

Pitonáková, Renáta

Article

Private sector savings

DANUBE: Law, Economics and Social Issues Review

Provided in Cooperation with:

European Association Comenius (EACO), Brno

Suggested Citation: Pitonáková, Renáta (2018) : Private sector savings, DANUBE: Law, Economics and Social Issues Review, ISSN 1804-8285, De Gruyter, Warsaw, Vol. 9, Iss. 1, pp. 1-17,
<https://doi.org/10.2478/danb-2018-0001>

This Version is available at:

<https://hdl.handle.net/10419/184536>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/3.0>



PRIVATE SECTOR SAVINGS

Renáta Pitoňáková¹

Abstract

The majority of household savings are in the form of bank deposits. It is therefore of interest for credit institutions to tailor their deposit policy for getting finances from non-banking entities and to provide the private sector with the loans that are necessary for investment activities and consumption. This paper deals with the determinants of the saving rate of the private sector of Slovakia. Economic, financial and demographic variables influence savings. Growth of income per capita, private disposable income, elderly dependency ratio, real interest rate and inflation have a positive impact on savings, while increases in public savings indicate a crowding out effect. The inflation rate implies precautionary savings, and dependency ratio savings for bequest. There are also implications for governing institutions deciding on the implementation of appropriate fiscal and monetary operations.

Keywords

Private Sector, Saving Rate, Precautionary Savings, Public Savings

I. Introduction

Savings are of great importance for macroeconomic and microeconomic reasons, as they serve as a prerequisite for financing investment opportunities and hence stimulate economic growth and increase the living standard of inhabitants. Saving behaviours and the efficiency with which the accumulated finances are invested are the two key determinants of economic growth (Buiter, 1991). A satisfactory rate of economic growth requires an adequate rate of investment and an adequate supply of savings (Prinsloo, 1994). Saving gives security, while investment gives rising incomes through enhanced productivity and therefore saving and investment are inevitable for an economy to provide for its future (Cole, 2016). If the saving rate is low, the amount of investment that the economy can undertake is limited and, for high investment and economic growth, it becomes necessary to rely on an inflow of foreign capital, which rapidly responds to changes in earning opportunities across countries (Tunc and Yavas, 2017). The gap (when domestic investment is higher

¹ Comenius University in Bratislava, Faculty of Social and Economic Sciences, Mlynské luhy 4, 821 01 Bratislava, Slovak Republic. E-mail: renata.pitonakova@fses.uniba.sk.

than domestic saving) is reflected in a deficit on the current account of the balance of payments, and must be financed by foreign savings or by the declining country's stock of foreign reserves (Prinsloo, 1994). The savings decision refer to income hypotheses such as Absolute Income Hypothesis (AIH) introduced by Keynes (1936), which assumes real consumption as a function of real disposable income, The Relative Income Hypothesis (RIH) described by Duesenberry (1949), according to which the satisfaction an individual gets from consumption depends on its relative importance in the society rather than its absolute level, the Life Cycle Hypothesis (LCH) elaborated by Modigliani and Brumberg (1954), and further presented in Ando and Modigliani (1963), Modigliani (1986), and Modigliani and Brumberg (1990). According to this hypothesis, individuals plan their consumption and saving along their life-cycle to ensure a required level of consumption for elderly times. The Permanent Income Hypothesis (PIH) described by Friedman (1957) postulates that consumption depends upon current and future income. Permanent income is defined in terms of the long-time income expectation over a planning period and transitory income is the difference between actual and permanent income (Ozcan, Gunay and Ertac, 2003). The simple permanent-income theory predicts that higher growth (higher future income) reduces current saving (Loayza, Hebbel and Servén, 2000). Theory on consumption and savings indicates motives such as saving for retirement, precautionary saving and saving for bequest. Saving motives were elaborated in detail by Keynes (1936). This paper concentrates on the determinants of the private savings of Slovakia in the environment of non-standard monetary operations currently provided by the European Central Bank (ECB). Slovakia joined the euro area on January 1, 2009, and since then has participated in the common monetary policy of the ECB². As the interest rates of the ECB have been declining since July 2011, currently reaching negative values for deposit facilities, it is of interest for governing bodies and the public to have knowledge of the saving motives and factors influencing the private sector (households and corporates) in their decision on saving or spending. The aim of the paper is to report on the short- and long-run relations between savings, economic, financial and demographic variables using an Autoregressive Distributed Lag Approach (ARDL) and to contribute to the existing literature on savings. The layout of the paper is as follows. After the introduction, there is a section with an outline of the corresponding literature, the third part is devoted to methodology, the fourth part presents achieved results, and the last concludes.

II. Overview of literature

This section presents the literature related to the savings of the private sector. Economic theory and income models suggest the variables influencing private sector savings. According to Buiter (1991), there are three important sets of determinants. The first is represented by private preferences (private attitudes towards intertemporal choice), the psychological and subjective rate of time preference, bequest and precautionary demand for savings, while the second set of the effects is characterized by the nature of private sector anticipations referring to future asset earnings. The last set includes demographic

² The monetary policy is currently characterized by low interest rates and non-standard monetary measures.

features with a view to social security retirement schemes. Most studies attempting to identify the determinants of savings behaviour rely on some variant of the life-cycle or permanent-income hypothesis (Prinsloo, 1994). Saving for retirement is the most important saving motive (Sturm, 1983). The basic LCH implies that, with retirement, saving should become negative (Modigliani, 1986); however, Sturm (1983) points out that saving behaviour can be reconciled with the LCH within a bequest motive if households accumulate wealth beyond the levels required to finance retirement consumption. The positive relation between the savings and elderly ratio was identified by, e.g. Thanoon and Baharumshah (2007), Pitoňáková (2017), Pécsyová, Vaňko and Machlica, (2013a,b), Grace, Bersales and Mapa (2006), Páleník et al. (2012). The assumption of the LCH about dissaving of people in retirement were confirmed by, e.g. Loayza and Shankar (2000), Ang and Sen (2011), Chowdhury (2001), Razzaq and Ahmad (2015), Bulří and Swiston (2006) and Johansson (1998). The research papers on private savings use different economic and financial variables (e.g. inflation, terms of trade, interest rate, public savings, disposable income, wealth), indicators of social security expenditures, demographic structure of population³ and financial infrastructure indicators (number of financial institutions, financial sector oversight). In the empirical literature on saving and growth, the most popular proxy for (macroeconomic) uncertainty is inflation (Loayza, Hebbel, and Servén, 2000). Because inflation deteriorates savings, the impact can be negative. A positive relation between inflation and savings is explained by Wachtel (1997) through the precautionary saving motive and uncertainty effect⁴, and by Deaton (1977) through involuntary savings and mass illusion⁵. The results presented by Koskela and Virén (1982), Tatliyer (2017), Heer and Süßmuth (2009), Townend (1976), Jongwanich (2010), Ozcan, Gunay and Ertac (2003, 2012), Bande and Riveiro (2013) confirmed a positive relation between savings and inflation. The effect of interest rates on saving relates to a substitution effect and an income effect which work in opposite directions (Elmendorf, 1996). Loayza and Shankar (2000), dealing with private saving in India, identified the income effect of an increase in the real interest rate. Opoku and Ackah (2015), estimating a dynamic error correction model, singled out a positive relation between rising real interest rates and private savings in the short and long run; similarly, Aizenman, Cheung and Ito (2016). Razzaq and Ahmad (2015) estimated private savings behaviour in China with the following findings: the inflation rate and real interest rate had a significantly negative impact on private savings behaviour. Athukorala and Sen (2004), Gök (2014) showed that an increase in public savings caused a crowding out effect of private savings. De Castro and Fernández (2009) aimed to test the validity of the Ricardian proposition for the Spanish economy and detected some degree of

³ The demographic structure of the population is summarized by the ratios of the elderly and the young to the working-age population – elderly and youth dependency ratios (Baumgartner and Meredith, 1995).

⁴ Savings are increasing as a precautionary response to an increase in uncertainty about economic conditions and real income (Wachtel, 1997).

⁵ At any given time, different individuals buy different commodities and each finds out that the price of the commodity is higher than expected and none of them at that time has enough information to calculate the absolute price level. There is a mass illusion that all goods are relatively more expensive and, because each consumer decides to lessen purchases, real consumption falls, and if real income is maintained, the saving ratio rises (Deaton, 1977).

substitution between public and private saving. Ozcan, Gunay and Ertac (2003), Güngör, Çiftçioglu and Balçılar (2014), Nwachukwu and Egwaikhide (2007) did not recognize a crowding out effect. Studies by Barro (1978), Hong (2012), De Freitas and Martins (2014), Leimer and Lesnoy (1983), Loh and Veall (1984), Borzutzky and Hyde (2015), Gruber and Yelowitz (1997), Borsch-Supan (2004), Karunaratne and Abeysinghe (2005), Meguire (1998) concentrated on the relation between social security and private savings. A paper of Tunc and Yavas (2017) identified the determinants of the personal and private saving rates in the US with a special focus on the role of mortgage payments. The mortgage payment rate negatively influenced both personal and private saving rates but with a larger effect on the private saving rate. Level of income had a positive impact on private savings in Athukorala and Sen (2004), Chowdhury (2001), Ozcan, Gunay and Ertac (2003) and Güngör, Çiftçioglu and Balçılar (2014). Although Nwachukwu and Egwaikhide (2007) found a positive relation between the saving rate and level of disposable income, there was a negative link to the rate of growth of disposable income. Based on the ARDL bounds estimation procedure, Ang and Sen (2011) identified a positive relation between income growth and private saving in India and Malaysia. Chowdhury (2004) focused on private savings in transition economies stressing the importance of terms of trade shocks. Favourable movements in both the permanent and transitory components of the terms of trade had a significant positive impact on private savings. Carroll and Summers (1987) dealt with the divergence of the private saving rate in the United States and Canada. Their primary conclusion was that tax policies could have a potent impact on private saving behaviour, so that differences in taxes and in the interactions of taxation and inflation appeared to explain the divergent behaviour. Serres and Pelgrin (2003) looked at the decline in private saving rates in the 1990s in OECD countries. The private saving rates in OECD countries have been significantly influenced by public sector saving rates, the old age dependency ratio, the growth rate of labour productivity, changes in terms of trade and the real interest rate. The financial deepening (the ratio of money and quasi-money to disposable income) was significant for private savings in Pakistan (Husain, 1996). According to Schrooten and Stephan (2004) income growth caused an increase in saving, while monetary policy effects were insignificant and fiscal policy had a major impact on private savings in Europe. Kivanc (2015) focused on savings in the APEC countries with the results showing demographics and growth as important determinants of private saving rates. The savings of Slovakia have been elaborated by, among others, Messner and Zavadil (2014), Bruncková, Machlica and Vaňko, (2010), Páleník et al. (2012), Sergi (2003), Pitoňáková (2015, 2017), Puhofová et al. (2012), Pécsyová, Vaňko and Machlica (2013a, b), Pauhofová and Želinský (2015).

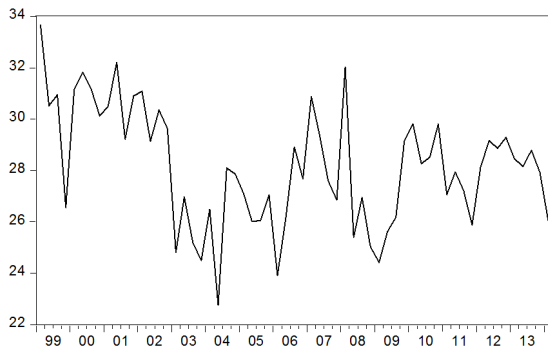
III. Description of variables and model

This part presents data obtained from Eurostat, the National Bank of Slovakia (NBS), the Statistical Office of the Slovak Republic, the Economic Research of Federal Reserve Bank of ST. LOUIS, OECD database, Index mundi and Quandl Financial and Economic Data. Figure 1 presents quarterly variables (1999Q1–2014Q1) applied in the Autoregressive Distributed Lag (ARDL) framework: Gross private saving rate (GPRS); Gross public

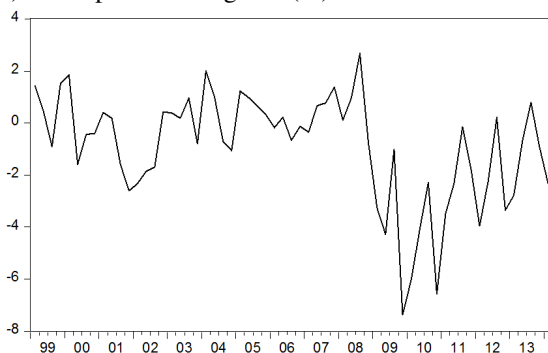
saving rate (GPS); Inflation rate (INF); Gross private disposable income (DI); Growth of real national disposable income per capita (IPC); Dependency ratio of Elderly (DE); Average real interest rate on deposits (IR).

Figure 1: Plots of variables

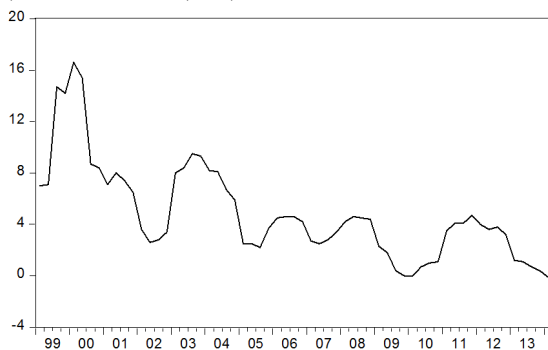
a) Gross private saving rate (%)



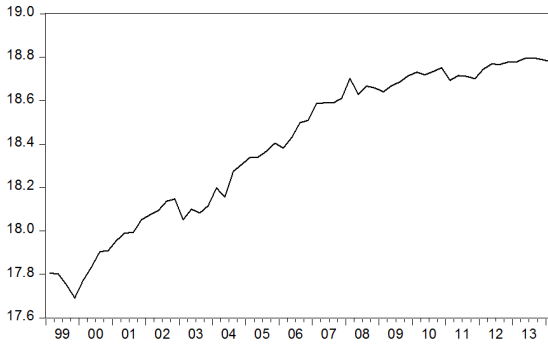
b) Gross public saving rate (%)



c) Inflation Rate (CPI) %



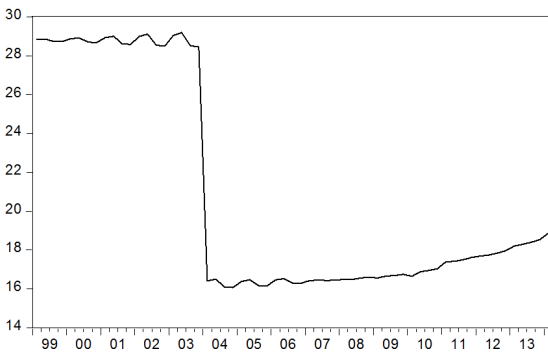
d) Gross private disposable income in real terms (log)



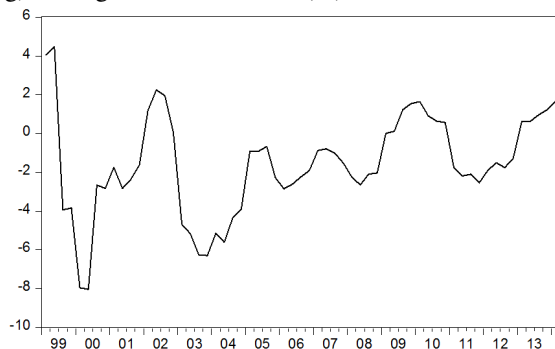
e) Growth of real national disposable income per capita (%)



f) Dependency ratio of Elderly (%)



g) Average real interest rate (%)



Source: Databases of Eurostat, the National Bank of Slovakia, OECD, Statistical Office of the Slovak Republic, the Economic Research of Federal Reserve Bank of ST. LOUIS, Index mundi and Quandl Financial and Economic Data.

The Gross private saving rate, Gross private disposable income and Dependency ratio were seasonally adjusted by Census X–12. The paths of presented variables reflect the domestic and foreign economic environment (Figure 1). Remarkable changes in the Gross private saving rate in 2003–2004 were associated with among other factors, the preparations of Slovakia to join the EU, and changes within 2008–2010 resulted from the global financial and economic crisis (rising macro uncertainty) and with entrance into the euro area in 2009. The Gross public saving rate declined substantially in 2008–2010 due to increased government expenditures dedicated to mitigating the consequences of the global financial crisis. Gross private disposable income showed a rising tendency. The rise in the inflation rate in 1999 was a result of the introduction of import tax, increases in regulated prices (electrical and heating energy, post offices, water rates and sewerage) and changes in oil prices. In 2009, the financial crisis, real GDP decline and lower prices of manufacturing commodities reduced the annual inflation rate. The dependency ratio of the elderly depicts changes in the pension system in 2004, when the age of retirement was extended from 60 to 62 for men, and for women from 53 and 57 to 62, depending on the number of children. The real interest rate reflects changes in interest rates on money market and changes in the inflation rate.

Data and Model

Inspection of the private saving rate will be provided by the ARDL technique presented by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001). This approach enables us to identify cointegration relation in small samples and can be applied to regressors of $I(1)$ and $I(0)$. In the ARDL procedure, variables can have a different number of lags (Husár and Lukáčik, 2004; Hatrák, 2007; Vogelvang, 2005). This framework requires the existence of a long-term relationship among variables. Based on Pesaran and Shin (1999), De Bandt, Bruneau and El Amri, (2009) a form of the ARDL model without trend is as follow:

$$Y_t = \beta_0 + \sum_{k=1}^r \chi_k Y_{t-k} + \sum_{m=0}^s \delta_m X_{t-m} + u_t \quad (1)$$

where Y – endogenous variable; β_0 – intercept; χ_k, δ_m – coefficients; X – set of regressors; u_t – error term.

As is well known, the ARDL model helps us to study the short-run and the long-run reactions that are important in many economic problems (Husár and Lukáčik, 2004). The ARDL can be reproduced to ARDL error correction model (ARDL ECM) by transforming variables (1) into differences and lags. Equation (2) displays the unrestricted ARDL ECM structure that we apply for identifying short- and long-run relations among variables.

$$\begin{aligned} \Delta GPRS_t = & \rho_0 + \sum_{j=1}^m \beta_j \Delta GPRS_{t-j} + \sum_{j=0}^m \gamma_j \Delta INF_{t-j} + \sum_{j=0}^m \delta_j \Delta IR_{t-j} + \\ & + \sum_{j=0}^m \varepsilon_j \Delta GPS_{t-j} + \sum_{j=0}^m \zeta_j \Delta DI_{t-j} + \sum_{j=0}^m \eta_j \Delta IPC_{t-j} + \\ & + \sum_{j=0}^m \theta_j \Delta DE_{t-j} + \lambda_1 GPRS_{t-1} + \lambda_2 INF_{t-1} + \lambda_3 IR_{t-1} + \\ & + \lambda_4 GPS_{t-1} + \lambda_5 DI_{t-1} + \lambda_6 IPC_{t-1} + \lambda_7 DE_{t-1} + u_t \end{aligned} \quad (2)$$

where Δ – first difference operator; ρ_0 – intercept; $\beta, \gamma, \delta, \varepsilon, \zeta, \eta, \theta$ – coefficients of short-run relation; λ_1 – λ_7 – coefficients of long-run relation; u_t – error term; $GPRS_t$ – Gross private saving rate (gross private savings over gross private disposable income); INF – Inflation rate (annual CPI inflation rate); IR – Interest rate (average interest rate on deposits deflated by CPI inflation); GPS – Gross public saving rate (public savings over gross national disposable income); DI_t – Gross private disposable income (deflated by CPI); IPC – Income per capita (Gross National Disposable Income per capita, annual growth); DE_t – Dependency ratio of elderly (ratio of the population aged 65 or older to the working-age population 15–64).

A long-run relation among variables was modelled using the following form:

$$GPRS_t = \alpha + \mathbf{B} * \mathbf{X}_t + u_t \quad (3)$$

where $GPRS$ – Gross private saving rate; α – intercept, \mathbf{B} – vector of the components consisting of the coefficients $\beta_1, \beta_2 \dots \beta_6$; \mathbf{X}_t – vector of explanatory variables $X_{1t}, X_{2t} \dots X_{6t}$ (Inflation rate; Real interest rate; Public saving rate; Disposable income; Growth of real income per capita; Dependency ratio of elderly); u_t – error term.

The restricted ARDL ECM form involving error correction term (ECT) is the following:

$$\begin{aligned} \Delta GPRS_t = & \rho_0 + \sum_{j=1}^m \beta_j \Delta GPRS_{t-j} + \sum_{j=0}^m \gamma_j \Delta INF_{t-j} + \sum_{j=0}^m \delta_j \Delta IR_{t-1} + \\ & + \sum_{j=0}^m \varepsilon_j \Delta GPS_{t-j} + \sum_{j=0}^m \zeta_j \Delta DI_{t-j} + \sum_{j=0}^m \eta_j \Delta IPC_{t-j} + \\ & + \sum_{j=0}^m \theta_j \Delta DE_{t-j} + \omega ECT_{t-1} + u_t \end{aligned} \tag{4}$$

where ω – speed of adjustment; ECT – Error correction term (lag residuals from the long-run relationship).

The ARDL procedure requires setting appropriate lags of variables. According to the Akaike’s information criterion (AIC), five lags should be appropriate. Table 1 presents the results from the lag selection criteria.

Table 1: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-675.0179	NA	89.35963	24.35778	24.61095	24.45593
1	-331.1219	589.5361	0.002416	13.82578	15.85113*	14.61101
2	-267.4452	93.24078	0.001550	13.30162	17.09915	14.77391
3	-235.6599	38.59651	0.003566	13.91642	19.48614	16.07579
4	-113.0462	118.2346*	0.000410	11.28736	18.62926	14.13380
5	-22.20474	64.88675	0.000227*	9.793026*	18.90711	13.32654*

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion; Note: Outcomes from EViews 9.

Unlike other cointegration tests, the ARDL approach does not require the same order of integration for all variables; however, since the bounds test assumes that the variables are I(0) or I(1), the performance of the unit root tests might be necessary to ensure that variables are not I(2) (Ayalew, 2013). The order of integration of time series was tested using the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979). Results are in Table 2.

Table 2: Results from Unit root testing (ADF test)

	ADF p values						
	GPRS	GPS	IR	DI	IPC	INF	DE
c	0.0002	0.1464	0.0027	0.4741	0.0151	0.0081	0.5128
ct	0.0009	0.3120	0.0030	0.9644	0.0114	0.0012	0.8749
diffc	0.0000	0.0048	0.0000	0.0000	0.0000	0.0002	0.0000
diffct	0.0000	0.0230	0.0004	0.0000	0.0000	0.0012	0.0000

Note: Outcomes from EViews 9.

The ADF test results indicate that GPRS, IR, IPC, INF are I (0); the GPS, DI, DE are I (1). Cointegration among variables was tested using the F test: testing the null hypotheses of no cointegration against the alternative of cointegration – $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$ and $H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq 0$. According to Pesaran and Shin (1999), if the computed Wald or F-statistic falls outside the critical value bounds, a conclusive inference can be drawn without needing to know the integration/cointegration status of the underlying regressors. When the computed F-statistic is greater than the upper bound critical value, then the H_0 is rejected (the variables are cointegrated); however, if the F-statistic is below the lower bound critical value, then the H_0 cannot be rejected (there is no cointegration among variables) (Nkoro and Uko, 2016). If the Wald or F-statistic falls inside these bounds, inference is inconclusive and knowledge of the order of the integration of the underlying variables is required before conclusive inferences can be made. Table 3 presents Critical Value Bounds for the F-Statistics.

Table 3: Critical Value Bounds for the F-Statistics

K	90%		95%		97,5%		99%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43

Source: Pesaran, Shin and Smith (2001)

The computed F-statistic (8.33) is higher than the upper bound value (4.43) tabulated by Pesaran, Shin and Smith, (2001). This confirms the existence of the long-run relationship among corresponding variables.

IV. Results

Table 4 presents the results from the ARDL ECM form (equation 2 and 4). The long-term impact of explanatory variables upon dependent variable is calculated⁶ from the ARDL ECM (2) dividing the coefficients of explanatory variables INF (-1), IR (-1), GPS (-1), DI (-1), IPC (-1), DE (-1) by negative value of the coefficient of dependent variable GPRS (-1). The results are as follows: INF (0.87), IR (1.12), GPS (-0.22), DI (7.51), IPC (0.15), DE (0.22). Macroeconomic uncertainty encourages households and corporates to increase the volume of their savings due to a precautionary motive and to create a buffer

⁶ From the unrestricted error correction model, the long-run elasticities are the coefficient of the one lagged explanatory variable (multiplied with a negative sign) divided by the coefficient of the one lagged dependent variable (Dritsakis, 2011 p. 6).

to cover their needs in the future. The coefficient of the inflation rate is significant and positive in the long run. The relation between real interest rate and savings is positive both in the long and short run. The substitution effect dominates the income effect. Higher interest rates at bank deposits stimulate the accumulation of savings in the form of liquid assets with low risk. Since households and corporates in Slovakia are financed mainly from banking instructions, this result is of importance for monetary financial institutions, especially for banks in getting deposits and granting loans to households and corporates. Public savings are pushing private savings down in the long and short run. According to Loayza, Hebbel and Servén (2000), most empirical evidence rejects full Ricardian equivalence. The level of private disposable income and the growth of disposable income impact savings. The coefficients are positive. These results indicate that positive changes in income induce higher saving. The elderly dependency ratio significantly influences savings. A higher proportion of old people (65 and older) in the working-age population (15–64) raises private savings.

Table 4: Results of ARDL ECM

	ARDL ECM Unrestricted	ARDL ECM Restricted
<i>Variable</i>	$\Delta GPRS$	$\Delta GPRS$
<i>Gross Private Saving rate GPRS (-1)</i>	- 0.568*** [-4.718]	
<i>Inflation Rate INF (-1)</i>	0.492** [2.283]	
<i>Interest Rate IR (-1)</i>	0.642** [2.603]	
<i>Gross Public Saving Rate GPS (-1)</i>	-0.124* [-1.796]	
<i>Gross Private Disposable Income DI (-1)</i>	4.270*** [3.945]	
<i>Growth of Disposable Income per Capita IPC (-1)</i>	0.087** [2.089]	
<i>Dependency Ratio of Elderly DE (-1)</i>	0.124** [2.542]	
<i>GPRS (-1)</i>	0.123* [1.739]	
<i>IR (-4)</i>	0.135* [0.135]	
<i>IR</i>	0.150* [1.948]	
<i>GPS (-4)</i>	-0.105* [-1.905]	-0.167*** [-2.684]

Continued on next page

	ARDL ECM Unrestricted	ARDL ECM Restricted
<i>DI</i>	48.848*** [12.112]	40.225*** [10.352]
<i>IPC</i>	0.064* [1.832]	0.118*** [3.482]
<i>IPC</i> (−2)	0.066** [2.534]	
<i>DE</i>	0.160** [2.011]	0.266*** [3.376]
<i>ECT</i> (−1)		−0.526*** [−5.127]
R^2	0.92	0.85
Adj R^2	0.89	0.84
No	56	56

Note: ***, **, * imply significance at 1%, 5%, 10% levels respectively, *t*-statistic in brackets. Estimations from EViews 9.

The life-cycle hypothesis assumes that the elderly population be dissaving. Empirical papers on savings in Slovakia elaborated by Pitoňáková (2015), Bruncková, Machlica and Vaňko (2010), Pécsyová, Vaňko, and Machlica (2013) show that retired people are increasing savings, which can be attributed to a bequest motive. According to Sturm (1983), saving behaviour can be reconciled with the LCH within a bequest motive if households accumulate wealth beyond the levels required to finance retirement consumption. The coefficient of adjustment (ECT) is negative and significant. The speed of adjustment shows that 53% of disequilibrium in the previous quarter will be corrected in the current quarter. The p-value (0.219) of the Breusch-Godfrey serial correlation LM test (Breusch, 1978; Godfrey, 1978) and the p-value (0.088) of the Breusch-Pagan test for heteroscedasticity (Breusch and Pagan, 1979) show that the null hypothesis of non-autocorrelation and homoscedasticity is not rejected⁷.

V. Conclusion

This paper focuses on the saving rate of the private sector of Slovakia. The outcomes suggest that inflation, real interest rate on bank deposits, public savings, level of private disposable income, growth of income per capita and the dependency ratio of the elderly are determinants of private savings. Higher income stimulates the private sector to increase savings and to build a buffer to cover expenditures in the future. The outcomes suggest a negative impact of public savings on private savings. The relation between savings and the real interest rate is positive. A rising dependency ratio pushes private savings up both in the short and long run, showing savings for bequest. A positive impact of inflation

⁷ The null hypothesis of homoscedasticity is not rejected at the 5% level of significance.

indicates a precautionary saving motive. Since the majority of household savings in Slovakia are in bank accounts, the findings have implications for banking institutions for managing deposit policy from non-banking subjects.

Acknowledgements

This work was supported by the Slovak research and development Agency under contract No APVV-14-0020.

References

- Aizenman, J., Cheung, Y. W., Ito, H. (2016). The Interest Rate Effect on Private Saving: Alternative Perspectives, NBER Working Paper No. 22872.
- Ando, A., Modigliani, F. (1963). The “Life Cycle” Hypothesis of Saving: Aggregate Implications and Tests, *The American Economic Review*, 53(1), 55–84.
- Ang, J. B., Sen, K. (2011). Private saving in India and Malaysia compared: the roles of financial liberalization and expected pension benefits, *Empirical Economics*, 41(2), 247–267.
- Athukorala, P. Ch., Sen, K. (2004). The Determinants of Private Saving in India, *World Development*, 32(3), 491–503.
- Ayalew, H. A. (2013). Determinants of domestic saving in Ethiopia: An autoregressive distributed lag (ARDL) bounds testing approach, *Journal of Economics and International Finance*, 5(6), 248–257.
- Bande, R., Riveiro, D. (2013). Private Saving Rates and Macroeconomic Uncertainty: Evidence from Spanish Regional Data, *The Economic and Social Review*, 44(3), 323–349.
- Barro, R. J. (1978). *Impact of Social Security on Private Saving*, Aei Press (January 1, 1978).
- Baumgartner, U., Meredith, G. (1995). Saving Behaviour and the Asset Price “Bubble” in Japan, *IMF Occasional Paper No. 124*, Washington DC.
- Borsch-Supan, A. H. (2004). From Public Pension to Private Savings: The Current Pension Reform Process in Europe, Mannheim Research Institute for the Economics of Aging (MEA), Mannheim, Germany, National Bureau of Economic Research, Cambridge, Mass., USA.
- Borzutzky, S., Hyde, M. (2015). A Just Retirement Future for Chilean Workers: Social Insurance or Private Savings? August 2015, *BWPI Working Paper 214*.
- Breusch, S. T. (1978). Testing for Autocorrelation in Dynamic Linear Models, *Australian Economic Papers*, 17(31), 334–355.
- Breusch, T. S., Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation, *Econometrica*, 47(5), 1287–1294.
- Bruncková, M., Machlica, G., Vaňko, M. (2010). *Miera úspor na Slovensku*. Bratislava: Ministerstvo financií SR, Inštitút finančnej politiky.
- Buiter, W. H. (1991). Saving and Endogenous Growth: A Survey of Theory and Policy, Economic Growth Center, Yale University, *Center Discussion Paper*, No. 642.

- Bulř, A., Swiston, A. (2006). What Explains Private Saving in Mexico? IMF WP/06/191.
- Carrol, Ch., Summers, H. L. (1987). Why have private saving rates in the United States and Canada diverged? National Bureau of Economic Research, 1050 Massachusetts, Cambridge, MA, WP No. 2319.
- Cole, A. (2016). *The Four Different Ways the Tax Code Treats Saving and Investment*. Retrived from <https://taxfoundation.org/four-different-ways-tax-code-treats-saving-and-investment/>.
- Chowdhury, A. (2001). The Impact of Financial Reform on Private Savings in Bangladesh, World Institute for Development Economics Research, *WIDER Discussion Paper*, 2001/78.
- Chowdhury, A. R. (2004). Private Savings in Transition Economies: Are there Terms of Trade Shocks? *Comparative Economic Studies*, 46(4), 487–514.
- Deaton, A. (1977). Involuntary Saving Through Unanticipated Inflation, *The American Economic Review*, 67(5), 899–910.
- De Bandt, O., Bruneau, C., El Amri, W. (2009). Convergence in household credit demand across euro area countries: evidence from panel data, *Applied Economics*, 41(27), 3447–3462.
- De Castro, F., Fernández, J. L. (2009). The Relationship between Public and Private Saving in Spain: Does Ricardian Equivalence hold? Banco de España, Documentos de Trabajo. N.º 0923.
- De Freitas, N. E. M., Martins, J. O. (2014). Health, Pension Benefits and Longevity How They Affect Household Savings? *The Journal of the Economics of Ageing*, 3, 21–28.
- Dickey, D. A., Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366), 427–431.
- Dritsakis, N. (2011). Demand for Money in Hungary: An ARDL Approach. *Review of Economics & Finance*, 5, 1–16.
- Duesenberry, J. (1949). *Saving and the Theory of Consumer Behaviour*. Cambridge, MA: Harvard University Press.
- Elmendorf, D. W. (1996). The Effect of Interest – Rate Changes on Household Saving and Consumption: A Survey, Federal Reserve Board.
- Friedman, M. (1957). *A Theory of the Consumption Function*. Princeton: Princeton University Press.
- Godfrey, L. (1978). Testing against General Autoregressive and Moving Average Error Models When the Regressors Include Lagged Dependent Variables, *Econometrica*, 46(6), 1293–1301.
- Gök, A. (2014). A Time Series Analysis of the Determinants of Private Savings in Turkey, *Afro Eurasian Studies Journal*, 3(1), 5–25.
- Grace, L., Bersales, S., Mapa, D. (2006). *Patterns and Determinants of Household Saving in the Philippines*, Washington, DC: USAID. Available on: <http://pdf.usaid.gov/pdf>.
- Gruber, J., Yelowitz, A. (1997). Public Health Insurance and Private Savings. Institute for Research on Poverty, *Discussion Paper*, 1135–97.
- Güngör, H., Çiftçiođlu, S., Balcılar, M. (2014). Does Financial Development Increase Private Savings? The Case of Turkey, *International Journal of Business and Social Science*, 5(2), 36–47.

- Hatrák, M. (2007). *Ekonometria*. Bratislava: Iura Edition.
- Heer, B., Süßmuth, B. (2009). The savings-inflation puzzle. *Applied Economics Letters*, 16(6), 615–617.
- Hong, M. (2012). Decomposition of effects of social security on private savings. *Journal of Pension Economics & Finance*, 11(3), 419–438.
- Husain, A. M. (1996). Private Saving and Its Determinants: The Case of Pakistan. *The Pakistan Development Review*, 35(1), 49–70.
- Husár, J., Lukáčik, M. (2004). *Aplikovaná ekonometria*. Vydavateľstvo EKONÓM, Bratislava 2004.
- Johansson, S. (1998). Life cycles, oil cycles, or financial reforms? The growth in private savings rates in Indonesia. *World Development*, 26(1), 111–124.
- Jongwanich, J. (2010). The determinants of household and private savings in Thailand. *Applied Economics*, 42, 965–976.
- Karunaratne, W., Abeyasinghe, T. (2005). Does mandatory pension savings crowd out private savings? The experience of Sri Lanka. *Journal of Asian Economics*, 16, 830–846.
- Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*. Available on: <http://cas.umkc.edu>.
- Kivanc, H. A. (2015). Determinants of savings in the APEC countries. *Theoretical and Applied Economics*, XXII (2), 113–122.
- Koskela, E., Virén, M. (1982). Inflation and savings: testing Deaton's hypothesis. *Applied Economics*, 14(6), 579–590.
- Leimer, D. R., Lesnoy, S. D. (1983). Social Security and Private Saving: An Examination of Feldstein's New Evidence. *Division of Economic Research*, 31.
- Loayza, N., Hebbel, K., Servén, L. (2000). Saving in Developing Countries. *The World Bank Economic Review*, 14(3), 393–414.
- Loayza, N., Shankar, R. (2000). Private Saving in India. *The World Bank Economic Review*, 14(3), 571–594.
- Loh, Ch. Ch., Veall, M. R. (1984). A Note on Social Security and Private Savings in Singapore, Centre for the Study of International Economic Relations Working Papers, 8428C. London, ON: Department of Economics, University of Western Ontario (1984).
- Meguire, P. (1998). Comment: Social Security and Private Savings. *National Tax Journal*, 51(2), 339–358.
- Messner, T., Zavadil, T. (2014). Regional Differences in Household Wealth across Slovakia, NBS. *Occasional Paper*, 1/2014.
- Modigliani, F., 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: Rutgers University Press, 338–436.
- Modigliani, F. (1986). Life Cycle, Individual Thrift, and the Wealth of Nations. *The American Economic Review*, 76(3), 297–313.
- Modigliani, F., Brumberg, R. (1990). Utility analysis and aggregate consumption functions: an attempt at integration, in Andrew Abel, ed., *The Collected Papers of Franco Modigliani: Volume 2, The Life Cycle Hypothesis of Saving*, Cambridge, MA, The MIT Press, 128–197.

- Nkoro, E., Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 63–91.
- Nwachukwu, E. T., Egwaikhide, O. F. (2007). An Error Correction Model of the Determinants of Private Saving in Nigeria. A paper presented at the African Economic Society (AES) Conference, Cape Town, South Africa, July 2007.
- Opoku, R. T., Ackah, I. (2015). How responsive are private savings to changes in real interest rate in Ghana? Munich Personal RePEc Archive, MPRA Paper No. 65040, Online at <http://mpra.ub.uni-muenchen.de/65040/>.
- Ozcan, K. M., Gunay, A., Ertac, S. (2003). Determinants of private savings behaviour in Turkey. *Applied Economics*, 35(12), 1405–1416.
- Ozcan, K. M., Gunay, A., Ertac, S. (2012). Macro and Socioeconomic Determinants of Turkish Private Savings. *Journal of Economic Cooperation and Development*, 33(2), 93–130.
- Páleník, V. a kol. (2012). *Strieborná ekonomika v slovenskom, európskom a svetovom kontexte*. Bratislava: Ekonomický ústav SAV.
- Pauhofová, I. a kol. (2012). *Paradigmy zmien v 21. storočí*. Bratislava: Ekonomický ústav SAV.
- Pauhofová, I., Želinský, T. (2015). Regionálne aspekty príjmovej polarizácie v Slovenskej republike. *Politická ekonomie*, (6), 778–796.
- Pécsyová, M., Vaňko, M., Machlica, G. (2013a). Determinanty miery úspor na Slovensku. 1. časť. *BIATEC*, 21(9), 10–13.
- Pécsyová, M., Vaňko, M., Machlica, G. (2013b). Determinanty miery úspor na Slovensku. 2. časť. *BIATEC*, 21(10), 10–14.
- Pesaran, M. H., Shin, Y. (1999). An Autoregressive Distributed-Lag Modeling Approach to Cointegration Analysis. In: STROM, S. (ed.): *Econometrics and Economic Theory in the 20th Century*. Online. Econometric Society Monographs, no. 31: 371–413. Cambridge: Cambridge University Press, Cambridge Books Online.
- Pesaran, M. H., Shin, Y., Smith, J. R. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), 289–326.
- Pitoňáková, R. (2015). Determinants of Household Saving: Evidence from Slovakia. *Ekonomický Časopis*, 63(8), Bratislava: Ekonomický ústav SAV, 837–852.
- Pitoňáková, R. (2017). Household savings of Slovakia: Effects of banks, dependency ratio, transitory income and unemployment. *International Journal of Trade and Global Markets*, 10(1), 115–122.
- Prinsloo, J. W. (1994). Private Sector Saving in South Africa, Quarterly Bulletin, South African Reserve Bank, No. 193 (September), 25–35.
- Razzaq, A. A., Ahmad, F. (2015). Estimating Private Savings Behaviour in China. *International Journal of Economics and Business Administration*, 1(1), 1–5.
- Sergi, S. B. (2003). Saving Functions of Keynes and Maizels. A Case Study on Slovakia. *Eastern European Economics*, 41(3), 60–69.

- Serres, A., Pelgrin, F. (2003). The decline in private saving rates in the 1990s in OECD countries: How much can be explained by non-wealth determinants? *OECD Economic Studies* No. 36, 2003/1.
- Schrooten, M., Stephan, S. (2004). Does Macroeconomic Policy Affect Private Savings in Europe? Evidence from a Dynamic Panel Data Model. Berlin: DIW.
- Sturm, P. H. (1983). Determinants of Saving: Theory and Evidence. *OECD Journal: Economic studies*, (1), 147–196.
- Tatliyer, M. (2017). Determinants of Private Saving Level: Evidence from Turkey. *Sosyoekonomi*, 25(32), 149–167.
- Thanoon, M. A. M., Baharumshah, A. Z. (2007). Private Savings, Growth, Dependency Ratio and Foreign Capital: Some Issues and Lessons from Malaysia. *Savings and Development*, 31(4), 399–417.
- Townend, J. C. (1976). The Personal Saving Ratio. *Bank of England Quarterly Bulletin*, 16, March, 53–73.
- Tunc, C., Yavas, A. (2017). Collateral Damage: The Impact of Mortgage Debt on U.S. Savings. *Housing Policy Debate*, 27(5), 712–733.
- Vogelvang, B. (2005). *Econometrics. Theory and Applications with EViews*, Amsterdam: FT Prentice Hall.
- Wachtel, P. (1997). Inflation, Uncertainty, and Saving Behavior, In: *Explorations in Economic Research*, Volume 4, number 4. Editor: Victor Zarnowitz and Geoffrey H. Moore, NBER, 88–108. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.467.4698&rep=rep1&type=pdf>.