Banking Sector Development and Household Saving in Emerging Eastern Europe

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William Davidson Institute Working Paper Number 1089
March 2015

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Abstract
This article examines the impact of the banking sector development on households' saving dynamics in the emerging economies of Eastern Europe. For this purpose, we use the mean group FMOLS estimator to estimate the saving function augmented with variables characterizing three dimensions of the banking sector development – depth, efficiency, and stability. The mean group results show that an increase in the depth and stability of the banking sector significantly stimulates saving, whereas an improvement in the efficiency has no significant effect on saving. Additionally, we find that an increase in the real GDP per capita and age dependency ratio significantly and positively affects saving, while an increase in the real interest rate has a significantly negative effect on saving.

JEL classification codes: **C33, E21**
Keywords: **household saving, banking sector development, Eastern Europe**

1. Introduction

Over the last 15 years, the economies of Eastern Europe witnessed significant variations in the household saving rates (Table 1). A number of factors can explain these fluctuations. First, changes in the demographic structures of these countries can significantly affect the saving dynamics because should a share of the elderly in a population increase, a saving rate usually declines and vice versa. Second, variations in the income growth rates can change households' expectations about the future and as a result affect the household saving behavior. Third, development levels of the banking sectors can influence the saving rates. A higher development level can either instill confidence in the banking system and therefore encourage saving or ease borrowing constraints and therefore discourage saving. Fourth, fluctuations in the real interest rates can change households' saving behavior. An increase in the real interest rate has either a positive or negative effect on saving depending on whether the substitution or income effect dominates. Additionally, such factors as inflation, exchange rates, and tax rates can also affect households' saving dynamics.

Table 1. Household saving as a percentage of GDP

Country	1999	2001	2003	2005	2007	2009	2011	2013
Bulgaria	2.04	5.18	3.23	6.10	7.27	3.68	4.91	3.59
Czech Republic	0.64	3.42	1.29	1.68	2.65	3.05	1.44	0.77
Estonia	3.27	3.52	1.53	5.02	2.83	0.63	3.08	2.10

Hungary	3.14	3.51	4.17	3.21	2.35	2.38	2.26	-2.37
Latvia	0.53	2.32	2.26	4.59	2.04	-0.07	0.13	0.71
Lithuania	2.26	2.78	1.94	5.82	5.17	1.26	-0.03	0.83
Poland	3.27	2.89	-0.35	1.65	2.09	3.76	3.66	2.24
Romania	3.33	3.80	1.70	2.33	6.26	2.88	1.55	0.95
Russia	2.03	2.39	3.48	3.18	4.02	3.80	3.22	4.38
Slovakia	3.33	3.10	0.65	0.09	3.31	-0.79	2.21	1.14
Slovenia	3.40	9.24	2.63	2.99	3.20	1.49	0.60	-0.84

Note: household saving is proxied by a change in household deposits; the saving ratios for 2013 correspond to the third quarter
Source: Author's calculations

In this paper, we examine the impact of the banking sector development on the household saving dynamics in 11 emerging Eastern European countries for the 1999-2013 period. Since banking sector development is a broad concept and includes such components as depth, efficiency, and stability, our main purpose is to establish which component or components significantly affect household saving in Eastern European countries. For this purpose, we estimate the standard saving equation derived from the Life cycle hypothesis and augmented with a set of proxies for depth, efficiency, and stability using the mean group FMOLS estimator. Although our findings vary across countries, the mean group results show that in emerging Eastern Europe, the characteristics of the banking sector development which significantly influence the household saving dynamics are depth and stability.

Our paper extends the existing literature on the saving dynamics in Eastern European countries (Denizer and Wolf, 2000; Chowdhury, 2003; Schrooten and Stephan, 2005) in several directions. First, the previous studies examine the effects of either depth or depth and efficiency, whereas our study considers three characteristics of the banking sector development. Second, we employ the mean group FMOLS estimator which unlike the GMM estimator applied in the previous papers accounts not only for endogeneity but also for heterogeneity in dynamics. Finally, although the previous studies examined saving dynamics from the household's perspective, they use either domestic or private savings data assuming that corporations and governments respond to variations in the saving determinants similarly to households. In this paper, we will remedy this shortcoming by using household bank deposits as a proxy for household savings.

The rest of the paper is organized as follows. In the next section, we review the existing literature. The third section presents the analytical framework of the paper, and the fourth section introduces the empirical methodology. In the fifth section, we describe the data, and in the following section, we present and discuss the empirical results. Finally, the last section concludes the paper with the major findings and policy implications.

2. Literature review

The previous literature on saving dynamics did not exclusively focus on the impact of the banking sector development on saving. Instead, most papers estimated the saving-income equation augmented with a rich variety of regressors which also included a measure of financial depth. For example, to investigate the determinants of saving in developed and developing

countries, Loayza et al (2000) employ the GMM estimator. Their sample includes 20 industrial and 49 developing countries and covers the period 1966-1995. However, due to the specifics of the estimator, they minimize the time series dimension to a reasonable extent. The estimation output demonstrates that the coefficients obtained for a panel of developing countries and a panel of industrial countries have the same signs, but the coefficients of some variables differ in magnitudes or significance or both. The coefficient of the financial depth variable (M2/GDP) is positive and insignificant in the panel of developing countries, but positive and significant in the panel of industrial countries. The level and growth rate of private income positively affect the saving rates in developing as well as industrial countries, but the coefficients are larger in developing countries. The real interest rate has an insignificant effect on the saving rates in both industrial and developing countries. An increase in the private credit flow to GDP ratio, a proxy for the effect of financial liberalization, leads to a statistically significant decline in the saving rates in both country groups, but the effect is especially large in developing countries. Demographic variables, such as urbanization and dependency ratios, negatively affect the private saving rates in developing and developed countries; however, the effect is significant only in developing countries.

In the most recent study, Hondroyiannis (2006) investigates the private saving dynamics in 13 developed European countries over the 1961-1998 period using the panel FMOLS technique. As an indicator of financial development, the author uses a ratio of private sector domestic credit to GDP. He finds that an increase in the financial depth leads to a decline in the private saving rate. The author also concludes that the real interest rate, old-age dependency ratio, and real income growth positively and significantly affect the private saving rate.

After the collapse of the socialist block, researchers also turned their attention to Central and Eastern Europe. However, due to data limitations, the research on saving in this region remains scarce. To our best knowledge, there are three papers on saving in Central and Eastern European countries, which use aggregate data. In the first paper, Denizer and Wolf (2000) study the saving behavior in transition economies using a cross section of 25 countries over the years 1989-1995. Applying the standard OLS estimator, they find that the level of GDP per capita has a positive and statistically significant effect on the domestic saving ratio, whereas the GDP growth rate has an opposite effect. An increase in the ratio of M2 to GDP positively and significantly affects domestic saving. The coefficients of dependency and urbanization are positive but insignificant. Additionally, to check whether the response of the domestic saving changes as countries move towards market economy, the authors run the same regression using a cross section only for the year 1995. Although the results for some variables changed dramatically, the coefficient of the financial depth variable remains positive and significant.

Chowdhury (2003) estimates the private saving function for a panel of 21 countries in Eastern Europe and Commonwealth of Independent States for the 1993-2001 period using the GMM dynamic panel technique. The author finds a significantly negative association between the ratio of M2 to GDP and private saving rate. The coefficient of the real interest rate is negative but insignificant, whereas the coefficient of the interest rate margin, a proxy for banking efficiency, is positive and significant. Furthermore, the estimation results show that an increase in per capita income significantly and positively affects the saving rate, whereas an increase in the dependency ratio negatively and significantly affects the saving rate.

Finally, in the third paper, Schrooten and Stephan (2005) analyze the determinants of private saving using a panel of ten Central and Eastern European countries for the period 1990-2000 using the first-differenced GMM estimator. The authors find that an increase in the

financial depth variable, M2 to GDP ratio, has a negative and significant effect on the private saving rate; however, an increase in the private credit to GDP ratio has a positive but insignificant effect on the private saving rate. Furthermore, the empirical results show that an increase in the real interest rate has a negative but insignificant effect on the private saving rate, and an increase in GDP per capita growth has a positive and significant effect on the private saving rate. Regarding the effect of demographics, the findings indicate that an increase in the dependency ratio negatively but insignificantly affects the saving rate.

This paper will extend the existing literature on saving in Emerging European countries in several directions. First, the paper provides a deeper analysis of the impact of banking sector development on saving using three characteristics of the banking system. Second, this study uses the mean group FMOSL estimator, which is superior to the simple OLS and GMM estimators employed in the previous studies. Finally, although the previous studies take the Life cycle hypothesis as a theoretical foundation, they use national and private saving data assuming that the government and business respond to changes in the economic environment similarly to households, whereas in this paper, we depart from this assumption focusing only on households.

3. Theory

The baseline model of the studies on saving is the Life cycle hypothesis (LCH) developed by F. Modigliani and R. Brumberg (1954). The idea of the hypothesis is that households allocate their life time resources over their lives to maximize their utility. In the LCH, the main determinants of saving are income growth, age, and real interest rate. With regard to income growth and age, the theory agrees that higher income growth stimulates saving, whereas higher age dependency discourages saving. However, the effect of an increase in the real interest rate on saving is ambiguous because if the substitution effect dominates the income effect, households will save more and vice versa.

The LCH is a frictionless world where households directly deal with capital users because they obtain and analyze information about a potential user at no cost and they feel certain of contract enforcement. However, in the real world, households encounter imperfect information, limited contract enforcement, and transaction costs; therefore, capital owners choose to deal with capital users through a banking system which is supposed to mitigate these frictions. In such circumstances, the willingness of households to use the banking system as a mediator depends on the level of banking sector development since a well-developed banking system effectively reduces inefficiencies and as a result increases real net returns to households (Shaw, 1973). While the banking sector development can encourage households to save more, we cannot determine the effect ex ante because the banking sector development also relaxes liquidity constraints for households and therefore can dampen saving motives if households save for precautionary reasons (Japelli and Pagano, 1994). Therefore, whether the banking sector development will encourage or discourage saving is an empirical question.

For empirical analysis of the effect of the banking sector development on household saving, we use the saving equation which is essentially derived from the LCH, but modified to account for the effects of the banking sector development:

$$\text{Saving} = \text{f}\begin{pmatrix}\text{income growth, age dependency ratio, real interest rate,}\\ \text{measures of the banking sector development}\end{pmatrix}$$

The banking sector development is a very broad concept and contains features which stimulate and discourage saving. As measures of the banking system development, we use three

characteristics of the banking sector: depth, efficiency, and stability (Cihak et al, 2012).[1] Depth measures volume of services provided by banks. An increase in depth expands saving opportunities and at the same time raises credit availability; therefore, the overall effect is ambiguous. Bank efficiency measures costs of provided services. An effect of an efficiency improvement on saving is also ambiguous because higher efficiency can imply both a decline in costs for borrowers and an increase in returns for savers. Bank stability measures vulnerability of the banking sector to systemic risks. We expect that greater bank stability will positively affect saving because an increase in stability strengthens confidence of households in security of their investments.

4. Empirical methodology

An application of the time series methods in empirical research on Central and Eastern European economies is problematic because these countries lack long enough time series. Small sample sizes reduce power of the time series methods and therefore lead to wrong inference. For this reason, many applied economists turned to the panel data methods which use not only a time series dimension but also a cross-sectional dimension to increase their power.

To analyze household saving dynamics in emerging Eastern Europe, we use the mean group fully modified OLS (FMOLS) estimator developed by Pedroni (2000, 2001). The main advantage of this estimator over the other panel estimators, such as fixed/random effects, panel IV or dynamic panel (Arellano and Bond, 1991), is that it allows for non-stationary and heterogeneity in dynamics. Furthermore, this estimator allows parameters of interest to vary across individual countries. The latter feature is very important for our application since we will be able to estimate not only the average magnitudes of the responses of saving to variations in variables but also the magnitudes of the responses of single countries.

The application of the FMOLS estimator requires variables to have a co-integration relationship. Before we perform Pedroni's residual co-integration test (Pedroni, 1999, 2004), we have to ensure that the variables are integrated of order one. To check the properties of the variables, we use two unit root tests: Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003). However, we have to acknowledge that both the unit root tests and co-integration test can yield wrong inference if the data suffer from cross-sectional dependence. In order to test for cross-sectional dependence, we run Pesaran's Cross-Dependence test (Pesaran, 2004). Should we find cross-sectional dependence, we include time dummy variables into the standard tests. The presence of cross-sectional dependence also invalidates the inference we make from the output of the FMOLS estimator. To solve this issue, we incorporate time dummy variables into the regression to subtract common time effects.

5. Data description

There are two approaches to calculating household saving at the aggregate level. One approach defines household saving as a difference between household income and expenditure. The other approach defines saving as a change in the stock of household assets (Le et al, 2010). In this paper, we use the second approach because of the deficiency of the data on household income

[1]Cihak et al (2012) also indicate access to banks as characteristic of the banking sector development; however, we do not consider this characteristic because of data unavailability.

and expenditure. The problem is that post-transition countries started conducting the Household Budget Surveys in different years and report data in different frequencies. If we compile the existing data, the obtained dataset will have a very small time dimension, which will not allow us to utilize effectively the panel co-integration technique which is superior to the other panel estimators.

Household assets can be in the form of financial assets like bank deposits and securities or physical assets like real estate. In this paper, I will proxy household assets by bank deposits, for which the data are available. We do not use securities because there is a lack of regularly reported data on the value of securities hold by households. Physical assets are also not included because of the data unavailability. In the analysis, following the previous studies, we use not the level of saving but the ratio of household saving to GDP.

On depth of the banking sector, two indicators are available: bank private credit to GDP and deposit money bank assets to GDP. However, in our study, we use the household credit to GDP ratio as the more suitable indicator because households will unlikely respond to an increase in depth of the banking sector if depth increases through growth in corporate credit or other assets not related to households.

Efficiency measures of the banking sector include such indicators as net interest margin, interest rate spread, return on assets, return on equity, overhead costs to total assets, and non-interest income to total income. Although these indicators are closely related, each of them measures a different dimension of efficiency. For example, the overhead costs to total assets ratio measures efficiency of all operations in the banking sector, whereas the net interest margin and interest rate spread measure effectiveness of intermediation. In this paper, for data availability reasons, we use the interest rate spread. The spread is calculated as a difference between a short term household lending rate and a short term household deposit rate. We use household interest rates because should households make their saving or borrowing decisions, they consider household deposit and lending rates rather than average market deposit and lending rates.

As regards stability of the banking sector, studies use one of the following indicators: bank Z-score, bank non-performing loans to gross loans, bank capital to total assets, bank credit to bank deposits, regulatory capital to risk weighted assets, and liquid assets to deposits and short term funding. Although the bank Z score which compares capitalization and returns with volatility of returns is the best indicator, due to the lack of data, we use the bank the credit to bank deposits ratio as a measure of stability.

Instead of income growth, we use an income level because income growth is a stationary variable and cannot be used in the co-integration analysis. Furthermore, since household income data are not available, we use GDP per capita as a proxy. As a measure of age, we use the age dependency ratio which shows the ratio of people younger than 15 and older than 64 to the working-age population. The real interest rate equals a difference between a short-term deposit rate and inflation.

The data set covers 11 Emerging European economies (Bulgaria, Estonia, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, and Slovenia) and spans the years 2000-2013. The data frequency is quarterly. However, the age dependency ratios are reported annually. To convert the age data into the quarterly frequency, we use a constant-match average method. GDP per capita is converted into real terms using the CPI (all items) and in the log form. The more detailed information about definitions of the variables and sources are given in Appendix.

6. Empirical results

Before we proceed to the estimation of the saving function, we have to ensure that the variables are difference stationary and co-integrated. To examine the properties of the variables, we use the Levin et al. (2002) and Im et al. (2003) panel unit root tests. Results of both tests are very sensitive to a lag order. In practice, to select an appropriate lag order, we use either a general-to-specific sequential t test rule or an information criterion based rule. However, we prefer the general-to-specific approach because the simulations performed by Ng and Perron (1995) show that the sequential t test rule has smaller size distortions. Furthermore, these panel unit root tests assume cross-sectional independence; the existence of cross-sectional dependence across panel members can distort the size of statistic and therefore reduce the power of the tests. To test for cross-sectional dependence, we implement Pesaran's test (Pesaran, 2004). The test statistic, reported in Table 2, indicates the presence of cross-sectional dependence in variables.

Table 2. Pesaran's test of cross sectional dependence

Statistic	9.63**

Note: The reported value is distributed N(0,1) under null of no cross-sectional dependence; *p<0.05 and **p<0.01

Source: Author's calculations

As a partial solution to this problem, we include time specific dummies into the panel unit root tests to account for the presence of common shocks that can cause cross-sectional dependence. The results, presented in Table 3, show that the saving ratio, household loans to GDP, interest rate spread, bank credit to bank deposits, real GDP per capita, and real interest rate are integrated of order one processes. Regards the dependency ratio, the tests demonstrate conflicting results: the Levin et al. test indicates that the variable has an order of integration higher than one, whereas the Im et al. test indicates that the variable has an order of integration equal to one. In such a situation, we should accept the result of the Im et al. test because this test has a better small sample performance.

Table 3. Panel unit root test results (time dummies included)

Variable	**Levin-Lin-Chu test**		**Im-Pesaran-Shin test**	
	Level	1st diff	Level	1st diff
Savings ratio	0.00	-5.74**	-1.27	-8.13**
Household loans to GDP	0.62	-2.51**	-0.88	-4.46**
Interest rate spread	0.79	-4.67**	-0.66	-6.41**
Bank credit to bank deposits	-0.31	-11.61**	-1.53	-12.29**
Real GDP per capita	1.73	-4.56**	1.61	-6.49**
Age dependency ratio	1.39	-0.77	1.10	-3.40**
Real interest rate	-0.04	-7.80**	-0.03	-8.89**

Note: ADF-statistic; the maximum lag order is set to ten; all reported values are distributed N(0,1) under null of unit root (a left tail); *p<0.05 and **p<0.01, the tests include an intercept

Source: Author's calculations

Having established that the variables are integrated of order one processes, we apply the Pedroni (1999) panel co-integration test to check for the presence of a long-run relationship among the variables. Results of the Pedroni test are also sensitive to a lag order. As in the case of the panel unit root tests, we use the general-to-specific sequential t test rule to determine the optimal lag order. To reduce cross-sectional dependence, we also include time specific dummies. The results of the test are reported in Table 4. The test reports seven statistics; however, we focus only on the panel and group ADF statistics because the simulations performed by Pedroni (2004) show that these two statistics have the best small sample properties. The magnitudes of both statistics provide evidence in favor of the existence of the co-integration relationship among the variables.

Table 4. Pedroni's panel co-integration test (time dummies included)

	Statistic
Panel v	-0.51
Panel rho	2.26**
Panel PP	1.31
Panel ADF	2.93**
Group rho	2.73**
Group PP	1.46
Group ADF	4.41**

Note: the maximum lag order is set to ten; all reported values are distributed N(0,1) under null of no co-integration (a right tail); *p<0.05 and **p<0.01, the test includes an intercept
Source: Author's calculations

Once reassured that the variables are co-integrated, we estimate the saving equation using the mean group FMOLS estimator. The regression results for individual countries as well as means for the whole group of countries are reported in Table 5. The estimation results for separate countries show that in fact, the signs, magnitudes, and significance of the coefficients differ across countries. For example, the financial depth variable has a significantly positive relation with the saving ratio variable in all countries except Romania, Russia, and Slovenia where the relation is insignificantly negative. This result implies that in the long-run, for the majority of households in most Eastern European countries, an increase in the financial depth implies greater saving opportunities. The previous empirical literature also presents ambiguous evidence on the way an increase in the financial depth affects saving. Some papers (Shrooten and Stephan, 2001; Chowdhury, 2003; Hondroyiannis, 2006) find a significantly negative relation between financial depth and saving, while the other papers (Denizer and Wolf, 2000; Loayza et al, 2000; Edwards, 1995) find either a significantly or insignificantly positive relation between financial depth and saving.

Table 5. Mean Group Panel FM Estimation (dependent variable: Households deposits to GDP, time dummies included)

Variable	Group	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia
Household credit to GDP	0.38**	0.55**	0.34**	0.13**	0.62*	0.63**	1.15**	0.64**	-0.18	-0.12	0.57**	-0.10
	(14.48)	(2.79)	(7.22)	(4.61)	(2.57)	(12.98)	(10.51)	(5.44)	(-0.86)	(-1.00)	(4.08)	(-0.30)
Interest rate spread	0.03	0.19	0.32**	0.02	0.61	-0.17*	-1.01**	0.10	-0.47**	0.02	-1.04	0.99*
	(-0.54)	(1.68)	(3.12)	(0.68)	(1.71)	(-2.40)	(-6.30)	(1.13)	(-3.21)	(0.35)	(-1.04)	(2.51)
Bank credit to bank deposits	-0.03*	-0.03	0.08**	-0.04**	-0.32**	-0.03**	-0.09**	0.02	-0.02	0.03	-0.06**	0.10*
	(-2.11)	(-1.32)	(10.59)	(-4.56)	(-4.23)	(-3.23)	(-4.51)	(0.42)	(-0.74)	(1.06)	(-2.77)	(2.30)
Log of real GDP per capita	1.76*	-62.62**	6.09**	2.55	15.64**	6.14*	7.11	-4.45	-15.64	13.02**	34.76**	16.74
	(2.35)	(-10.12)	(2.59)	(1.73)	(4.09)	(2.33)	(1.62)	(-1.01)	(-1.87)	(2.83)	(4.00)	(1.60)
Age dependency ratio	0.81**	7.37**	-0.04	-0.27	-3.58**	-1.15**	0.63**	2.08**	1.15	0.60	1.40**	0.74
	(11.26)	(23.34)	(-0.16)	(-1.51)	(-3.65)	(-2.64)	(5.17)	(9.53)	(1.22)	(0.82)	(4.50)	(0.74)
Real interest rate	-0.06**	0.14**	0.02	-0.16**	0.02	-0.28**	-0.40**	0.06	0.05	-0.02	0.04	-0.08
	(-4.21)	(2.66)	(0.60)	(-5.81)	(0.12)	(-6.02)	(-6.06)	(1.17)	(0.52)	(-1.09)	(0.37)	(-0.45)

Note: t statistics in parentheses; *p<0.05 and **p<0.01
Source: Author's calculations

An improvement in the efficiency significantly stimulates saving in Latvia, Lithuania, and Romania and significantly discourages saving in Czech Republic and Slovenia. In the other countries, the effect of a variation in the efficiency on the saving ratio is statistically insignificant. These findings suggest that for the most of households in Czech Republic and Slovenia, higher efficiency signals on the relaxation of borrowing constraints, whereas for the most of households in Latvia, Lithuania, and Romania, higher efficiency implies a higher net return.

An increase in the stability of the banking sector leads to a significant increase in the household saving ratio in Estonia, Hungary, Latvia, Lithuania, and Slovakia and a significant decline in the saving ratio in Czech Republic, and Slovenia. In the rest of the countries, the relationship is insignificant. The existence of the negative relationship between stability and saving in Czech Republic, and Slovenia goes against our hypothesis that stability in the banking sector encourages saving. To explain this result, we should refer to the definition of our proxy for stability which corresponds to the ratio of credit to deposits. A higher increase in deposits than in credit implies an increase in stability; however, households in Czech Republic, and Slovenia can regard a slower expansion of credit as a negative sign that the banking sector becomes less deeper and respond by lower saving.

An increase in GDP per capita positively and significantly affects the saving ratio in Czech Republic, Hungary, Latvia, Lithuania, Russia, and Slovakia. This result implies that in these countries, as households become richer, they save more to secure their future consumption. In Bulgaria and Romania, the countries with the lowest GDP per capita, on the contrary, an increase in GDP per capita leads to a significant reduction in the saving ratio. As explanation, we can suggest that the levels of household consumption in Bulgaria and Romania are at the EU minimum social level, and therefore, as households become richer, they try to catch up with the EU peers at the cost of low saving. In the remaining countries, the effect is insignificant, which implies that the upward and downward effects of a higher income offset each other.

The age dependency ratio has a positive and significant association with the saving ratio in Bulgaria, Lithuania, Poland, and Slovakia. In Hungary and Latvia, the association is negative and significant. In the rest of the countries, the age dependency ratio has an insignificant relation with the saving ratio. Although finding a positive significant or insignificant relationship between the age dependency ratio and saving ratio does accord with the Life cycle hypothesis, this phenomenon is not new in the empirical literature (Loayza et al, 2000; Denizer and Wolf, 2000;Shrooten and Stephan, 2005; Hondroyiannis, 2006). The plausible explanation of this result can be the financial situation in the social security systems which do not provide retirees with decent pensions and healthcare. The bequest motives of the elderly can also encourage saving and discourage dissaving. Furthermore, households with children can save more to afford tuition fees of their children.

An increase in the real interest rate encourages saving in Bulgaria and discourages saving in Estonia, Latvia, and Lithuania. However, in the most countries, a change in the real interest rate has no effect on the saving ratio. In other words, we find that in the majority of countries, the income effect balances the substitution effect; in Bulgaria, the substitution effect outweighs the income effect, and in the Baltic States, the income effect dominates.

To generalize the results for Eastern European emerging economies, we refer to the mean group results. According to the group results, an increase in the financial depth has a positive and significant effect on the household saving ratio. An improvement in the efficiency of the banking sector negatively but insignificantly affects the saving ratio. An increase in the stability of the

banking sector leads to a significant increase in the saving ratio. Real GDP per capita has a significantly positive association with the saving ratio. The positive and significant coefficient of the age dependency ratio implies that an increase in the ratio of population which does not participate in the labor force positively and significantly affect saving. Finally, an increase in the real interest rate has a negative and significant effect on the saving ratio.

7. Conclusions

The mean group results of this study show that the household saving in emerging Eastern Europe responds significantly to the developments in the banking sectors. Households save more when the banking sector is deeper and more stable. An increase in income also leads to a higher saving rate. Furthermore, we find that an increase in the age dependency ratio positively and significantly affects the saving rate. However, the household saving rate responds negatively and significantly to an increase in the real interest rate. This indicates that in the long run, in Eastern Europe, the income effect outweighs the substitution effect.

These results imply that policymakers can enhance saving motives of households through implementing policies targeted at increasing the depth and stability of the banking sector. However, it is a very tricky task to increase depth and stability at the same time because deepening a banking sector assumes credit expansion which if not backed by an adequate volume of deposits can cause instability in the banking sector. Therefore, policy makers should sustain the balance between deepening the banking sector and maintaining the stability. Additionally, policymakers can stimulate saving accumulation through accelerating economic development which will result in a higher per capita income.

If policymakers aim to encourage consumption, they can use either the age dependency or real interest rate channel or both. Increasing pensions and other social benefits, policymakers will be able to instill confidence of households about the future and therefore discourage saving. At the same time, a successful implementation of inflation stabilization policies can increase the real interest rates and therefore discourage saving.

References

Arellano, M. and Bond, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, Vol. 38, No. 2, pp. 277-297.

Cihak, M., Demirguc-Kunt, A., Feyen, E., Levine, R. 2012. Benchmarking Financial Systems Around the World. World Bank Policy Research Working Paper, No. 6175.

Chowdhury, A.R. 2003. Private Savings in Transition Economies: Are There Terms of Trade Shocks? William Davidson Institute Working Paper, No. 572.

Denizer, C. and Wolf, H.C. 2000. The Saving Collapse during the Transition in Eastern Europe. *The World Bank Economic Review*, Vol. 14, No. 3, pp. 445-455.

Edwards, S.1995. Why are Saving Rates so Different Across Countries? An International Comparative Analysis. NBER Working Paper, No. 5097.

Hondroyiannis, G. 2006. Private Saving Determinants in European Countries: A Panel Co-integration Approach. *The Social Science Journal*, Vol. 43, No. 4, pp. 553-569.

Im, K. S., Pesaran, M. H. and Shin, Y. 2003. Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, Vol. 115, No. 1, pp. 53–74.

Jappelli, T. and Pagano, M. 1994. Saving, Growth, and Liquidity Constraints. *The Quarterly Journal of Economics*, Vol. 109, No. 1, pp. 83-109.

Le, T., Gibson, J. and Stillman, S. 2010. Household Wealth and Saving in New Zealand: Evidence from the Longitudinal Survey of Family, Income and Employment. Motu Economic and Public Policy Research Working Paper, No. 1006.

Levin, A., Lin, C. F. and Chu C. 2002. Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties. *Journal of Econometrics*, Vol. 108, No. 1, pp. 1–24.

Loayza, N., Schmidt-Hebbel, K. and Servén, L. 2000. What Drives Private Saving across the World? *The Review of Economics and Statistics*, Vol. 82, No. 2, pp. 165-181.

Modigliani, F. and Brumberg, R. 1954. Utility analysis and the consumption function: an interpretation of cross-section data. In: K. K. Kurihara (Ed.). *Post-Keynesian Economics*, pp. 388–436. New Brunswick, NJ: Rutgers University Press.

Ng, S. and Perron, P. 1995. Unit Root Tests in ARMA Models with Data-Dependent Methods for the Selection of the Truncation Lag. *Journal of the American Statistical Association*, Vol. 90, No. 429, pp. 268–281.

Pedroni, P. 1999. Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics*, Vol. 61, No. 1S, pp. 653–70.

Pedroni, P. 2000. Fully Modified OLS for Heterogeneous Cointegrated Panels. In: B. H. Baltagi (Ed.). *Nonstationary Panels, Panel Cointegration and Dynamic Panels*, 15, pp. 93–130. Amsterdam: Elsevier.

Pedroni, P. 2001. Purchasing Power Parity Tests in Co-integrated Panels. *The Review of Economics and Statistics*, Vol. 83, No. 4, pp. 727–731.

Pedroni, P. 2004. Panel Co-integration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis. *Econometric Theory*, Vol. 20, No. 3, pp. 597–625.

Pesaran, M.H. 2004. General Diagnostic Tests for Cross Section Dependence in Panels. Cambridge Working Papers in Economics, No. 0435.

Schrooten, M. and Stephan, S. 2005. Private Savings and Transition. Dynamic Panel Data Evidence from Accession Countries. *Economics of Transition*, Vol. 13, No. 2, pp. 287-309.

Shaw, E.S. 1973. *Financial Deepening in Economic Development.* New York: Oxford University Press.

Appendix. List of definitions of variables and data sources

Variable	Definition	Source
Saving ratio, *%*	Saving ratio is household deposits divided by GDP.	Author's calculations
Household loans to GDP, *%*	Household loans to GDP is household loans divided by GDP.	Author's calculations
Interest rate spread, *%*	Interest rate spread is the interest rate charged by banks on short term loans to households minus the interest rate	Author's calculations

	paid by banks for short term deposits from households.	
Private credit to total deposits, *%*	Private credit to total deposits is private credit divided by total deposits.	Author's calculations
Real GDP per capita, *domestic currency*	GDP per capita is gross domestic product divided by end-year population and adjusted for inflation.	Author's calculations
Real interest rate, *%*	Real interest rate is a short-term deposit interest rate adjusted for inflation.	Author's calculations
Age dependency ratio, *%*	Age dependency ratio is the ratio of dependent people (younger than 15 or older than 64) to the working-age population (those ages 15-64).	World Development Indicators (World Bank)
Household deposits, *domestic currency*	Household deposits include demand, time, and savings deposits of resident households (for some countries, household deposits also include deposits of Nonprofits Serving Individuals and Households and nonresident households).	Central Banks
Household loans, *domestic currency*	Household loans include includes all loans to households (for some countries, household loans also include loans of Nonprofits Serving Individuals and Households and nonresident households).	Central Banks
Private credit, *domestic currency*	Private credit includes all credit to various sectors with the exception of the credit to the government (for some countries, private credit does not include credit to the financial sector).	Central Banks
Total deposits, *domestic currency*	Total deposits include demand, time, and savings deposits of all sectors (for some countries, total deposits do not include deposits of the financial sector).	Central Banks

GDP, *domestic currency*	GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	EUROSTAT, Federal State Statistics Service
Population	Population on January 1.	EUROSTAT, Federal State Statistics Service
Short term deposit rate, *%*	Interest rates for deposits up to one year.	Central Banks
Short term lending rate, *%*	Interest rates for loans up to one year.	Central Banks
Inflation, *%*	Inflation is an annual percentage change of Consumer Price Index.	Author's calculations
Consumer Price Index (CPI)	CPI measures changes in the price of a basket of goods and services purchased by an average household.	EUROSTAT, Federal State Statistics Service

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