The Influence of Stock Market and Housing Wealth on Consumption Expenditures in Transition Countries

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Abstract

We explore the link between stock market wealth, housing wealth and aggregate consumption for a sample of four European post-transition economies. We use Johansen co-integration, vector error correction models and impulse response functions in order to assess the long run and the short run responsiveness of consumption to permanent changes in both types of wealth. We find evidence that supports the presence of the long run wealth effect in Bulgaria, Croatia, and the Czech Republic. In Bulgaria only stock market wealth effect appears to matter, while in the other two countries both types of wealth effects are effective. Loading factor estimates suggest that in the short run income and consumption adjust most of the discrepancies, while stock market and housing wealth are weakly exogenous.

JEL classification codes: C32, D12, E21, E44
Keywords: post-transition, consumption, wealth, co-integration

1. Introduction

Many countries, including European post-transition countries, experienced large fluctuations in housing and stock market prices over the last decade. As housing is the largest asset for most families, while stock market holdings also constitute a large segment of household asset portfolio (albeit in European post-transition countries, stocks are not even remotely as significant as housing), such large price changes are undoubtedly associated with consumers´ net worth and consequently might have a big impact on aggregate consumption.

Empirical literature studying the impact of housing and stock market wealth on consumption can be broadly divided in two categories. One strand of literature models direct wealth effect using aggregate macroeconomic data, while the other assesses indirect wealth effect using disaggregated (usually household level) data. In our study we follow the former approach, which assumes that rising asset prices (both house and stock market prices) increase household wealth that in turn increases consumption via the budget constraint. Direct wealth effect is most often modelled using co-integration and error correction models, which allows one to distinguish between the short run and the long run relationship between consumption, income and wealth. Moreover, this approach identifies the variables that adjust after the shock in order to restore the equilibrium.

Given the fact that the literature offers very limited insight with regards to impact of changes in housing and stock market wealth effect on consumption in European post-transition countries, this study will shed more light on this very important, yet under explored topic. Studying the wealth effect in CEE countries has great policy relevance because asset price boom and busts in the last two decades have been more pronounced in these countries when compared to developed countries (Posedel and Vizek, 2009), which may have had a strong impact on the consumption spending. This study also contributes to the literature by distinguishing the effects of changes of both types of wealth on consumer spending in four European post-transition European countries. To the best of our knowledge, there have been no such studies published so far.

The remainder of the paper is organised as follows. Section 2 reviews the literature on wealth effect in developed and European post-transition countries. Section 3 presents the data and the methodology applied and discusses the results of the empirical analysis. Section 4 summarises the main findings.

2. Literature Review

The majority of studies on stock market and housing wealth effect on consumption are conducted for industrialised countries. Poterba (2000) surveys the literature exploring the stock market wealth effect in industrialised countries, while Paiella (2009) reviews more recent papers analysing both the stock market and housing wealth effect on consumption in the industrialised countries. As Paiella (2009) claims, the empirical research on the link between wealth and consumption has generally found evidence of a positive and significant long-run relationship between wealth and consumption in developed countries. Recent studies using aggregate data for the USA, such as Ludvigson and Steindel (1999), Mehra (2001), Davis and Palumbo (2001) and Lettau and Ludvigson (2004), find that a one dollar

increase in aggregate wealth leads to an increase in aggregate consumption of 3–5 cents. In addition, Ludvigson and Steindel (1999) and Lettau and Ludvigson (2004) find that wealth is the variable that adjusts after the shock in order to restore the long-run equilibrium relationship between income, wealth and consumption. Fernandez-Corugedo et al. (2003), Fisher and Voss (2004) and Chen (2006) find quantitatively similar evidence for the Unied Kingdom, Australia and Sweden. Studies encompassing a sample of industrialised European countries, such as Labhard et al. (2005), suggest that the total wealth effect on consumption ranges between 1 and 5 percent for most euro-area countries.

The main drawback of the aforementioned studies is that they do not differentiate between stock market and housing wealth. Several studies for industrial countries have specifically addressed that issue. Dvornak and Kohler (2003) investigate the impact of stock market wealth, as well as housing wealth, using state level panel data for Australia, while Case et al. (2005) do the same for the USA and a panel of OECD countries. Ludwig and Slok (2004) apply the co-integration panel method on data for 16 OECD countries. Dvornak and Kohler (2003) conclude that the stock market wealth effect is more important in Australia, while Case et al. (2005) find the opposite for the USA. Furthermore, Case et al. (2005) estimates suggest marginal propensities to consume out of housing wealth are substantially larger than marginal propensities to consume out of stock market wealth for both a panel covering 14 developed countries and a panel of US states. Ludwig and Slok (2004) research suggests that stock market wealth effect on consumer spending has increased over time, with stock market wealth effect being more pronounced in countries with a market-based financial system, when compared to countries with a bank-based financial system. On the other hand, housing wealth effect has become significant in the 1990ies. Zemcik (2006) models housing, stock market wealth and consumption using the bi-variate Markov switching model, Granger causality tests and impulse responses. His results suggest that both housing and stock market wealth cause consumption, although impulse responses indicate that consumption reacts a bit more strongly to changes in stock market wealth.

Besides the aforementioned two groups of papers, there exists another strand of literature that looks exclusively at the housing wealth effect on consumption in industrialised countries. However, studies like Campbell and Cocco (2007), Morris (2007), Disney et al. (2007), Bover (2005) and Attanasio et al. (2005) differ greatly on the exact effect of housing wealth on consumption. Atanasio et al. (2005) estimates for the marginal propensity to consume out of housing wealth for the UK range from 0.04 to as high as 0.21, while on the other end of spectrum Bovers (2005) estimate for Spain is only 0.02 percent.

As far as studies on housing wealth effect in post-transition countries are concerned, to the best of our knowledge only one paper exists. Namely, Sec and Zemcik (2007) use a panel data approach in order to estimate the impact of change in housing prices, rents and mortgage payments on consumption in the Czech Republic. They combine household expenditure survey data with regional data on apartment prices. Their results suggest that homeowners respond differently to changes in house prices and rents than renters. More specifically, higher house prices increase consumption for those households who are homeowners, but as expected not for those households that are renters. Finally, mortgage payments do not explain any variation in consumption. Funke (2004) is the only study of stock market wealth effect on a sample of 16 emerging countries, which however does not include European countries. The author finds a very small, but statistically significant, stock market wealth effect: when stock prices on average increase by 10 percent, private consumption grows by 0.2–0.4 percent.

3. Data and Methodology

The main purpose of this study is to assess the relative importance of two wealth components, stock market and housing wealth, for private consumption in European post-transition countries: Bulgaria, the Czech Republic, Croatia and Estonia. The motivation for including wealth in consumption function stems from several theories, including the permanent income theory by Friedman (1957), and the life cycle theory by Modigliani and Brumberg (1954), and Ando and Modigliani (1963). Co-integration and error correction methods are usually the method of choice when modelling wealth effect on consumption since the basic prediction of the life-cycle model of household spending suggests that predictable changes in asset prices should not lead to changes in planned consumption, while unexpected changes should generate a response.

To determine whether the aggregate consumption forms an equilibrium relationship with income, stock market and housing wealth in the long run we use the Johansen procedure, i.e. trace and maximum eigenvalue statistics. These two test statistics also determine the number of co-integrating vectors between variables (Johansen, 1988; Johansen, 1991). The trace statistic tests the hypothesis that the number of co-integrating vectors is less than c, while the maximum eigenvalue statistic tests that the number of co-integrating vectors is equal to c against $c + 1$.

We begin the co-integration analysis by estimating a VAR in the form of Equation 1. k represents country, and $\mathbf{Y}_{k,t}$ is a 4 x 1 vector containing the values that four variables assume at time t. $\mathbf{Y}_{k,t}$ consists of four variables representing aggregate consumption, income, stock market wealth and housing wealth.

$$\mathbf{Y}_{k,t} = \mathbf{c}_k + \sum_{j=1}^{p} \mathbf{\Phi}_{k,j}\, \mathbf{Y}_{k,t-p} + \boldsymbol{\varepsilon}_{k,t} \tag{1}$$

The dynamics of $\mathbf{Y}_{k,t}$ is presumed to be governed by a p^{th}-order Gaussian vector autoregression, where p represents the lag length, $\mathbf{Y}_{k,t}$ (4 x 1) vector contains the constant terms of the VAR, the matrices $\mathbf{\Phi}_{k,1}, \ldots, \mathbf{\Phi}_{k,p}$ contain the autoregressive coefficients, and $\varepsilon_{k,t}$ is an i.i.d. N(0, Σ) process.

After the long-run relationships were derived, an error-correction model of aggregate consumption was estimated for each country. Only results for error-correction model for consumption are presented in this paper, while other error correction model results can be obtained from the author upon request.

Although the analysis carried out does not require numerous variables, there are several limitations related to the data availability. In order to conduct the analysis quarterly data (series) is required on consumption, income, housing wealth and stock market wealth for the four countries – Bulgaria, Croatia, Czech Republic, and Estonia. It was not possible to include other post-transition European countries in the analysis because longer house price series were not available to the author.

House price series is used as a proxy for housing wealth since housing wealth series and housing stock series, from which one derives housing wealth series, are not available for the analysed countries (except Estonia). House prices were also used as a proxy for housing wealth in studies on wealth effect on consumption in Miles (1992), Miles (1995), Girouard and Blöndal (2001), Aoki et al. (2003), and Ludwig and Slok (2004). Sources for house prices and all other series are displayed in the Appendix.

Since a stock market wealth variable is difficult to construct, stock market indices are used as a proxy for wealth. The same approach was followed in a great number of other studies, including Romer (1990) and Poterba and Samwick (1995). Data on total real aggregate consumption was used, although in the empirical literature non-durable consumption series is also used. The advantages of using non-durable consumption are straight forward: durable consumption can be thought of as a replacement and improvement to a capital stock that opposes mainstream consumption theories, which perceive consumption as a flow variable (Ludwig and Slok, 2004). However, several authors, including Romer (1990), Brady et al. (2000) and Mehra (2001), recommend using a total consumption series when testing for wealth effect because the stock market crashes usually only affect (i.e. postpone) durable consumption. Moreover, equity extracted from homes via financial instruments is usually used for financing the purchases of durable goods. Finally, net wage series published by national statistical offices and Eurostat are used as a proxy for income.

The series are expressed in real terms. Net wages, house prices and stock market price series were deflated using the consumer price index. All series were transformed into logarithms. All series were tested for unit roots using the Ng-Perron test (Perron and Ng, 1996). The results suggest that all series are stationary in first differences.[1] The longest sample for transition countries is available for Croatia (from Q4:1996). Data for Estonia starts in Q1:1997, while for Bulgaria and the Czech Republic the starting observation is Q1:1998. The data series for all transition countries are available up to Q1:2010.

4. Results

The first step in the analysis is to test for co-integration between private consumption, income, stock market wealth and housing wealth. Trace and maximum eigenvalue statistics suggest that in Estonia and Bulgaria one co-integrating vector is found, while in the case of Croatia and the Czech Republic three vectors are detected.[2] The analysis proceeds by the imposing of a normalisation restriction to the long run private consumption, which allows the identification of the long run parameters of the first vector for all four countries.

Table 1 displays the long-run elasticities of private consumption with respect to income and two wealth proxies, along with the results of zero restrictions test (calculated as LR test with Chi^2 statistics) on each individual long run elasticity. Chi^2 statistics and the corresponding p-values suggest which of the variables entailing the long run relationship are not statistically significant and can thus be excluded from the long run model. One can notice that in the case of Croatia, and the Czech Republic, all variables are statistically significant and can not be excluded from the long run model. In the case of Estonia, only private consumption is marginally significant, while the coefficient for the other three variables are not statistically different from zero. This finding suggests that although one co-integrating vector is found, the long run impact of income and wealth on private consumption in Estonia is slim at best. In the case of Bulgaria, private consumption seems to be affected by stock market wealth, while long run coefficients of income and housing wealth are not statistically different from zero.

[1] To conserve space we do not show the results of unit root tests here, however, they are available from the author upon request.

[2] The details on trace and maximum eigenvalue statistics can be obtained upon request from the author.

As far as the magnitude of the long-run wealth effect coefficients, the results reveal they are surprisingly high in Bulgaria and the Czech Republic, while they are much smaller in Croatia. In Bulgaria where only stock market wealth is relevant for private consumption, the long run increase of stock market prices by 1 percent increases private consumption by 0.12 percent. In Croatia and the Czech Republic, which are the only two countries with both types of wealth effect present in the long run model, additional restrictions are imposed in order to identify the coefficients and to facilitate their comparison. Thus in Croatia the assumption is made that two wealth effect coefficients are the same, while in the Czech Republic the assumption is made that the housing wealth effect coefficient is twice as large as the stock market coefficient. Both restrictions are accepted (for the former restriction Chi2 statistics 2.77 and corresponding p-value 0.16 is obtained, while for the latter restriction Chi2 statistics 1.55 and corresponding p-value 0.28 was obtained). The derived wealth coefficients for Croatia are quite small: an increase of both housing and stock market prices by 1 percent raises private consumption by 0.028 percent. Unlike Croatia, where both types of wealth effect have the same effect on the consumption, in the Czech Republic housing wealth effect is double in size (0.18), when compared to the stock market effect (0.09).

Table 1. Long-Run Elasticities of Consumption and Corresponding Zero Restrictions

Variable	Consumption		Net wage		Housing wealth		Stock market wealth	
Country	β	$\beta=0$	β	$\beta=0$	β	$\beta=0$	β	$\beta=0$
Bulgaria	1.0	8.52* [0.004]	0.12	0.514 [0.47]	0.009	0.005 [0.94]	0.12	6.32** [0.01]
Croatia	1.0	13.2* [0.0003]	1.52	13.2* [0.0003]	0.023	3.01 [0.08]	0.06	6.32** [0.012]
Croatia – restricted model	1.0	-	1.52	-	0.028	-	0.028	-
Czech Republic	1.0	44.0* [0.00]	0.137	51.1* [0.00]	0.191	31.6* [0.00]	0.089	46.9* [0.00]
Czech Republic - restricted model	1.0	-	0.16	-	0.18	-	0.09	-
Estonia	1.0	3.33 [0.07]	0.28	1.28 [0.25]	0.25	1.39 [0.23]	0.054	1.56 [0.21]

Note: * significant at 1 percent level. ** significant at 5 percent level. Zero restriction on long run elasticities is tested using the likelihood ratio test of restriction with the Chi^2 statistics. Numbers in brackets denote the p-values.

Source: Author's calculations

Table 2 presents the adjustment coefficients that are estimated along with the long run coefficients in a co-integration space. By testing the zero restriction on individual adjustment coefficients, it establishes which variables are weakly exogenous, i.e. which variables in the short run do not correct the deviations from the long run equilibrium. This is important because, although the Granger representation theorem suggests that there must be an error-correction mechanism if the series in question are co-integrated, error-correction terms in error-correction models with weakly exogenous series as dependant variables will not be statistically significant. When observing Table 2 one can notice that private consumption adjusts to changes in the long run equilibrium in three out of four countries (the exception is Croatia). As far as other variables are concerned, both the house prices and the stock

market prices do not adjust the long run discrepancies. The only exception in that regard is Croatia, whose stock prices are not weakly exogenous. Along with consumption, income also changes in the short run to adjust the disequilibria and is therefore not weakly exogenous in three out of the four countries.

Table 2. Adjustment Coefficients and Weak Exogeneity Tests

Variable	Consumption		Net wage		Housing wealth		Stock market wealth	
Country	α	α =0	α	α =0	α	α =0	α	α =0
Bulgaria	-0.338	12.4* [0.0004]	-0.164	5.7** [0.016]	-0.074	0.34 [0.55]	-1.31	3.14 [0.07]
Croatia	-0.11	0.04 [0.80]	0.76	10.3* [0.001]	3.19	1.20 [0.27]	-10.9	8.87* [0.002]
Czech Republic	-1.09	9.34* [0.002]	3.5071	28.8* [0.00]	2.313	3.54 [0.06]	6.14	1.10 [0.29]
Estonia	-0.449	4.49** [0.03]	-0.132	1.83 [0.17]	-0.074	0.007 [0.93]	0.26	0.354 [0.55]

Note: * significant at 1 percent level. ** significant at 5 percent level. Zero restriction on adjustment coefficients are tested using Likelihood ratio test of restriction with Chi^2 statistics. Numbers in brackets denote the p-value.
Source: Author's calculations

Table 3 summarises the results of the error-correction models. One must note that error correction models for Croatia and the Czech Republic were derived using the restricted version of the co-integration relation. Also it must be noted that there is no reason to estimate an error correction model for Estonia given the fact that all variables entailing a long run model for Estonia are not statistically different from zero.

Table 3. Error-Correction Model – Summary of Estimation Results

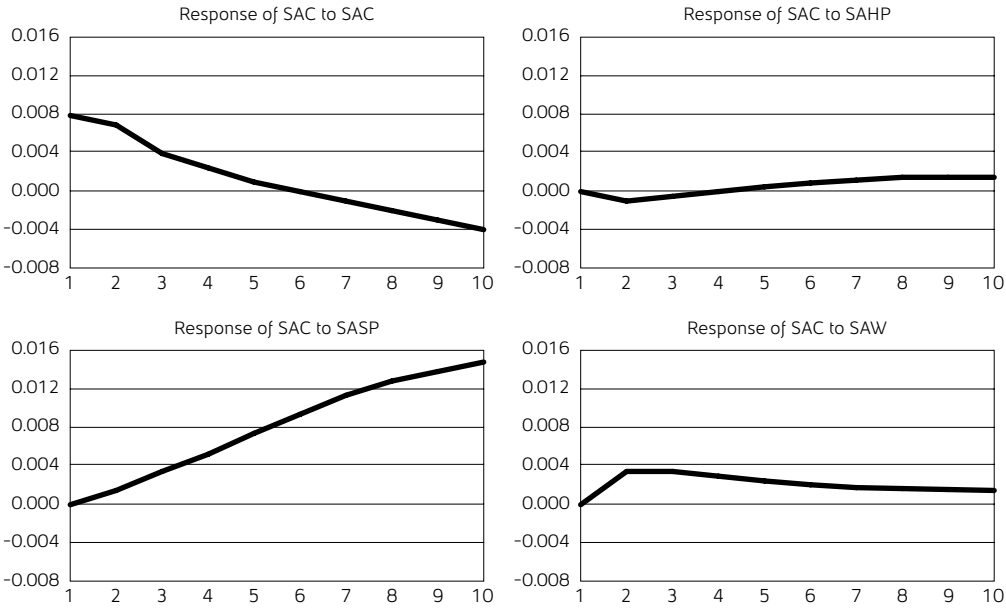
Explanatory variables	Bulgaria	Croatia	Czech Republic
Error correction term	-0.33* [0.00]	0.12 [0.73]	-1.05** [0.04]
Consumption persistence	1.52 [0.22]	0.24 [0.90]	2.50 [0.08]
Net wage	3.89 [0.06]	0.69 [0.60]	0.78 [0.59]
Housing wealth	4.43** [0.043]	0.42 [0.78]	1.71 [0.20]
Stock market wealth	1.03 [0.32]	1.64 [0.25]	1.39 [0.29]
Adjusted R^2	0.48	0.62	0.67
RSS	0.0018	0.0007	0.0019
Number of lags of independent variables	1	4	6
AR test	2.10 [0.12]	0.13 [0.94]	0.32 [0.58]
ARCH test	0.18 [0.90]	0.22 [0.88]	0.01 [0.92]
Normality test	2.27 [0.32]	1.37 [0.50]	1.001 [0.60]
RESET test	1.35 [0.25]	1.42 [0.24]	0.49 [0.49]

Note: * significant at 1 percent level. ** significant at 5 percent level. Numbers in parentheses denote the time lag. Numbers in brackets denote the p-value; statistics corresponding to independent variables refers to F-statistics and associated p-value of block exclusion restriction on all lags of an individual variable.
Source: Author's calculations

As one can notice, the country models satisfy all diagnostic tests. Furthermore, in all countries, except Croatia, consumption is not weakly exogenous, i.e. it responds to deviations from the long-run equilibrium. This should not come as a surprise given that the weak exogeneity tests also indicated consumption in Croatia and were not responding to discrepancies in fundamentals. Moreover, the adjustment dynamics is quite strong in the remaining two countries. In the Czech Republic all discrepancy is adjusted in one quarter, while in Bulgaria the adjustment takes approximately three quarters. Lagged values of consumption in all countries are not significant, suggesting consumption smoothing is not present in this sample of economies. As far as the influence of income and wealth on short term private consumption dynamics, the conclusion can be made that in the short run consumption is affected by those variables that do not seem to matter for its determination in the long run. For example in Bulgaria changes in net wage and housing wealth Granger cause consumption, while in the long run only stock market wealth seem to matter. Similarly, in Croatia in the long run all variables explained the private consumption variance, while in the short run none of the variables matter. In the Czech Republic consumption in the short run does adjust the long run discrepancies, but it does not respond to wealth variables, while the opposite is true for the long run effect of wealth changes.

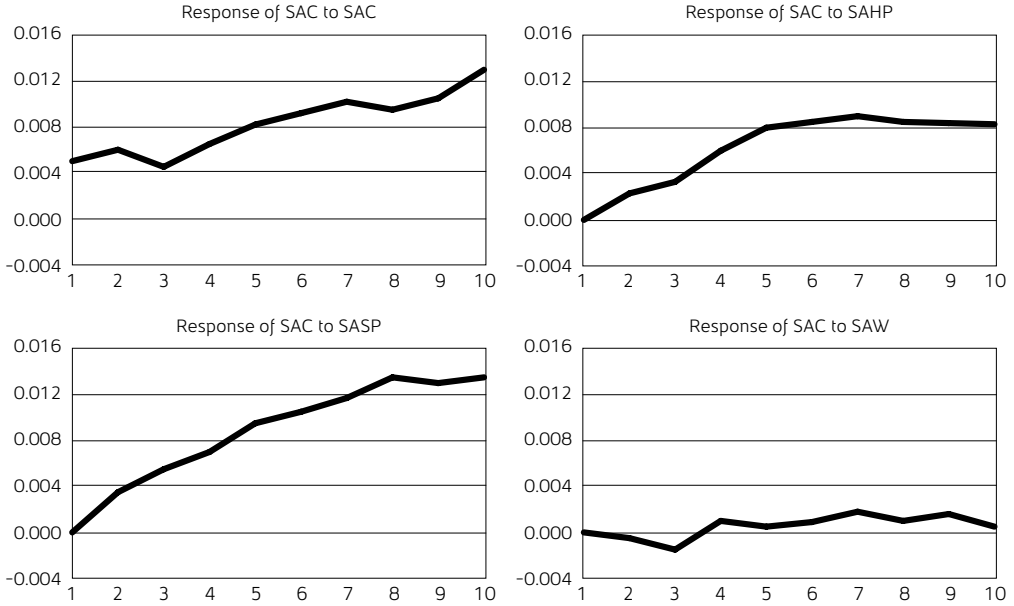
The empirical segment of the paper is concluded by the impulse response estimated using the error correction model framework. The Choleski identification scheme was employed with the following ordering: stock market prices, consumption, net wages, and house prices. One must also note that the results remained unchanged when reversing the ordering of variables.

Figure 1. Responses of Consumption to Innovations in All Variables – Bulgaria



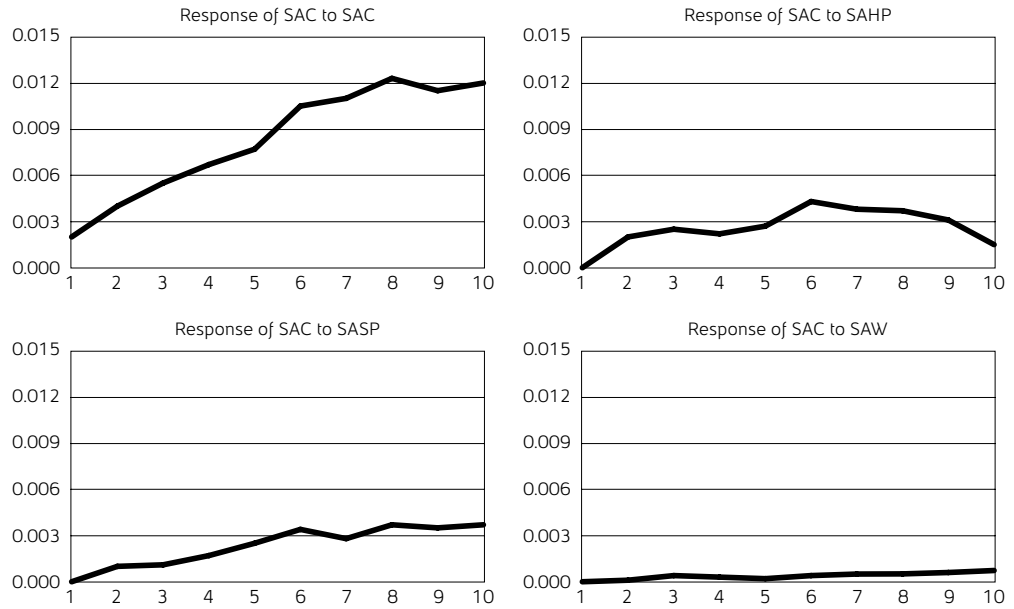
Note: Response to Cholesky One S. D. Innovations
Source: Author's calculations

Figure 2. Responses of Consumption to Innovations in All Variables – Croatia



Note: Response to Cholesky One S. D. Innovations
Source: Author's calculations

Figure 3. Responses of Consumption to Innovations in All Variables – The Czech Republic



Note: Response to Cholesky One S. D. Innovations
Source: Author's calculations

Due to space considerations, we present only the responses of consumption (SAC) to innovations in house prices (SAHP), stock market prices (SAPC) and net wage (SAW). The rest of the impulse response estimates can be obtained upon request from the author.

Impulse responses for all three countries suggest that consumption reacts similarly to stock price innovations in all three countries (Bulgaria, Croatia and the Czech Republic). Namely, after a one standard deviation shock in stock prices private consumption permanently increases. The reaction of consumption to house price innovations however differs significantly across countries. In Bulgaria house price innovations have hardly any effect on consumption, while in Croatia and the Czech Republic they permanently increase consumption. One must also note that impulse response estimates suggest some degree of consumption persistence is present in Croatia and the Czech Republic.

5. Concluding Remarks

We show that private consumption in three out of four post-transition countries responds to long run changes in stock market wealth, housing wealth or both. In Bulgaria only stock market wealth effect is significant in the long run, while in Croatia and the Czech Republic both stock market and housing wealth explain consumption variance in the long run. There seems to be no long run wealth effects on consumption in Estonia. As far as the magnitude of the long-run wealth effect coefficients, the results reveal they are surprisingly high in Bulgaria and the Czech Republic, while they are much smaller in Croatia. In Bulgaria, where only stock market wealth is relevant for private consumption, the long run increase of stock market prices by 1 percent increases private consumption by 0.12 percent. In Croatia an increase of both housing and stock market prices by 1 percent raises private consumption by 0.028 percent. Unlike Croatia, where both types of wealth effect have the same effect on the consumption, in the Czech Republic housing wealth effect coefficient is double in size (0.18), when compared to the stock market effect (0.09).

Loading coefficient estimates suggest that in the short run private consumption and income adjust to changes in the long run equilibrium in three out of four countries (the exception is Croatia), while stock market and housing wealth do not (the only exception is once again Croatia).

Error correction model estimates suggest consumption persistence is not present in the analysed economies. As far as the influence of income and wealth on short term private consumption dynamics, we can conclude that consumption is affected by those variables that do not seem to matter for its determination in the long run. For example in Bulgaria changes in net wage and housing wealth Granger cause consumption in the short run, while in the long run only stock market wealth matters. Similarly, in Croatia in the long run all variables explained the private consumption variance, while in the short run none of the variables matter. In the Czech Republic consumption in the short run does adjust the long run discrepancies, but it does not respond to wealth variables, while the opposite is true for the long run effect of wealth changes.

There are numerous ways to enhance the analysis presented in this paper. One could use other proxies for income (like disposable income); since obtained income elasticities of consumption are in general lower than one might expect. One might also use other proxies for stock market and housing wealth (like stock market capitalisation or housing stock) in order to check the robustness of obtained estimates. Moreover, more countries could be

added to the sample. In particular, it would be interesting to add developed European countries that would in turn facilitate the comparison of wealth effects in developed and post-transition European countries. Adding more countries to the sample might also enable the application of a panel co-integration method that would impose the same long run behaviour of consumption to all countries, while allowing for the short run heterogeneity.

References

Ando, A. and Modigliani, F. 1963. The 'Life-Cycle' Hypothesis of Saving: Aggregate Implications and Tests. *American Economic Review*, Vol. 53, pp. 55–84.

Aoki, K., Proudman, J. and Vlieghe, G. 2003. Houses as Collateral: Has the Link between House Prices and Consumption in the U.K. Changed? *FRBNY Economic Policy Review*, Vol. 8, No. 1.

Attanasio, O., Blow, L., Hamilton R. and Leicester, A. 2005. Booms and Busts: Consumption, House Prices and Expectations. *IFS Working Paper*, No. 05/24.

Bover, O. 2005. Wealth Effects on Consumption: Microeconometric Estimates from the Spanish Survey of Household Finances. *Documentos de Trabajo*, No. 0522, Banco de Espana.

Brady, P.J., Canner, G.B. and Maki, D.M. 2000. The Effects of Recent Mortgage Refinancing. *Federal Reserve Bulletin*, July 2000.

Campbell, J. and Cocco, J. 2007. How do House Prices Affect Consumption? Evidence from Micro Data. *Journal of Monetary Economics*, Vol. 54, No. 3, pp. 591–621.

Case, K., Shiller, R. and Quigley, J. 2005. Comparing Wealth Effects: The Stock Market versus the Housing Market. *Advances in Macroeconomics*, Vol. 5, No. 1, pp. 1-32.

Chen, J. 2006. Re-evaluating the Association between Housing Wealth and Aggregate Consumption: New Evidence for Sweden. *Journal of Housing Economics*, Vol. 15, No. 4, pp. 321-348.

Davis, M. and Palumbo, M. 2001. A Primer on the Economics and Time Series Econometrics of Wealth Effects. *FEDS Working Paper*, No. 2001-09, Board of Governors of the Federal Reserve System.

Disney, J. 2007. Affordable Housing in Australia: Some Key Problems and Priorities for Action. *Proceedings of the National Forum on Affordable Housing*, 19 April 2007, Australian Housing and Urban Research Institute, Melbourne.

Dvornak, N. and Kohler, M. 2003. Housing Wealth, Stock Market Wealth and Consumption: A Panel Analysis for Australia. *Research Discussion Paper*, No. 2003-07, Economic Research Department, Reserve Bank of Australia.

Fernandez-Corugedo, E., Price, S. and Blake, A. 2003. The Dynamics of Consumer Expenditure: the UK Consumption ECM Redux. *Working Paper*, No. 204, Bank of England.

Fisher, L. and Voss, G. 2004. Consumption, Wealth and Expected Returns in Australia. *Economic Record*, Vol. 80, pp. 359-372.

Friedman, M. 1957. *A Theory of the Consumption Function*. Princeton, NJ: Princeton University Press.

Funke, N. 2004. Is There a Stock Market Wealth Effect in Emerging Markets? *Economic Letters*, Vol. 83, No. 3, pp. 417-421.

Girouard, N. and Blöndal, S. 2001. House Prices and Economic Activity. OECD Economics *Department Working Papers*, No. 279.

Johansen, S. 1988. Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*, Vol. 12, No. 2-3, pp. 231-254.

Johansen, S. 1991. Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregression. *Econometrica*, Vol. 59, No. 6, pp. 1551-1580.

Labhard, V., Sterne, G. and Young, C. 2005. Wealth and Consumption: An Assessment of the International Evidence. *Bank of England Working Paper*, No. 275.

Lettau, M. and Ludvigson, S. 2004. Understanding Trend and Cycle in Asset Values: Reevaluating the Wealth Effect on Consumption. *American Economic Review*, Vol. 94, No. 1, pp. 276–299.

Ludvigson, S. and Steindel, C. 1999. How Important is the Stock Market Effect on Consumption? *Federal Reserve Bank of New York Economic Policy Review*, No. 5, 29–52.

Ludwig, A. and Slok, T. 2004. The Relationship between Stock Prices, House Prices and Consumption in OECD Countries. *Topics in Macroeconomics*, Vol. 4, Issue 1, pp. 1-25.

Mehra, Y.P. 2001. The Wealth Effect in Empirical Life-Cycle Aggregate Consumption Equations. *Federal Reserve Bank of Richmond Economic Quarterly*, Vol. 87, No. 2, pp. 45-68.

Miles, D.K. 1992. Housing Markets, Consumption and Financial Liberalization in the Major Economies. *European Economic Review*, Vol. 36, 1093-1136.

Miles, D.K. 1995. *Housing, Financial Markets and the Wider Economy*. Chichester: John Wiley & Sons.

Modigliani, F. and Brumberg, R. 1954. Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data. In Kurihara, K.K. (Ed.), *Post-Keynesian Economics*. New Brunswick, NJ: Rutgers University Press.

Morris, E. 2007. Examining the Wealth Effects from Home Price Appreciation. *Job-Market Paper*, University of Michigan.

Paiella, M. 2009. The Stock Market, Housing, and Consumer Spending: A Survey of Evidence on Wealth Effect. *Journal of Economic Surveys*, Vol. 23, No. 5, pp. 947–973.

Perron, P. and Ng, S. 1996. Useful Modifications to Some Unit Root Tests with Dependent Errors and Their Local Asymptotic Properties. *Review of Economic Studies*, Vol. 63, No. 3, pp. 435-463.

Posedel, P. and Vizek, M. 2009. House Price Determinants in Transition and EU-15 Countries, *Post-Communist Economies*, Vol. 21, No. 3, pp. 327-343.

Poterba, J.M. and Samwick, A.A. 1995. Stock Ownership Patterns, Stock Market Fluctuations, and Consumption. *Brookings Papers on Economic Activity*, Vol. 2, pp. 295-357.

Poterba, J. 2000. Stock Market Wealth and Consumption. *Journal of Economic Perspectives*, Vol. 14, No. 2, pp. 99-118.

Romer, C. 1990. The Great Crash and the Onset of the Great Depression. *Quarterly Journal of Economics*, Vol. 105, No. 3, pp. 597–624.

Sec, R. and Zemcik, P. 2007. The Impact of Mortgages, House Prices and Rents on Household Consumption in the Czech Republic. *CERGE-EI Discussion Paper*, No. 2007-185.

Zemcik, P. 2006. Housing, Consumption, and Stock Returns: A Joint Econometric Model . *CERGE-EI Discussion Paper,* No. 2006-163.

Appendix. Data Description and Sources

Table A.1. Bulgaria

Variable	Description	Source
Household consumption (C)	Millions of national currency, chain-linked volumes, reference year 2000	Eurostat
Wage (W)	Average nominal wages and salaries of the employees under labor contract in national currency	Bulgarian Statistical Institute
Stock market index (SP)	2005=100	International Financial Statistics
House price (HP)	Average market prices per square meter of dwellings, in national currency, total for Bulgaria	Bulgarian Statistical Institute
CPI deflator	Derived using Consumer Price Index	International Financial Statistics

Table A.2. Croatia

Variable	Description	Source
Household consumption (C)	Millions of national currency, chain-linked volumes, reference year 2000	Eurostat
Wage (W)	Average net nominal wages of the employees in legal entities, in national currency	Croatian Central Bureau of Statistics
Stock market index (SP)	2005=100	International Financial Statistics
House price (HP)	Average market prices per square meter of dwellings, in national currency, total for Croatia	Real Estate Exchange database
CPI deflator	Derived using Consumer Price Index	International Financial Statistics

Table A.3. Czech Republic

Variable	Description	Source
Household consumption (C)	Millions of national currency, chain-linked volumes, reference year 2000	Eurostat
Wage (W)	Average gross nominal wage, in national currency	Czech Statistical Office and Eurostat
Stock market index (SP)	2005=100	International Financial Statistics
House price (HP)	Apartment price index, total for Czech Republic	Czech Statistical Office
CPI deflator	Derived using Consumer Price Index	International Financial Statistics

Table A.4. Estonia

Variable	Description	Source
Household consumption (C)	Millions of national currency, chain-linked volumes, reference year 2000	Eurostat
Wage (W)	Average nominal net wages and salaries, in national currency	Estonian Statistical Office and Eurostat
Stock market index (SP)	2005=100	International Financial Statistics
House price (HP)	Average purchase-sale price per square meter of dwelling, in national currency, Tallin	Estonian Statistical Office
CPI deflator	Derived using Consumer Price Index	International Financial Statistics