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## Determinants of foreign loans in Estonian private sector

### Abstract

Estonia is one of the leading countries in terms of indebtedness in Central and Eastern Europe. Even though the public sector debt is surprisingly low, the private sector indebtedness has risen very quickly in recent years. In current paper the indebtedness of the private sector of Estonia in 2000-2007 has been analyzed. Our study shows that indebtedness in Estonia in that period has been determined by low interest rate as well as high growth of income. We also proved that those determinants alone cannot be enough to explain the credit growth. Determinants of credit growth are indicating that the credit growth in Estonia could be explained by permanent income hypothesis.

**Keywords:** indebtedness, private sector, Estonia, credit growth.

**JEL Classification:** F21, G21, D14, C12.

### Introduction

The pattern of the money inflow has changed in recent years in all over Central and Eastern European (or CEE) countries where the FDI has been gradually replaced by the foreign loans. Starting from the very low initial levels, credit has rapidly increased in the last 8-9 years in the region where credit to households has been the most dynamic component of those money inflows.

Estonia, along with Croatia, is one of the leading countries in terms of overall indebtedness in CEE countries. Specific trend of Estonia compared with other CEE countries is the very low borrowing ratio of public sector and, on the other hand, active borrowing of households. Here it should be stressed that Estonia has made successful macroeconomic reforms – having early privatization, low and simple taxation and successful monetary and banking reform. Therefore, high level of FDI as well as low interest rates and high overall economic rating should not be surprising. But is it enough to explain high level of indebtedness?

The aim of the current paper is to study the determinants of credit demand by private persons in Estonia. Even though the supply side of the credit is an important factor by relaxing liquidity constraints to many households we still consider the demand for credit crucial to explain the recent development of indebtedness. In the current study we analyze basic models of credit development and test these models with 2000-2007 macroeconomic data of Estonia.

The paper is organized as follows. Section 1 gives a good overview of recent macroeconomic development and financial sector growth in Estonia. We consider it very important to explain the background of the model we use for empirical study. The paper also explains why it is difficult to carry out econometric studies on macroeconomics

of transition economies. Also, fast changes in economic environment, unfortunately, are devaluing the findings of the current study.

The second part of the paper aims to give broad overview of recent literature. There are number of approaches and models to explain the credit growth and indebtedness of private persons. We refer also empirical findings and stress the environment where those studies were made. Important part of literature review is the positive feedback problem where economic growth encourages people to borrow and high credits in turn heat up economy. There are not many studies where positive feedback issue has been analyzed. There are studies with non-linear dynamic models for credit markets but due to the limited empirical usage we have excluded those from our literature review.

In the third part of the paper we introduce our testing model, explain detailed data selection and present results. We have tested several models where our results support permanent income model for the period of 2000-2007. Later years clearly do not fit to the permanent income model nor any of those models tested in recent literature. In conclusion we give our comments on it and outline directions for further studies.

### 1. Macroeconomic development of Estonia

International investments are among the most important factors for guaranteeing the economic growth and innovation of transition market economies in Central and Eastern Europe. Most contributions in the researches point at FDI as one of the main factors of the increasing trade between East and West (Carlin and Landesmann, 1997; Kamiski, 2000; Jensen, 2001).

Transition countries generally have insufficient domestic savings due to their meager incomes. For that reason transition countries try to attract foreign investors. The investments to Central and Eastern European countries are rapidly growing. The

research of McKinsey Global Institute finds out that incentives used to attract FDI and restrictions placed on it are largely ineffective. Even worse, they are frequently counter productive, costing governments millions of dollars annually, protecting inefficient players and lowering living standards and productivity (Farrell et al., 2004).

Thanks to liberal external interactions, Estonia has been able to attract FDI in the amount of 182,3 billion kroons by the end of 2008, which is equal to 73,5% Estonian gross domestic product in 2008. Estonia is a leader of FDI stocks among CEE countries and its FDI integration with EU old countries is the highest (Havlik, 2005).

Table 1 shows decrease of the share of FDI in the total amount of foreign investments. The main reason is a very quick growth of other investments, including loans. By the amount of FDI per capita, we are one of the most successful among transition countries. What makes this result even more valuable is that generally, the size of a country is the significant factor favoring foreign investment (Barrell and Pain, 1997). Thus, Russia and Poland have rather better prerequisites for a higher rank on investment per capita. On the other hand, inflow of foreign investments into Central European transition countries (Czech Republic, Hungary, etc.) started some years earlier than for Estonia, until 1991 Estonia was still a part of the Soviet Union.

In 2005 large capital movements between the accounts of direct investment and portfolio investment mainly stemmed from the buying up of the shares of Hansapank by Swedbank, which is reflected in an increase in direct investment and a decrease in portfolio investment.

Table 1. Estonian investments inflow (EEK m)

	2003	2005	2007	2008
Direct investments	12865	35275	30702	21374
Portfolio investments	7782	-16884	2724	-3439
Financial derivatives	120	-111	82	173
Other investments	6731	30912	56627	16705
Total foreign investments	27498	49192	90135	34813
Share of direct investments (%)	46,8	71,7	34,1	61,4

Source: Estonian Preliminary Balance of Payments ..., 2008; completed by the authors.

From Table 1 we see that during the period of 2003-2008 portfolio and other investments until 2007 grew much faster than FDI. It has several reasons. One of them is the well-developed banking structure sided by the high credit rankings of those banks. Due to the lack of own savings most of the lending money has foreign origin. In 2008 already international economic and financial crisis started to

influence the capital inflow. Decrease was noticed in most mobile capital: portfolio investments and short-term loans inflow indicators were negative. Table 2 indicates that loans have now the biggest share among other investments in Estonia.

Table 2. Structure of other investments into Estonia (EEK m)

Year	Total volume	Among which			
		trade credit	loans	deposits	other capital
2001	3288	103	2570	81	534
2002	6733	781	1963	3764	225
2003	6731	-116	3220	4588	-960
2004	13715	625	4565	8805	-279
2005	30912	16334	24674	2953	1652
2006	43695	3207	19332	21081	75
2007	56627	-582	38013	18876	116
2008	16705				

Source: Estonian Preliminary Balance of Payments ..., 2008; completed by the authors.

In the beginning of this millennium the share of deposits was more than half of total other investments but then it started to decrease. Loans volume increased extremely quickly in 2007 when it practically doubled during one year.

From Table 2 we may conclude that in Estonia during this millennium loans have the fastest growth rates. Volume of loans grew nearly 15 times to 2007.

Reforms in Estonian banking sector started in 1988. During the two decades five banks remained from more than 50 licensed commercial banks, the rest were not able to continue independently, they merged or have failed. The bad result of such kind of development was also the excessive high concentration in banking sector. Market share of the biggest bank (Swedbank Estonia) by assets in Estonia is over 50 per cent.

The positive result of the second banking crisis in Estonia in 1998 was that during this period foreign banks bought from Tallinn stock exchange the cheapened shares of the Estonian major banks and became their strategic owners. Quite similar developments were also in Croatia where in 2007 the banking sector was in the hands of foreign owners (90% by assets) and very concentrated (four largest banks market share 64%), and during last years credit growth was very quick there (Gardo, 2008).

Globalization needs the free capital movement but it adds financial sector risks. For example, research of the Norwegian banking crisis revealed that the deregulation of the credit market triggered a lending boom that made the Norwegian economy very vulnerable to adverse shocks when the exchange

rate was fixed. A major policy conclusion is that the pro-cyclical monetary policy due to the fixed-exchange-rate regime was one of several important factors explaining the weak performance of the Norwegian economy, the sharp decline in real estate prices, and the banking crises (The Norwegian Banking crisis, 2004).

The third feature of last years' developments in Estonia is extremely quick growth of loan portfolio. In this millennium Estonian banks loan portfolio grew near seven times. In addition to the domestic resources Estonian banks also borrowed money from their Scandinavian mother banks. We may conclude that near half of the credit growth was financed by foreign strategic investors of Estonian banks.

Table 3. Growth of loans and its sources of Estonian banks

Year	Loan portfolio EEK bln	Loans from foreign credit institutions EEK bln	Share %
2000	34,3	6,1	17,8
2001	40,7	6,1	15,0
2002	50,0	11,7	23,4
2003	69,2	16,5	23,8
2004	92,6	26,8	28,9
2005	125,5	45,1	27,8
2006	177,7	64,6	36,4
2007	239,5	110,3	46,1
Growth % 2000-2007	698	1808	259
2008	260,1	92,2	35,4

Source: Eesti Pank; authors' calculations.

So, Estonian banks have quite ambitious growth strategies. But those are risky strategies. Already researchers analyzing Nordic banking crises at the beginning of 1990th discovered the fact that if banks grew faster than overall economy then in the long run economies end up in big misbalance and in banking crises (Koskenkylä, 1995). The economists analyzing Japanese banking crises came up to the same conclusions (Kanaya and Woo, 2001). In the Nordic countries the previous banking crisis was the crisis of large banks (Skar, 1995; Kjellmann, 1994). Troubles faced by US and European bigger banks in autumn 2008 demonstrate that this conclusion is on place even today.

At the end of 2008 Estonia's gross external debt amounted 288.6 bln EEK (27.9 bln €), which was 75.8% bigger of 2008 GDP. Peter Isard (2005) wrote "The financial crises of the past decade have underscored those high levels of external or public debt are a major source of vulnerability. Several studies support the judgment that emerging market countries are well advised to hold their debt levels below 35-40 percent of their GDPs".

## 2. Literature review

A starting point for examining trends in household borrowing is the permanent income model which states the maximization of household utility over its lifetime by intemporal budget constraint (Friedman, 1957; Muelibauer, 1994). Assuming the standard upward sloping path for labor income over the working life of the household, households dissave in the early part of their working life, and their consumption is financed by borrowing. As the household ages and labor income grows, indebtedness decreases and once it is repaid, assets are accumulated. Later in life, when the household is no longer working, households dissave again by consuming the earnings on their accumulated assets and gradually running down their stock of wealth. The debt position of an individual household can therefore be determined by the path of future income and the interest rate (relative to the discount rate):

$$L = L(Y, i).$$

Empirical evidence of those studies can be found in various papers (Coricelli et al., 2006; Kraft, 2007; Havrylchyk, 2004) but still predominantly in the papers about the developing economies. Those studies have found the strong impact and high significance of income on the household credit equation. Those studies also point out that the relatively high influence of the income on the credit growth compared with developed economies would be referred to the relative small size of liquidity-constrained households (Coricelli et al., 2006; de Bondt, 1999).

Another approach explaining the behavior of households' borrowing decisions has been reasoned by following transmission mechanism (Mishkin, 2001; Fritzer et al., 2007). An increase in money supply increases the amount of bank liquidity and causes interest rates to fall in order to encourage households and firms to spend more on consumption and investment goods respectively. In this case, households are expected to reduce savings and increase spending and/or borrowing. Firms are also expected to increase borrowing for investment. There is an overall increase in employment and output, especially of credit services. This liquidity effect is counterbalanced in the modern literature by an anticipated inflation effect (Li, 2000). Here an expansionary monetary shock leads households to expect that the rate of inflation will increase. They therefore move out of cash and increase demand for credit with the resultant increase in nominal interest rates and a reallocation of labor towards credit services.

$$L=L(i) \quad \text{or} \quad L=L(infl_E(i)).$$

This approach has been used in number of empirical studies where results have been supportive (Kaufmann, 2001; Nieto, 2007; Fritzer et al., 2007) or less supportive (Valderrama et al., 2004). There could be also asymmetric effects of monetary policy on bank lending over the business cycle as in Austria in 1990-1998 (Kaufmann, 2001). During the economic recovery from the second quarter of 1993 to the second quarter of 1998 the effect of interest rate changes on bank lending is insignificant, while from the second quarter of 1990 to the first quarter of 1993 interest rate changes have a significant, albeit counter intuitively positive, effect on bank lending. Another group of empirical studies focuses on fiscal policy impacts on the cost of financing of real estate debts of households (Wolswijk, 2005; Van der Noord, 2003). Those studies refer more to the different tax treatment as well as other fiscal limitation impact on the household debts and the price of real estate. Nevertheless, caveats regarding data-based analysis of fiscal effects on mortgage debt, notably related to data availability, quality and comparability, call for caution in interpreting those results.

Alongside these views about the transmission mechanism, there has been the strict monetarist view that emphasizes relative price effects and the neutrality of money. Here monetary policy changes which are not backed by output changes have price effects, thus leaving real variables unchanged, once these price effects have been fully assimilated by all agents (Meltzer, 1995). This approach has relatively low usage of empirical studies even though the inflation influence has been considered as an explanatory variable in a number of studies (Lawrence, 2002; Kraft, 2007).

Different approach to those transmission models are s.c. microfinance studies where the main focus is on the change of liquidity constraints of households (Coricelli et al., 2006; Kraft, 2007; Havrylchuk, 2004; Nieto, 2007; Casolaro et al., 2005). This approach has been strongly focused by some explanatory research of fast credit growth development of CEE countries (Coricelli et al., 2007). The empirical part lays on the rapid credit development of CEE countries in the early 2000 where the volatility of households' consumption is much less than the volatility of disposable incomes. Those effects are explained by the development of the credit institutions, overall financial liberalization, successful monetary and fiscal reforms as well as the influence of the integration process on the European Union (Lawrence, 2004; Coricelli et al., 2007; Debelle, 2004). A number of studies mention those aspects on introduction level

but do not include them into the part of empirical studies of research (Nieto, 2007; Fritzer, 2008).

Another type of studies has focused on many socio-demographic parameters to find statistically valid causalities explaining the expansion of credit (Lawrence, 2002; Nieto, 2007; Crook et al., 2003). Studies have shown that households' demand for debt is related positively to home ownership, family size and job status while negatively related to net worth, age and risk aversion (Crook, 2003). Structural studies analyzing different socio-economic groups of population and examining the changes in the distribution of household debt-income ratios, income and assets across borrowers conclude that the increase in debt-income ratios of households during the second half of the 1990s was larger among the youngest and lowest-income households (Nieto, 2007). There are also several comparative studies comparing explanatory credit growth variables of different countries (Crooke et al., 2003) or even of different ethnic groups within the country (Carroll et al., 1999). These studies revealed that borrowing behavior does not seem to be significantly affected by ethnic or cultural origin and statistically significant effects can be found that the pattern of origin dummy does not conform to country-of-origin aggregate savings patterns.

Final part of studies where the credit growth has been investigated are those where price of housing has been incorporated as the explanatory variable to the credit growth of households (Hoffmann, 2001; Egert et al., 2008). In all those studies the strong positive relationship between the GDP and house price has been established as well as the relationship between the loan growth and real estate price. Therefore, some studies have even used the real estate price as the proxy for the household credit and the household wealth (Nieto, 2007). Given that the majority of credits in CEE countries are real estate credits (in Estonia more than 70% of household credits are real-estate credits) real-estate price could be a good proxy for the income and wealth of households (Coricelli et al., 2007). Despite serious problems regarding the quality of data on house prices and their determinants, one can conclude that the fundamentals have played an important role in explaining house prices in both CEE and OECD countries. There is a strong positive relationship between per capita GDP and house prices but there also exist robust relationships between real interest rates and house prices, as well as between housing (or private sector) credit and house prices, in both CEE and OECD countries.

The intriguing question on the subject of credit growth and income growth is the positive feedback

between those parameters. Surprisingly, only very few studies have mentioned this feedback problem and only some of them have tried to measure it (Coricelli et al., 2007). The paper presents figures of measured credit growth contribution to the real consumption during the period of 2000-2004 in CEE countries. The methodology of those measurements is similar to the liquidity constraint measurements where the real consumption growth is compared with the “theoretical” consumption growth deducted through the credit growth simulation. Results of credit induced consumption growth over consumption growth are presented in Table 4.

Table 4. Credit induced consumption growth over consumption growth

	Real consumption growth 2000-2004	Credit induced consumption growth over consumption growth	Initial debt/GDP ratio (end 1999)
Bulgaria	5.0	2.8	2.0
Croatia	4.8	1.1	13.3
Czech R.	3.2	1.6	6.4
Estonia	7.3	0.9	6.4
Hungary	6.7	1.6	4.0
Latvia	7.8	1.4	2.2
Poland	8.3	0.4	8.0
Romania	6.1	3.6	0.4
Slovakia	2.8	1.7	5.8
Turkey	3.2	3.8	2.5

Source: Coricelli et al. (2007).

As the table shows, during the 2000-2004 period Estonia had very little credit induced consumption growth over the consumption growth where the multiplier is very close to 1.

### 3. The empirical model

The basis of our empirical study is the permanent income model for open economies where credit growth is determined by the income growth and the change of an interest rate variable. In addition, there are some modifications in our approach which should be introduced first.

Many previous studies have taken the GDP growth as a proxy for income growth (Fritzer et al., 2007; Coricelli et al., 2006). In some studies authors have developed more sophisticated function such as household credit to GDP to investigate the household credit behavior (Evans, 2007). Household credit to GDP has been used also in many cross-country comparative analyses to draw first illustrative conclusions (Lawrence, 2002; Nieto, 2007; Crook et al., 2003). In some papers authors have not specified the meaning of GDP in their econometric analyses and have reasoned the household credit development by aggregated macroeconomic variables as GDP and real interest rate (Calza et al., 2003).

Our baseline specification tries to explain the growth of credits with nominal income and nominal interest rate. Sutton (2002) and Tsatsaronis and Zhu (2004) show that nominal interest rates perform better than real interest rates in explaining credit decisions because banks typically make decisions to grant households' loans based on the ratio of debt servicing costs to income. This ratio is dependent on nominal interest rate not the real interest rate.

The biggest difficulty to test the hypothesis and find determinants of credit growth consists mainly in the nonstability of macroeconomy and constant development and reforms of financial sector. The theories on debt mostly consider the steady state and not how debt markets behave when states change, or in the transition between them (Davis, 1995).

The fast growth of economy, turbulent macroeconomic situation and institutional changes in Estonia have limited the period of the analysis. Moreover, the authors have found the period of 2000-2007 where the influences of Russian rouble crises have disappeared; monetary and banking reforms have been carried through; institutional changes specially in banking sector have been ended and heated economic influences has not been yet significant. Still there is remarkable growth in total outstanding foreign debt but not considerable effect of positive feedback.

Our first test model followed most quoted credit growth theory where transmission between the money supply and credit growth takes place through the change of interest rates as follows

$$FL_t = B_0 + B_1 * i_{t,j} + e_t,$$

where  $FL_t$  stands for foreign loans;  $i_{t,j}$  is variable of nominal interest rate;  $B_0$ ,  $B_1$  are parameters, and  $e_t$  stands for residual.

In place of interest rate we tested both rates used in Estonian credit contracts: TALIBOR which is local interbanking credit rate and EURIBOR. In the test TALIBOR could indicate influences of internal credit market and EURIBOR could indicate outside influence. Even though these interest rates have similar pattern they are not identical. Duration of both EURIBOR and TALIBOR has been taken for 1 month to make them comparable.

The weighted least square regression with both of those interest rates failed where the significance of the variable was not enough to explain the function – the growth of credit.

Our second tested model was based on the approach of permanent income model where along with the

interest rate there also exists income as variable. Thus, the tested model looks as follows:

$$FL_t = B_0 + B_1 * GDP_{t-i} + B_2 * i_{t-j} + e_t,$$

where  $FL_t$  stands for foreign loans;  $GDP_{t-i}$  is variable of  $GDP$ ;  $i_{t-j}$  is variable of nominal interest rate;  $B_0$ ,  $B_1$ ,  $B_2$  are parameters and  $e_t$  stands for residual.

### Model summary<sup>b,c</sup>

Model	R	R-squared	Adjusted R-squared	Std. error of the estimate	Durbin-Watson
1	,930 <sup>a</sup>	,864	,848	,11	1,975

Notes: a. Predictors: (Constant), EURIBOR, SKP. b. Dependent variable: VOLG. c. Weighted least squares regression – Weighted by WEIGHT2.

Where estimation parameters were as follows

### Coefficients<sup>a,b</sup>

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95% Confidence interval for B		Collinearity statistics	
	B	Std. error	Beta			Lower bound	Upper bound	Tolerance	VIF
(Constant)	-26117,2	26217,353		-,996	,333	-81430,953	29196,605		
SKP	4,329	,786	,681	5,506	,000	2,670	5,988	,521	1,920
EURIBOR	-5655,296	2205,164	-,317	-2,565	,020	-10307,785	-1002,806	,521	1,920

Notes: a. Dependent variable: VOLG. b. Weighted least squares regression – Weighted by WEIGHT2.

Due to the low VIF coefficient large confidence intervals can be explained by the low number of samples ( $n = 34$ ) rather than collinearity of variables.

There is a statistically significant causality between the foreign loans and interest rates combined with  $GDP - R^2$  was 0.864. Therefore, it can be argued that the growth of  $GDP$  as a proxy for income growth together with the decreasing external interest rate has caused the inflow of the foreign loans. Due to the many theoretical models and theories we find the significance of the causality very important.

Our third test model followed the hypothesis that foreign loans are just stabilizing the current account deficit. The model itself is analyzed as follows:

$$FL_t = B_0 + B_1 * FA_{t-1} + e_t,$$

where  $FL_t$  stands for foreign loans;  $FA_{t-1}$  is variable of current account deficit;  $B_0$ ,  $B_1$  are parameters and  $e_t$  stands for residual.

The weighted least square regression where the significance of the variable was not enough to explain the function is the growth of credit where  $R^2$  was less than 0.4.

### Conclusions

For years Estonia has been an attractive transition country for foreign investors. It has received more foreign investment per capita than other CEE countries. Together with the FDI attraction Estonia has “attracted” many foreign loans. To analyze the determinants of credit demand or indebtedness in Estonia the macroeconomic development and the banking sector development should be considered. This, on the other hand, makes it very difficult to make long-term empirical researches of development of economic growth. Still we have found the period of 2000 till 2007 where the macroeconomic conditions can be

considered quite stable as well as the banking sector rather constant.

In the current paper the indebtedness of the private persons of Estonia in 2000-2007 has been analyzed. Our study shows that indebtedness in Estonia in those years has been determined by low interest rate as well as high growth of income. We also proved that those determinants alone cannot be enough to explain the credit growth.

The macroeconomic model which includes determinants such as interest rate and income – the permanent income hypotheses – is the most quoted explanation in literature. There could be another explanation as well. One of the hypotheses is that the significant relaxation in liquidity constraints combined with high expectations for income growth in highly segmented credit market would give similar results as permanent income hypothesis. This “reverse permanent income hypothesis” would require analysis of different segments of borrowers.

The current study has two important limitations. First, positive feedback problem. Even though in the second part of the study we referred to the paper where the issue was deeply analyzed and we used it in our study, the time period of 2000-2007 is long enough where positive feedback influence could change significantly. Those years can be considered quite homogeneous as we described in the first part of the current paper; in addition, there might be changes in positive feedback influence.

The second limitation is the extrapolation of causality we found. We only can argue that the growth of personal credits determined by income and interest rate in Estonia is valid during very certain period of time – from 2000 till 2007.

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