HUF100,000 extra income the multiplier effect is 3.86, that is, the total economic output would be HUF386,000. What happens if the net spendable income decreases due to an increase in taxes? Certainly, as a result of the

extra tax burden, the multiplier effect will also decrease. The multiplier effect also decreases to 3.48, so the economic stimulation role of households' consumption also decreases, while government budget revenues increase, which may result in an increase in community consumption. The decrease in consumption may result in an increase in savings, which may stimulate corporate investments.

Now I will examine how the GDP consumption structure would have developed on the basis of the 2013 budget figures considering the marginal propensity to consume, and the related changes in the level of savings and the level of taxation. The following assumptions are used for the model calculations:

- GDP is the total income at the level of the national economy
- consumption tax and individuals' income taxes are taken into account of the taxes
- tax burden is 20% of initial GDP
- spendable income is total income minus taxes
- autonomous consumption equals food turnover (HUF2,276 billion)
- marginal propensity to consume: 0.74
- use of GDP is divided into consumption, investment and government expenditures
- households' expenditures belong in the consumption category

Table 2. Sensitivity Analysis

Marginal Propensity to Consume	Tax GDP %	Disposable Income $Y_d \equiv Y - T$	Consumption Spending $C = c_0 + .c_1(1-t)Y_d$	Other Purchase $I+G$	Aggregate Expenditure $C + I + G$
0,74	20%	23 902	16 463	13 384	29 846
0,75	20%	23 902	16 654	13 384	30 038
0,74	19%	24 200	16 819	13 384	30 203
0,75	19%	24 200	17 015	13 384	30 399

Also using the calculations made in connection with marginal propensity to consume (MPC), I used sensitivity analysis to establish to what extent consumption and economic output change in relation to changes in the two independent variables. A 0.1 increase in marginal propensity to consume adjusted by taxes would increase households' spending by HUF191 million, a 1 percentage point decrease in tax burdens by 356, and the combined change of the two factors by 553 million on the basis of the Hungarian macro-economic figures. This analysis does not examine the multiplier effects on other – e.g.

investment or government – expenditures, *my objective was to determine marginal propensity to consume on the basis of Hungarian statistical data.*

Summary

My objective was to determine Hungary's marginal propensity to consume (MPC). In order to achieve it, I examined the different consumption categories and chose the one where the data sets were closely connected, and autonomous consumption could also be determined. I examined the development of several factors with an effect on consumption, for example analysed the correlation values of inflation, employment rate, interest rate, income and consumption, and it is the changes in individuals' income that most markedly determine consumption data. In order to determine marginal propensity to consume and autonomous data, I used the equation figures of linear regression.

I clarified the different terms related to private consumption since the Hungarian Statistical Office publishes data of different contents. I collected data on the final consumption expenditures of households which are the consumption expenditures which residents. I worked with different figures if total expenditure, and different ones if the so-called COICOP consumption is analysed.

I tried to prove the closeness of the connection between the two sets of data (income and consumption) by calculating the correlation values, the analysis was continued by calculating the linear regression.

I examined the multiplier effect works on the basis of the calculated data and analysed how specific consumption would develop on the basis of the extra income, and what effects it would have on the total performance of the economy

When performing the modelling, I used some simplifications since in this study I did not consider the multiplier effect of the changes in marginal propensity to consume adjusted by taxes on investment or government expenditures. In the course of developing the model, it is possible to determine the consumption, savings levels and taxation rates on the basis of which the equilibrium state can be examined at which GDP as an income category may be maximised.

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Appendix 1

Period of time	Total Household actual final consumption expenditure by purpose (COICOP) HUF in Million
1995. year	3 301 419
1996. year	4 042 996
1997. year	4 905 101
1998. year	5 773 200
1999. year	6 657 147
2000. year	7 668 500
2001. year	8 772 848
2002. year	9 675 894
2003. year	10 760 994
2004. year	11 477 911
2005. year	12 250 225
2006. year	12 992 041
2007. year	13 866 995
2008. year	14 586 640
2009. year	14 269 293
2010. year	14 391 413
2011. year	15 026 988
2012. year	15 647 042
2013. year	16 054 715