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MODELLING CONSUMPTION ON THE BASIS OF THE COMPLETE SYSTEM OF NATIONAL ACCOUNTS IN SERBIA – THE WEALTH EFFECT

ABSTRACT: *System of National Accounts (SNA) data on the financial and non-financial assets of the household sector are not currently being compiled by official statistics in Serbia, but this situation will change on the path of convergence to the standards of EU economic and monetary union. This paper, starting from models of consumption in developed and some former transition countries that take into account the wealth effect based on the whole SNA, analyses if this effect is taking place in Serbia. Research, based on available data sources, has shown that the wealth variables of securities and net financial wealth enter the consumption function in Serbia and it is yet to be seen if this model will be different at some higher stage of economic development or with better data.*

KEY WORDS: *consumption function, national accounts, wealth effect, time series analysis*

JEL CLASSIFICATION: D12, C22, E01, E60

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1. INTRODUCTION

The changes in value of components of household sector wealth, like the value of residential houses, financial market securities, etc., are an integral part of the econometric models of consumption in developed and some former transition countries. The Serbian Statistical Office is not currently compiling the data necessary for modelling the wealth effect on consumption[1], which are part of the System of National Accounts (SNA). In this paper, based on currently available and constructed data, we have examined whether the wealth effect takes place in Serbia, and if the complete production of SNA data is relevant to the econometric modelling of consumption in Serbia. In another words, the question is whether the potential use in economic analysis of SNA data based on complete SNA data compilation is superior and relevant compared to the present compilation and use in Serbia.

Including this introduction, this paper consists of five parts and a Conclusion. The next part presents relevant references in the literature to wealth effect modelling and an overview of the current situation and perspective in the field of SNA data compilation in Serbia. The third part describes how the data for this research has been constructed, and the fourth part consists of a short overview of the methodology and econometric model used. The fifth part presents the research results and the Conclusion presents the paper's most relevant findings.

2. MODELLING CONSUMPTION BASED ON NATIONAL ACCOUNTS DATA AND THE SITUATION IN SERBIA

In the context of predicting business cycles and the inflation pressures of aggregate demand, which is relevant to fiscal and monetary macroeconomic policies, modelling gross domestic product and consumption, as part of their final use and part of aggregate demand, is very important. The System of National Accounts, an overview of macroeconomic statistics, provides sufficient data for this purpose. The reform of the SNA in 1993 introduced institutional sector balance sheets because of the empirically evidenced relevance of the sector's assets and liabilities in predicting their behaviour. The wealth effect - the effect of financial and non-financial asset prices and value on consumption[2] - has been examined

1 Wealth effect on consumption is further explained in the second part of this paper.

2 As the prices of financial and non-financial assets rise, the households that own those assets become wealthier and may choose to increase their consumption. Conversely, when asset prices fall, households may reduce consumption.

by several economists, including Keynes ("Windfall changes in capital values as a major factor capable of causing changes in propensity to consume", Speight 1990, Ch.6, in Brodin and Nymoen 1992, p. 433). Other authors have investigated the theory as part of the life cycle hypothesis, the permanent income hypothesis, and liquidity theories (Modigliani 1963, Friedman 1957, Tobin and Dolde 1971, etc., in Brodin and Nymoen 1992, p. 433). According to the life cycle-permanent income hypothesis, consumers estimate their long-term ability to consume, and the appropriate fraction of that ability is their current spending. That estimate can be based on wealth (Modigliani) or permanent income (Friedman).[3] Park (1996, p. 48) points to Deaton (1972), who emphasized, in the context of a modified life cycle hypothesis, that rapid changes in financial assets play a substantial role in determining private consumption. The relevance of physical assets (see Park 1996, p. 48), including land and housing, to consumption has been tested only sporadically in the literature. Perhaps the irrelevance of physical wealth like land in explaining private consumption behaviour in the Western hemisphere is due largely to the fact that in recent years the region has experienced little change in physical asset prices compared to Far-East Asian countries (i.e., Japan, Korea, and Taiwan).

The wealth effect is part of econometric models in developed countries and the European Central Bank, but here we limit the discussion to the example of Norway. The Norwegian authors Brodin and Nymoen (1992) have proved that "capital gains matter when they arrive in the same manner as wage income"[4]. They determined the significance of the following wealth variables in the consumption function: residential housing stock and household sector liquid assets decreased by household sector loans from banks and other financial institutions. Gross disposable income as a variable is defined by National Accounts; thus (real)

3 Hall (1978), p. 971. As permanent income is an unobservable category, uncorrelated to current and past income, according to this hypothesis lagged income also has little predictive power beyond that of lagged consumption. A stringent variant of this hypothesis states that any past variable beyond lagged consumption has little predictive power, because consumption is a random walk with a drift just like marginal utility of consumption: this is a strong stochastic implication of the hypothesis. But Hall showed that a variable that is correlated with permanent income in *t-1*, like the stock market, will help in predicting consumption in period *t*, and proved a modified version of the life cycle-permanent income hypothesis.

4 Brodyn, Nymoen (1992), p. 448

capital gains are not included (idem p.434).[5] All financial stocks are measured at the end of the preceding period. The housing price is the quarterly average (idem p. 435). The authors show that total wealth had risen significantly owing to a rapid increase in real housing prices, and use Johansen's procedure to prove that both gross disposable income and wealth (as a total) enter the cointegrating relation. Housing stock data were constructed by combining available sources, as they were not readily available (Brodin 1989 in idem p. 434).

The RIMINI quarterly model of the Central Bank of Norway is one example where household behaviour, as part of the interest rate transmission mechanism on inflation, is modelled on the basis not only of disposable income but of wealth, loans, and housing prices and expectations (Bardsen, Eitrheim et al. 2010, p. 13, Graph 1.4).

As far as former transition countries or emerging market economies are concerned, in a paper entitled "Wealth effects in emerging economies" (Ciarlone 2012), for a panel of 16 countries in Asia and Central and Eastern Europe, both real and financial wealth are found to affect household consumption positively in the long-run, with the elasticity of housing wealth being greater than that of stock market wealth. The author uses econometric techniques for heterogeneous panels, and real and financial wealth were proxied by house and stock market prices, as data from the balance sheet were not available for the whole sample.

In Serbia the data on the real and financial wealth of the institutional sectors (stocks and flows) are unavailable, as the official statistics institutes (Serbian Statistical Office, National Bank of Serbia) do not compile this part of the SNA. Data for the rest of the SNA, i.e., institutional sector current accounts, are available, but at present only on an annual basis[6] and with two or more years' time lag. On the other hand, as already mentioned, since 1993 the institutional sector balance sheets have been an integral part of the SNA. However, according to the Development Plan of the Serbian Statistical System 2008-2012, this situation will change and this missing statistical data will be introduced[7]. For the time being, research on the wealth effect has to rely on quarterly data compiled from the other

5 This means that the influence of realized and non-realized capital gains was taken into account as a determinant of consumption via the overall balance sheet position, as well as its changes (which is the common approach, and is also applied in this paper) and not through the financial account transactions included in gross disposable income (some of them, like receivables from sale of assets, are included in disposable income in the Household Budget Survey of the Statistical Office of the Republic of Serbia, in line with international guidelines of the ILO, UN, and Eurostat; see www.rzs.rs).

6 On the UNdata site the last available data for Serbia are for 2011. See website Data.un.org.

7 The same applies to the new plan for the period 2016-2020.

available sources. The next chapter deals with the methods used in compiling the necessary data for this research, and their quality.

3. VARIABLES OF THE MODEL, CONSTRUCTION AND QUALITY OF DATA

The base for analysing the wealth effect in the Serbian consumption function is the quarterly VAR model made up of the variables C, GDI, FAFL, SEC, and HW, where

C – household consumption[8] (henceforth 'consumption')
GDI – gross disposable income of households, excluding property and gross mixed income (henceforth 'gross disposable income')
FAFL – savings (S) and transaction deposits (D) of the households decreased by financial liabilities or loans (L) by banks, end of period (henceforth 'net financial assets')
HW – housing wealth, value of household residential property, end of period, (henceforth 'housing wealth')
SEC – value of securities (shares) in the hands of households, end of period (henceforth 'securities')

The data were available or constructed from 2004 Q1 onwards. The last analysed period is Q3 2014. The variables' logarithm values are used in the econometric modelling.

The data for consumption, net financial assets, and securities were readily available (The Household Budget Survey of the Serbian Statistical Office was used for consumption, National Bank of Serbia statistics for net financial assets, and market capitalization data from the Belgrade exchange for securities). The quarterly data for gross disposable income are not available; the Statistical Office of Serbia only compiles data for "disposable income",[9] based on the Household

8 Institutional household sector as defined in SNA

9 For gross disposable income it was necessary to correct the Serbian Statistical Office's available data on disposable income in order to make the series as consistent as possible with the SNA definitions. The 2004 and 2005 "other receivables" data were decreased, as they include savings withdrawals and extended loans, and starting from the 2006 "other receivables" data were decreased because they include savings withdrawals and loan repayments. Consumer and investment loans were also deducted starting from the 2006 data as they were registered separately from that year on, and "income from assets" was deducted as it entails receivables from sale of assets.

Budget Survey, which is conducted quarterly. Gross disposable income is constructed using these data but it does not meet SNA standards because interest, rents, dividends, insurance receivables, and some other current transfers had to be excluded, as, together with financial account transactions, they were an integral part of the data component "other receivables" until 2006 and "other receivables" and "income from assets" after 2006[10].

Another difference between the measure of gross disposable income used in this research and that according to SNA standards is the gross household mixed income (417 billion dinars or 29% of the gross disposable income, according to 2006 national accounts data) present in the annual but not in the quarterly data of the Serbian Statistical Office, which are, as previously mentioned, the source of the gross disposable income variable. Note that transfers from abroad, a very important part of household income in Serbia, are present in gross disposable income, as they are captured separately in the Survey of the Serbian Statistical Office. The difference between the used and ideal aggregate of gross disposable income is given in Table 1, which presents the complete system of household sector national accounts. The fields that are completely or partly missing from gross disposable income are marked in bold (gross mixed income, property income, and other current transfers like life and asset insurance transfers). The components in the data that were deducted from the disposable income data of the Serbian Statistical Office because they are not the part of the gross disposable income are in italics (positions 54-56), and the most important balance sheet wealth components are underlined in the third part of Table 1. SNA transactions that are relevant to the household sector (predominantly for modeling consumption) but not all available in Serbia are shaded and the available data are given for 2006 on the basis of Statistical Office (for the current account) and National Bank (for the financial account) data.

Consumption was also taken from the quarterly Household Budget Survey of the Serbian Statistical Office. Both disposable income and household consumption, or at least their dynamic, are captured very well in this survey. The quarterly and annual consumption data differ because some additional sources are available on a yearly basis, and there is more time to compile yearly data than quarterly data. Additionally, some kinds of consumption are missing from the data: illegal

10 The fact that property income is missing from the data is in line with Blinder and Deaton 1985, p. 482. They point to the basic permanent income and life cycle theory where consumption depends on current wealth and on current and expected future labour income. Income from capital is omitted because the current market value of wealth is the best estimate of the discounted stream of income that will be derived from the assets currently owned.

consumption, consumption of goods in kind provided by employers, and the consumption of wealthy households, which is relevant to this research. The Statistical Office of Serbia has analysed this area of consumption for the period 2003-2006, but it is not integrated into the quarterly data[11]. This unobserved component of consumption amounts to 14%-18% of the observed consumption, and up to approximately 0.9% of Serbian Gross Domestic Product.

Securities were constructed using the average proportion of household ownership in share portfolios according to the Central Register for Securities and the value of Belgrade Stock Exchange shares at the end of the quarter. The data used to construct the net financial assets were from National Bank of Serbia statistics, as already mentioned.

The construction of the housing wealth variable was the most difficult. The Statistical Office provides annual data on the area of residential property in square metres and data on newly built house prices are available half-yearly. Quarterly data on construction activity were used to disaggregate the yearly data, and data loans extended to household sector for half-yearly prices[12]. As residential property includes not only new builds but also older properties, amortization of 1% per year was used to calculate the value in real terms[13]. The quality of the housing wealth series is strongly influenced by the fact that the price dynamic of newly built houses is not equal to the price dynamic of older properties, and therefore to the total property value.

Land was not taken into account as a part of total Serbian household sector assets because in this period there were no substantial price changes in Serbia as a whole, so that macroeconomic effects of this wealth component on consumption were unlikely. Also, there are no data, and limited possibility of constructing

11 The Statistical Office of the Republic of Serbia, "Upotpunjavanje procene finalne (privatne) potrošnje domaćinstava", www.rzs.rs http://webrzs.stat.gov.rs/WebSite/userFiles/file/Nacionalni/PHCNOEII.pdf

12 As in De Nederlandsche Bank (2011), p. 9; the logic is that the final buyers of residential property are households and that the purchases are financed predominantly via mortgage credit. The coefficient of correlation between mortgage loans and prices per m^2 of newly built residential houses is 0.8. As data for mortgage credit were not available for the whole period and the correlation between mortgage and total loans is 0.94, total loans extended to the household sector were used.

13 This was based on the structure of dwellings from the census of the Statistical Office of Serbia conducted every 10 years, see Popis stanovništva, domaćinstava i stanova, 2012, www.rzs.rs, Table 1-1.

them.[14] Inflation rate was not part of this model because the series are integrated of order two for most of the observed time span (until the end of 2010). Reference interest rate was constant until Q2 2009, so it was also not taken into account in this analysis.

Data were recalculated in euros in order to approximately eliminate Serbian inflation from the data.

Table 1. National Accounts for Households in Serbia 2006

		Households (4)	
		U	R
	Production accounts		
1	Imports		
2	Exports		
3	External balance of goods and services		
4	Output at basic prices		889
5	Intermediate consumption	398	
6	Gross value added at basic prices	491	
7	Taxes less subsidies on products		
8	Gross domestic product **GDP** (6 + 7)		
	GENERATION OF INCOME ACCOUNTS		
9	Gross added value at basic prices		491
10	Employee compensation	71	
11	Wages and salaries	62	
12	Employers' social contributions	9	
13	Other taxes on production	3	
14	Taxes less subsidies on products		
15	Gross operating surplus (9 - 10 - 13)		
16	Gross mixed income (9 - 13) (R - U)	417	
	ALLOCATION OF PRIMARY INCOME		
17	External balance of goods and services		
18	Gross operating surplus		
19	**Gross mixed income**		**417**
20	Compensation of employees		947
21	Wages and salaries		811
22	Employers social contributions		135
23	Other taxes on production		
24	Taxes less subsidies on products		
25	**Property income**	**32**	**64**
26	Balance of primary income (R-U)	1397	

14 For the land-as-wealth component, which in some cases can have a very marked impact on consumption, see Park (1996): in South Korea extreme land price oscillations were the result of a high degree of urbanization and industrialization in an environment of relatively scarcity of this resource, as well as speculation enabled by non-adequate tax policies. This paper showed that hyper-appreciation of land prices can have a significant impact on private consumption.

		Households (4)	
		U	R
	SECONDARY DISTRIBUTION OF INCOME		
27	Balance of primary income/gross national income		1397
28	Current taxes on income	105	
29	Social contributions	268	
30	Social benefits other than in kind		318
31	**Other current transfers**	**121**	**221**
32	Gross disposable income (R-U)	1442	
	REDISTRIBUTION OF INCOME IN KIND		
33	Gross disposable income		1442
34	Social transfers in kind		0
35	Social benefits in kind		0
36	Transfers of individual goods and services		0
37	Adjusted gross disposable income	1442	
	USES OF DISPOSABLE INCOME		
38	Gross disposable income		1442
39	Final consumption expenditures C	1493	
40	Adjustment for change in net-equity		0
	of households in pension funds		
41	Gross savings S	-51	
42	Current external balance		
43	Actual final consumption (adjusted) C	1725	
	CAPITAL ACCOUNT		
44	Gross savings S		-51
45	Current external balance		
46	Gross capital formation I	87	
47	Consumption of fixed capital	110	
48	Net capital formation	-22	
49	Acquisitions less disposal of non-produced assets	0	
50	Capital transfers, receivables		1
51	Capital transfers, payable	1	
52	Net assets (+) /liabilities (-) (R-U)	-138	
	FINANCIAL ACCOUNT		
53	Net lending (+) /Net borrowing (-)		
54	*Net acquisition of financial assets*		
55	*Neto incurrence of financial liabilities*		
56	*Currency, deposits etc.*	*81*	
57	Securities other than shares		
58	*Loans*		*71*
59	Shares and other equity		
60	Insurance technical reserves		
61	Net equity on household life insurance		
62	Net equity on household pension funds		
63	Prepayment of premiums		
64	Reserves against outstanding claims		
65	Other accounts receivable/payable		

		Households (4)	
		U	R
	BALANCE SHEETS		
	OPENING BALANCE SHEET		
66	Non-financial assets		
67	Produced assets		
68	Non-produced assets		
69	Financial assets/liabilities		
70	Opening net worth		
	CHANGE IN BALANCE SHEETS from		
	CAPITAL AND FINANCIAL ACCOUNT		
71	Non-financial assets		
72	Produced assets		
73	Non-produced assets		
74	Financial assets/liabilities		
	OTHER CHANGES IN VOLUME AND REVALUATION		
75	Non-financial assets		
76	Produced assets		
77	Non-produced assets		
78	Financial assets/liabilities		
	Change in net worth		
79	Gross savings		
80	Consumption of fixed capital		
81	Capital transfers		
82	Other changes in volume and revaluations		
	CLOSING BALANCE SHEETS		
83	Non-financial assets		
84	Produced assets		
85	Non-produced assets		
86	Financial assets/liabilities		
87	Closing net worth		

Source: Statistical Office of the Republic of Serbia and National Bank of Serbia, January 2012
Notes: a) In billions of dinars
b) See part 3 for explanation

4. ANALYSIS METHODOLOGY

This paper uses the relevant quantitative methods of time series analysis. Firstly, the presence of the season component is tested in the time series and the series de-seasonalized where necessary (consumption, gross disposable income, and housing wealth), then the non-stationarity of time series is established, and lastly cointegration and VAR analysis are implemented. Cointegration analysis based

on the vector error correction model (VECM) and Johansen's procedure enable detection of long-run relations between non-stationary variables, estimation of long-run parameters, and determination of weakly exogenous variables. A VECM model is estimated if cointegration exists, eliminating all the unnecessary lags of the model's differenced variables based on t-tests. Additionally, analysis of Granger causality in the VAR will ascertain if a model with additional wealth variables is capable of better predicting consumption in Serbia than other narrower models (for example, models with only consumption and gross disposable income, for which the data are currently available).

Only the multiple cointegrating vector model (Johansen's procedure) is used for cointegration analysis, as using a single-equation representation implicitly assumes that all the explanatory variables are exogenous[15], which might not be the case here, and there could be more than one cointegration relationship if more than two variables are tested, which makes the traditional estimation procedure inappropriate[16].

VAR analysis is a good framework when we suspect endogeneity in the model, which is the case here, bearing in mind that consumption could theoretically be both dependent and an explanatory variable for all other variables.

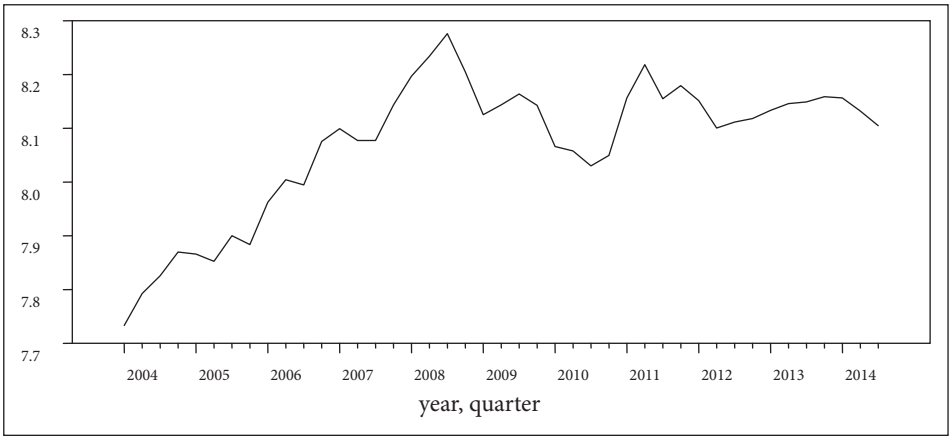
5. RESEARCH RESULTS

The analysis of the seasonal component using the X12 census model showed that consumption, gross disposable income, and housing wealth possess a seasonal component, so de-seasonalized data were used for these series.

There follows a graphic representation of the series, to allow for visual inspection of the data.

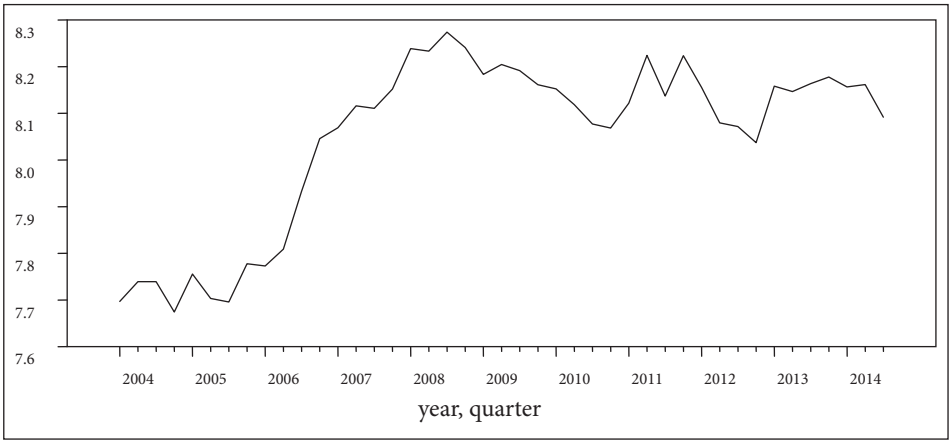
15 Kennedy (1998), p. 270
16 Idem

Graph 1. Consumption



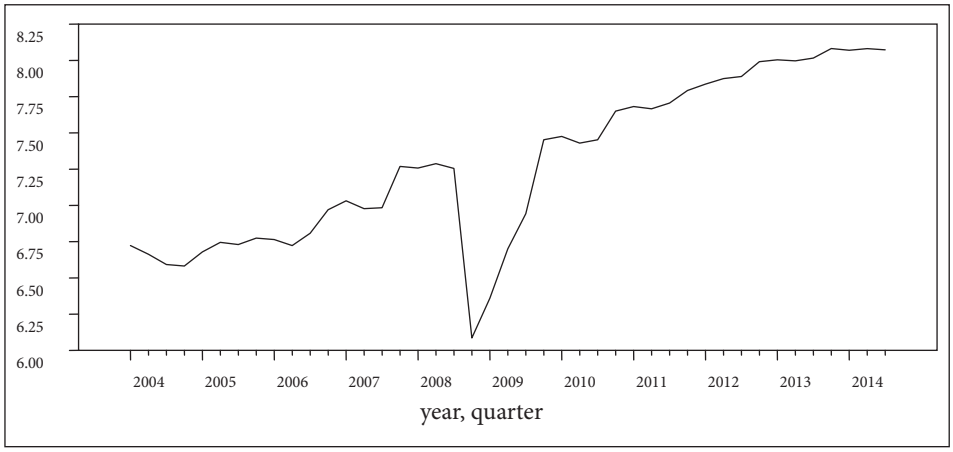
Source: Statistical Office of the Republic of Serbia, April 2015

Graph 2. Gross disposable income



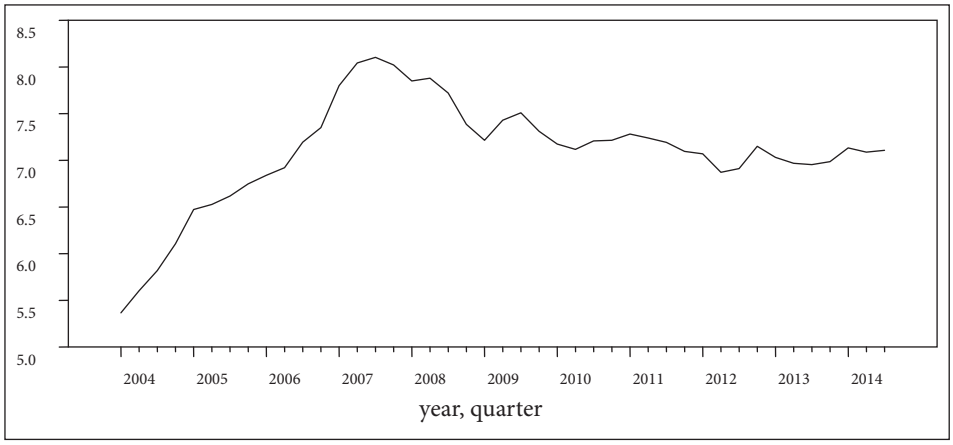
Source: Statistical Office of the Republic of Serbia and Author's calculation, April 2015

Graph 3. Net financial assets



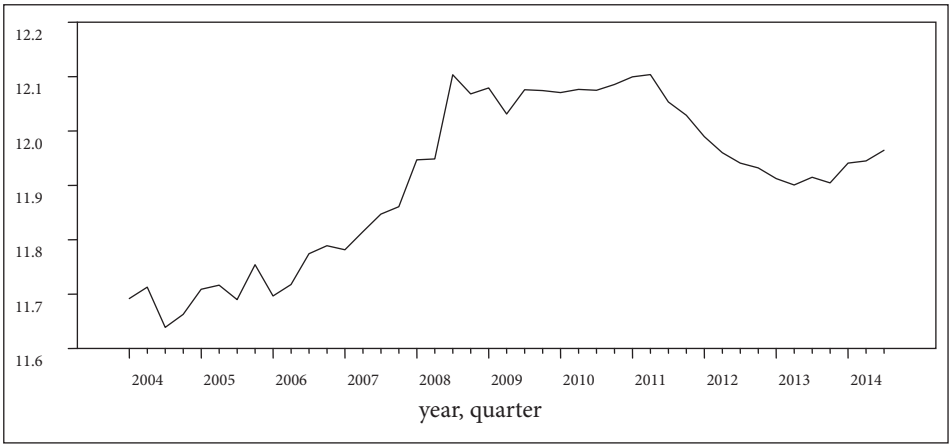
Source: National Bank of Serbia and Author's calculation, April 2015

Graph 4. Securities



Source: Belgrade Exchange, Central Register for Securities and Author's calculation, April 2015

Graph 5. Housing wealth



Source: Statistical Office of the Republic of Serbia, National Bank of Serbia and Author's calculation, April 2015

Visual inspection of the data shows that all series rise until approximately 2008 Q3 (for securities 2007 Q3) and decline or stagnate after that.

The series of net financial assets have a structural break from Q4 2008 until Q3 2009. The sharp fall in net financial assets in the fourth quarter of 2008 is the consequence of the beginning of the crisis, when savings declined, liabilities increased, and the euro exchange rate rose significantly.

As is widely accepted, before the financial crisis started in 2007 there was a marked rise in all asset prices, which we can define as bubbles, and we see this in the Serbian housing wealth and securities data, just as in other countries.

The Zivot-Andrews unit root test enables us to examine the presence of a unit root in a series where there are one or more permanent breaks present in trend, constant, or both, by introducing different shift dummy variables. It is not necessary to specify the moment of the break(s) as that is one of the outcomes of the test (the moment when the test statistic takes the minimum value). The whole series range is analysed except the fraction of 0.15, which is skipped at either end when examining possible break points. The results are shown in Table 2.

Table 2. Zivot-Andrews Unit Root Test

	allowing for one or more breaks in			critical value			
series	trend	intercept	both	1%	5%	test statistics value	break-point
Consumption				-4.93	-4.42	-3.79	Q2 2008
Gross disposable income				-5.57	-5.08	-4.26	Q3 2006
Securities				-4.93	-4.42	-4.14	Q2 2007
Housing wealth				-5.57	-5.08	-3.99	Q1 2008

Source: Author's calculation
Note: Two lags are used in all equations

Table 3. Augmented Dickey Fuller Unit Root Test

	deterministic component		critical value		
series	intercept	none	1%	5%	test statistics value
DC_SA			-3.59	-2.93	-5.09
DGDI_SA			-3.59	-2.93	-6.39
DSEC			-3.59	-2.93	-3.71
DHW_SA*			-3.59	-2.93	-3.61
DC_SA			-2.62	-1.95	-5.06
DGDI_SA			-2.62	-1.95	-6.32
DSEC			-2.62	-1.95	-3.68
DHW_SA*			-2.62	-1.95	-3.44

Source: Author's calculation
Notes: a) SA – de-seasonalized
b) abbreviations explained in part 3
c) *one lag is only used in testing housing wealth: in all other equations 0 lags were chosen.

The type of break is chosen based on visual inspection, whether in trend, in constant, or both. For all analysed series the values of the test statistics are greater than both the 1% and 5% critical values, which confirms the hypothesis that the series are not stationary. An Augmented Dickey Fuller (ADF) unit root test of first differences showed that the series possess only one unit root (Table 3).

An ADF unit root test with a dummy variable for the structural break confirmed the non-stationarity of the net financial assets (the value of test statistics is -0.72, which is more than the τt critical value of -3.5) and the presence of a single unit root (the value of the test statistics of the Augmented Dickey Fuller test with two lags on the first difference is -3.1, whereas the τM critical value is -2.93).

Now that we have confirmed that the series possess one unit root we can proceed with the cointegration analysis, which is the necessary analytical frame when series are not stationary. A lag-length test suggested that VAR(5) would be most appropriate, but as it was not possible to calculate Bartlett[17] small sample correction for the trace test due to the number of lags in use, VAR(4) was used (VECM with lag length of 3). The deterministic component applied in the test VECM was the constant in the cointegrating relationship. Johansen's trace test showed that there is one cointegrating relationship. We have normalized the Beta vector so that C_SA is equal to one, as 'Consumption' is our variable of interest. Residual analysis showed that the analysed VECM performs well statistically, as the normality condition was fulfilled and there was an absence of autocorrelation in the unrestricted and restricted models. The forward and backward recursive estimation procedure for investigating constancy of the parameters, to test the adequacy of the model, showed that the parameters are stable[18]. The applied tests of beta constancy and eigenvalue fluctuation proved the constancy of the alpha and beta parameters as the test statistics values are positioned under the rejection area. The results of Johansen's procedure and analysis of the adequacy of the estimated model are shown in Table 4.

17 Bartlett correction is a correction of the relatively moderate samples developed by Johansen for the rank test as well as for the tests on ß to better approximate the true tests distributions. It can be substantial for samples comprising 50-70 observations. Juselius (2006) p.141, Dennis (2006), pp. 160-161.

18 Checking the constancy of the beta vector is another way to ascertain that the VECM and cointegration relationship is well specified and that the estimated coefficients can be trusted. Juselius (2006) p. 165, p. 170.

Table 4. Results of Johansen's procedure

TRACE TEST

I(1)-ANALYSIS		
r	p-value	p-value*
0	0.000	0.016
1	0.000	0.144
2	0.023	0.423
3	0.086	0.257
4	0.251	0.415

THE MATRICES BASED ON 1 COINTEGRATING VECTOR

ß (1)			α(1)	
variables			equations	
C_SA	1 (NA)		DC_SA	**-0.154** **(-4.846)**
GDI_SA	2.157 (7.420)		DGDI_SA	-0.126 (-2.789)
HW_SA	-0.733 (-2.956)		DHW_SA	0.012 (-0.381)
SEC	-0.531 (-8.079)		DSEC	0.037 (-0.290)
FAFL	-0.414 (-10.276)		DFAFL	0.567 (-3.055)
CONSTANT	1 (-4.926)			

RESIDUAL ANALYSIS (restricted model)

Tests for Autocorrelation	
LM(1):	$\chi^2(25) = 21.160$ [0.684]
LM(2):	$\chi^2(25) = 30.877$ [0.193]
Test for Normality	$\chi^2(10) = 13.283$ [0.208]

Source: Author's calculation

Notes: a) p* is Bartlett-corrected p-value

b) LM(1) is the Ljung Box Test based on the estimated auto- and cross-correlations of the first T/4 lags. See Dennis (2006), p.51

c) LM(2) is the test for the n^{th} order autocorrelation, idem

d) Test for Normality is the Doornik-Hansen test, idem

Because gross disposable income has the wrong sign in the cointegrating relationship, we have tested the restriction that the coefficient in the Beta vector for this variable is zero. As housing wealth turned out to have the wrong sign after setting the gross disposable income to zero, we have tested if it also equals zero. Both restrictions proved to be correct, as the p-value of the test statistics was greater than 0.05. Also, we tested the zero restrictions on Alpha coefficients of net financial assets and securities, as they were not statistically significant after restricting the Beta vector, and they were correct at 5% significance level, together with other restrictions. The results of comparing the unrestricted and restricted models are shown in Table 5.

Table 5. Results of Johansen's procedure - testing imposing restrictions

TEST OF RESTRICTED MODEL: $\chi^2(5) = 8.988$ [0.110]
BARTLETT CORRECTION: $\chi^2(5) = 5.166$ [0.396]

THE MATRICES BASED ON 1 COINTEGRATING VECTOR WITH VALID RESTRICTIONS

ß (1)		α (1)	
variables		equations	
C_SA	**1 (NA)**	DC_SA	**-0.806 (-8.590)**
GDI_SA	0.000 (NA)	DGDI_SA	-0.467 (-2.682)
HW_SA	0.000 (NA)	DHW_SA	0.000 (0.000)
SEC	**-0.145 (-12.518)**	DSEC	0.000 (0.000)
FAFL	**-0.098 (-10.734)**	DFAFL	0.000 (0.000)
CONSTANT	-6.340 (-62.911)		

Source: Author's calculation
Note: Bartlett correction mentioned in footnote 17

We can see that the consumption, securities, and net financial assets series are cointegrated. The cointegrating relationship is only significant for the behaviour of Consumption, and the sign of the adjustment coefficient is negative. This means that after a shock or equilibrium error term in the previous period, Consumption adjusts in the next period to the cointegration relationship or the equilibrium,

and makes all the adjustment necessary for the cointegration relationship to exist. It also confirms that Consumption is 'Granger-caused' by the other two variables.[19]

In explaining this relationship we have to look at the graphic representation of these three series together (Graph 6). Securities reflect the expectations in the economy, and net financial assets explain the dynamic of consumption as the wealth component.

The fact that gross disposable income has not entered the cointegrating relation can perhaps be explained by the fact that important parts are missing (mixed or entrepreneurial income, property income, and some transfers) which, if they were present in the data, would not only add to the modelling of consumption but also to the explanation of the net financial assets dynamic, together with consumption (net financial assets are constantly rising, except for one major structural break, which is not in line with rising and declining gross disposable income exclusive of mixed income, and consumption is of the same dynamic as gross disposable income. See Graph 7).

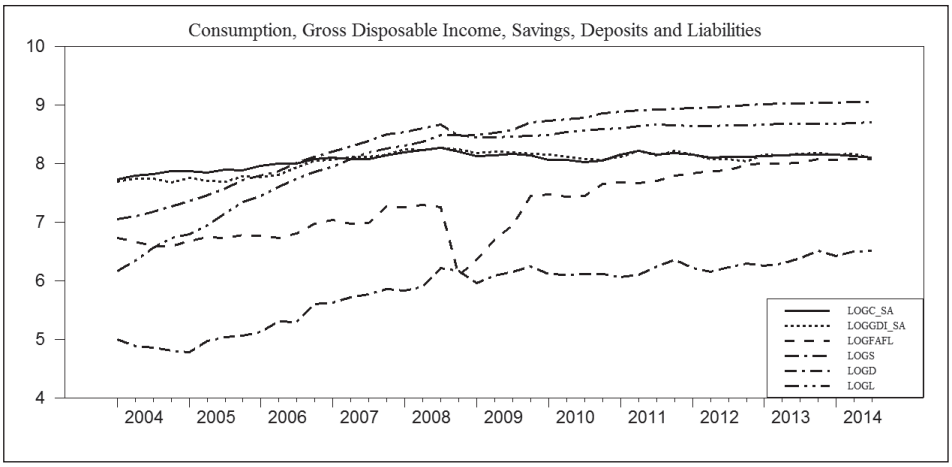
The net financial assets dynamic, i.e., rising deposits (D) and savings (S) with stagnant financial liabilities (L) in the second part of the analysed time span (see Graph 7) could also be explained by the eventual sales of non financial household assets to foreigners or to the holders of financial assets outside the banking system.

19 As Maddala and Kim (2004) point out, (p.189), cointegration is concerned with long-run equilibrium and Granger causality with short-run forecastability. Nevertheless, the two concepts can both be analysed in ECM. If coefficient of adjustment α of a variable takes a non-zero value it is Granger-caused by other variables of the cointegration relation because the equilibrium error is a function of variables in a previous period.

Graph 6. Consumption, Securities and Net Financial Assets

Source: Statistical Office of the Republic of Serbia, National Bank of Serbia, Central Register for Securities and Author's calculation, April 2015

Graph 7. Dynamics of Net Financial Assets



Source: Statistical Office of the Republic of Serbia, National Bank of Serbia and Author's calculation, April 2015

We also performed VAR analysis and analysed the Granger causality[20] in the VAR in levels for the variables that enter a cointegration relation (consumption,

20 Wald test χ^2 distributed on the VAR estimated by OLS in levels was implemented.

net financial assets, and securities). Lag length was determined by information criteria, normality, and autocorrelation tests. It was chosen to be five.

Consumption and net financial assets are Granger-caused by two other variables in the model, whereas the securities variable is not Granger-caused by consumption and net-financial assets.

Table 6. Granger Causality X^2 test

VAR (5) C_SA, SEC, FAFL, constant, dummys	probability (p)
Jarque Bera (Doornik Hansen ortogonalization) Normality Test	0.86
Granger causality in consumption equation (SEC and FAFL excl.)	0
Granger causality in securities equation (C_SA and FAFL excl.)	0.85
Granger causality in equation for net-financial assets	0.05

Source: Authors' calculation

Analysis of smaller VAR models, like that comprising consumption, gross disposable income and housing wealth and that comprising consumption and gross disposable income, showed that those models have the correct specification but gross disposable income and housing wealth are not statistically significant for modelling consumption, or consumption is not Granger-caused by the other two variables[21]. Since we have already established the superiority of the wider model comprising consumption, net financial assets, and securities in comparison to the model consisting only of lagged consumption (as consumption is Granger-caused by both variables) we conclude that in Serbia consumption is not a random walk, as suggested by the stochastic implication of the one variant of the permanent income-life cycle hypothesis.[22]

Lastly, we present the final ECM model for consumption based on the findings of Johansen's procedure and the statistical significance of certain lags and variables based on the t-test in VECM in Table 7 and its performance in Graph 8. Instead of the four lags chosen for the VECM for the Johansen's procedure, we have implemented five lags as the optimal choice.

21 Gross disposable income, on the other hand, is Granger-caused by consumption in the VAR model with consumption and gross disposable income.

22 The narrow model would be supported by the stochastic implication of one variant of the life cycle-permanent income hypothesis. "The strong stochastic implication of the life cycle-permanent income hypothesis is that only consumption lagged one period should have a nonzero coefficient in such a regression". See Hall (1978), p. 972 and footnote 3.

Table 7. Parameters and Variables of the ECM Model for Consumption

VARIABLE	PARAMETER ESTIMATE	t statistics
Zt-1	-0.806	-7.5
DC_SAt-1	0.31	2.84
DSECt-1	-0.079	-2.133
DSECt-2	-0.152	-3.786
DFAFLt-2	-0.043	-2.123
DC_SAt-3	0.362	3.035
DFAFLt-3	-0.082	-3.961
DFAFLt-4	-0.089	-3.673

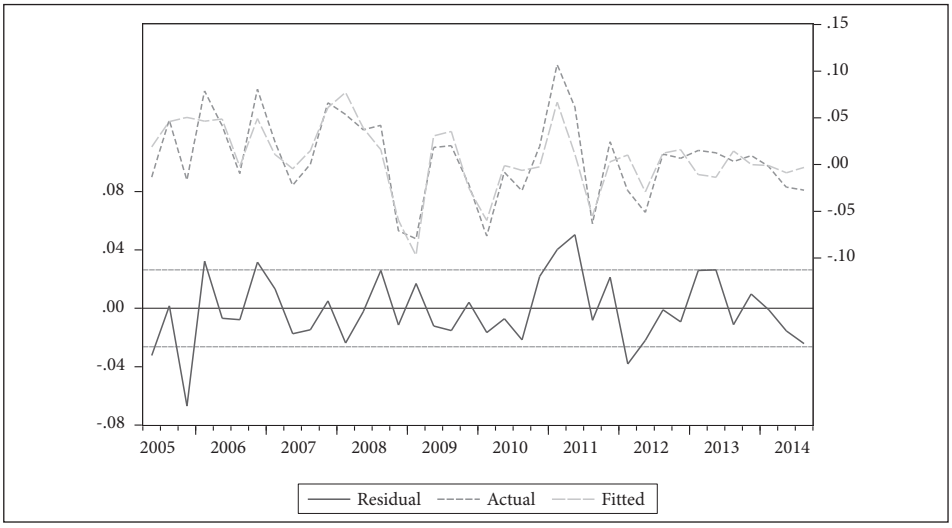
a) Z-equilibrium error of the estimated cointegration relation
Z=C_SA-0.145SEC-0.088FAFL-6.426

RESIDUAL ANALYSIS

JARQUE BERA NORMALITY TEST (p value)	0.92
BREUSCH-GODFREY SERIAL CORRELATION LM TEST, p value, $\chi^2(6)$	0.08
ADJUSTED COEFFICIENT OF DETERMINATION	0.64

Source: Authors' calculation

Graph 8. Error Correction Model for Consumption: Actual values, Fitted values, and Residuals



Source: Authors' calculation

6. CONCLUSION

In this paper we have examined the presence of the wealth effect in the consumption function of Serbian households.

The balance sheets of the institutional sectors, in this case households, enable most developed and some emerging market economies to model wealth effect on consumption. In these countries, variables such as housing wealth, stocks, and net financial assets form part of econometrical models, together with the gross disposable income of households. This part of the SNA is not currently compiled in Serbia, although this is planned to change.

We based econometrical modelling on data of the System of National Accounts. We constructed the currently missing data that was relevant to this research. The construction of data was based on currently available data from the Serbian Statistical Office, the National Bank, the Belgrade Exchange, and the Central Register for Securities. Because of the limitations of current statistics sources, constructed data concerning housing wealth are not precise regarding the house price dynamic, and the gross disposable household income is incomplete as it does not include mixed and property incomes.

The results of cointegration and VAR analysis based on the constructed data show that in Serbia the wealth variables 'securities' and 'net financial household assets' explain the behaviour of household consumption, and gross disposable income is not statistically significant. Therefore we conclude that when the complete SNA data is compiled in Serbia it will enable the use of a more complete consumption model than is the case at present, when the only readily available quarterly data for consumption modelling are data for consumption and disposable income.

Time will show if a higher level of economic development, more pronounced changes in housing wealth in Serbia, or better data compiled by the Statistical Office of Serbia will result in a different model.

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