

# *The Estonian Speculative Real Estate Market: The boom and bust cycle. Would land tax prevent it?*

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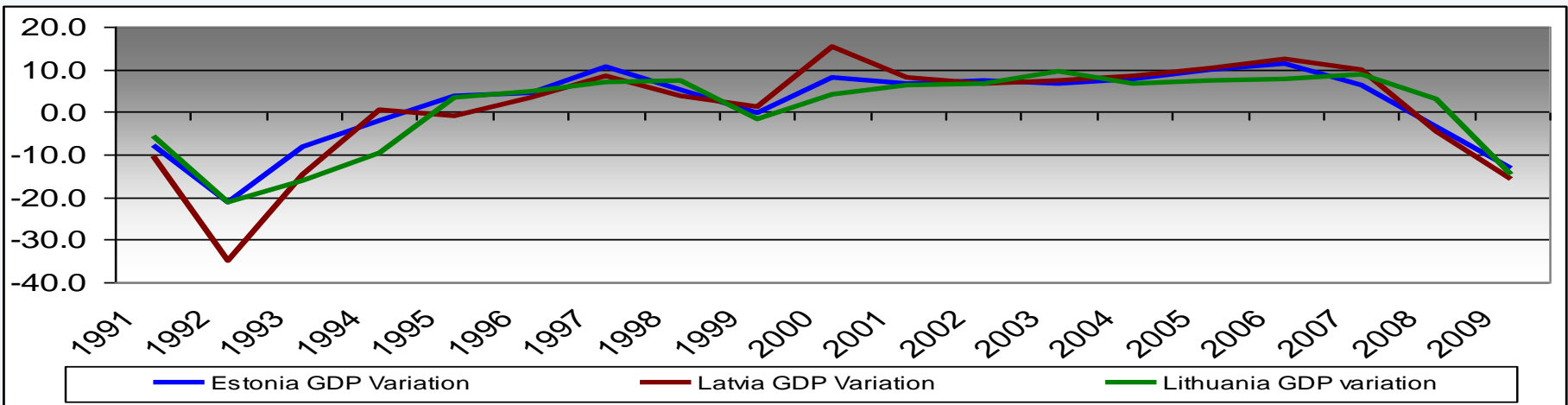
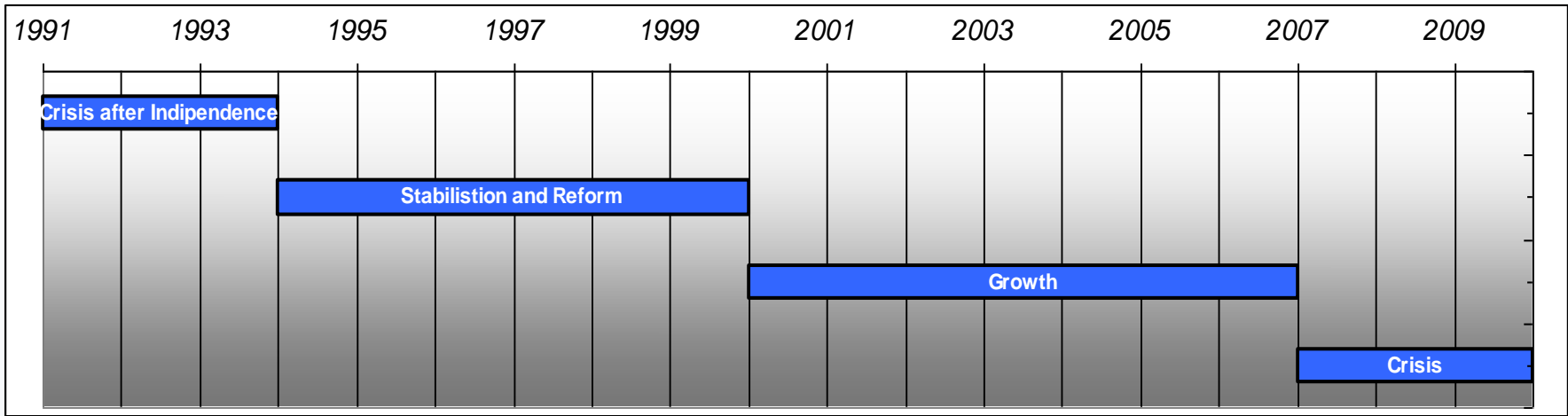
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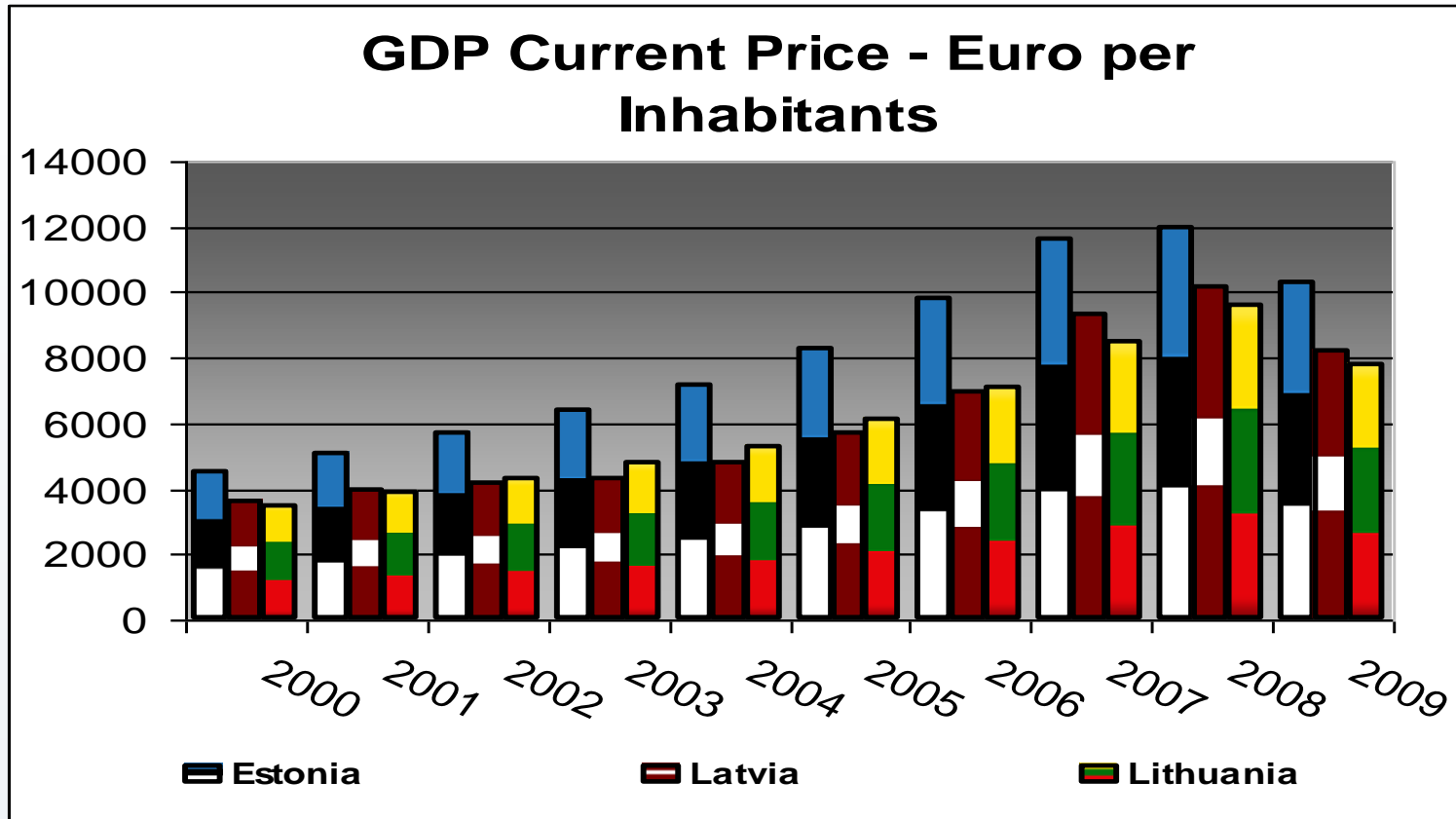
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- 2. Objectives**
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# 1. Estonian Economic and Financial Background



Data Source: ERS, USDA; UCL calculation. Note: Variation is expressed in (ln) on the same period of the previous year

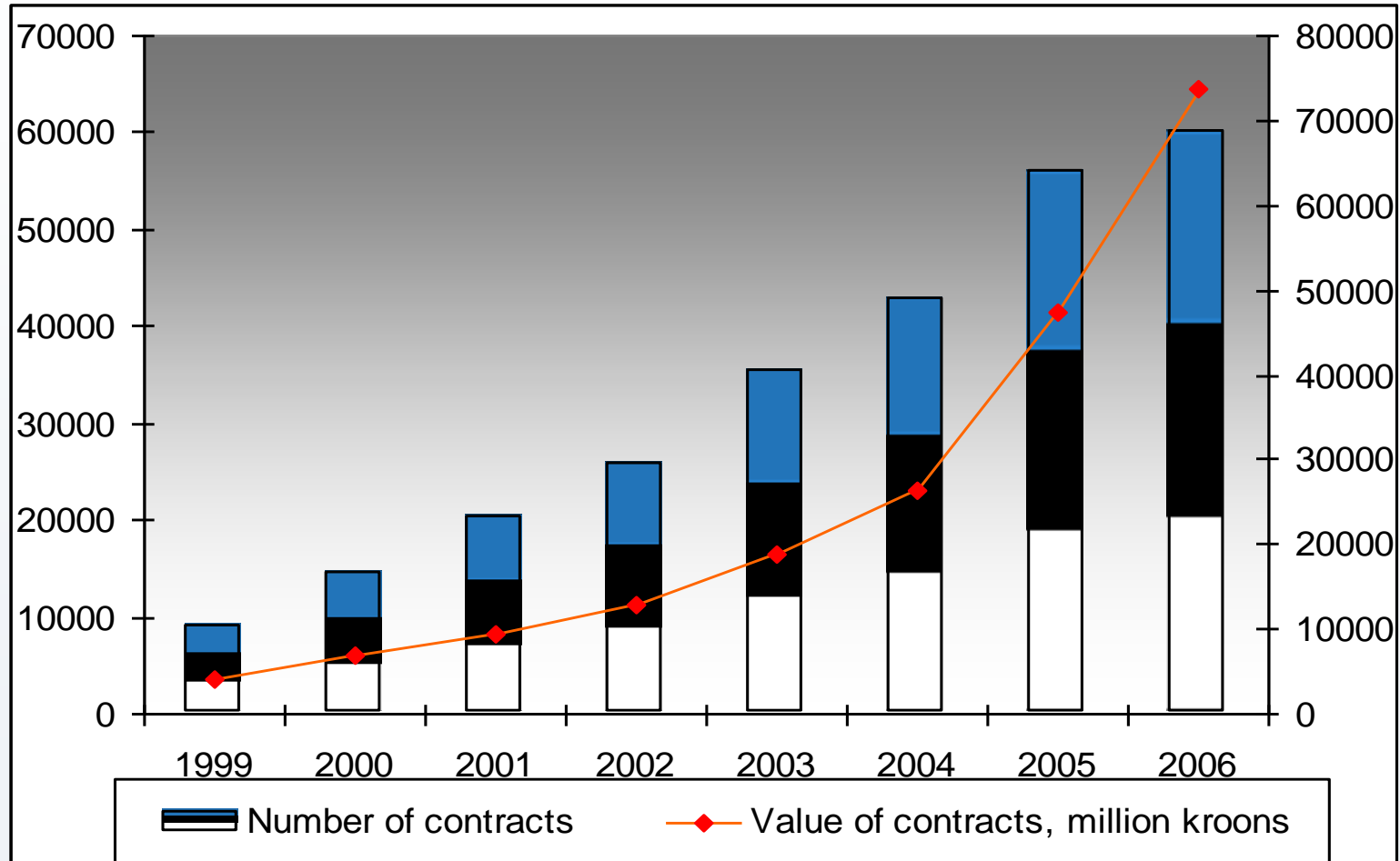
# 1. Estonian Economic and Financial Background



Data Source: EURO Stat; UCL calculation;

# 1. Estonian Economic and Financial Background

Figure 12. Estonian purchase sale contracts: number and value



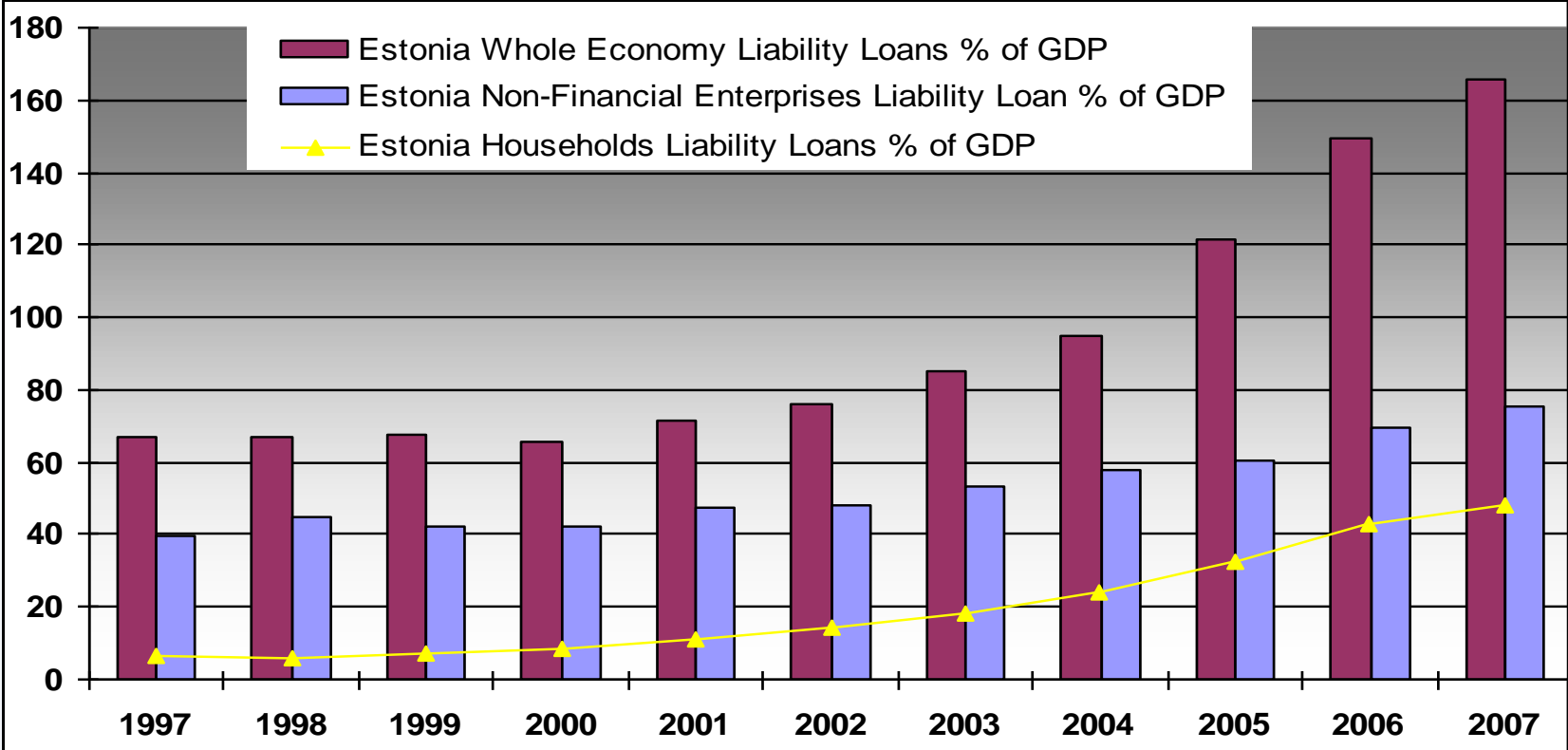
## 2. Objectives

- Assess the presence and development of speculative bubbles in Tallinn real estate markets.
- Evaluate how the Estonian land fiscal system failed to prevent the market distortion.
- Does Public transport capitalise in Real Estate Values in the city of Tallinn?

# 2. Real Estate Growth



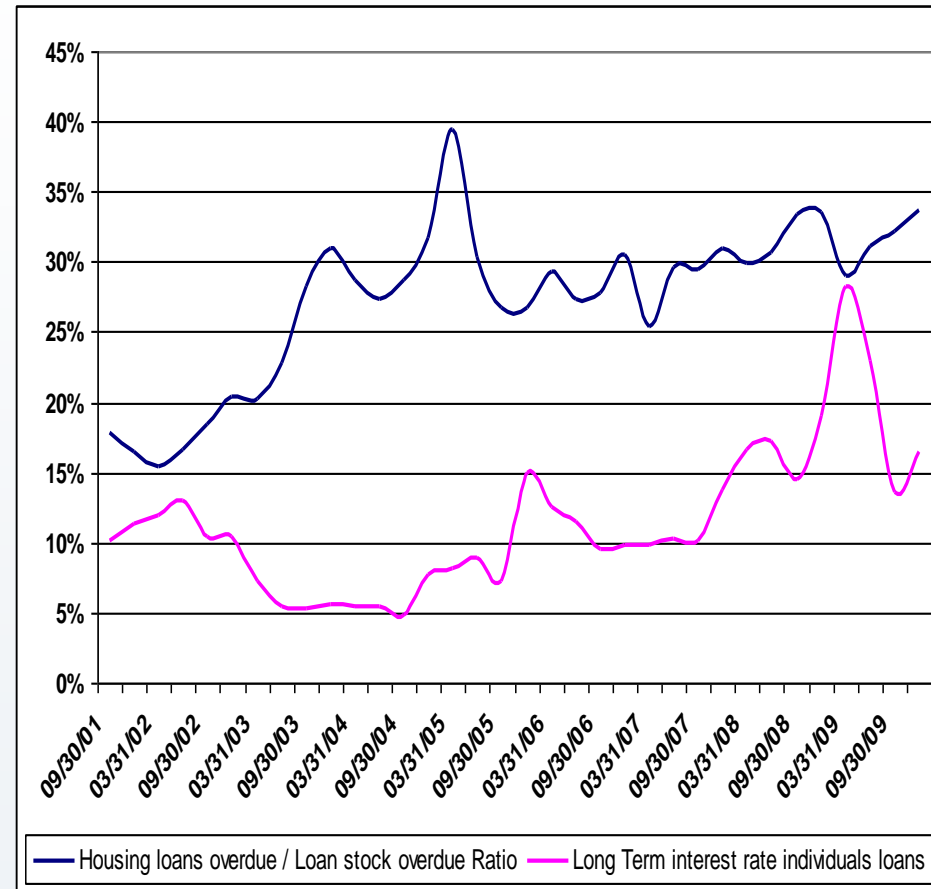
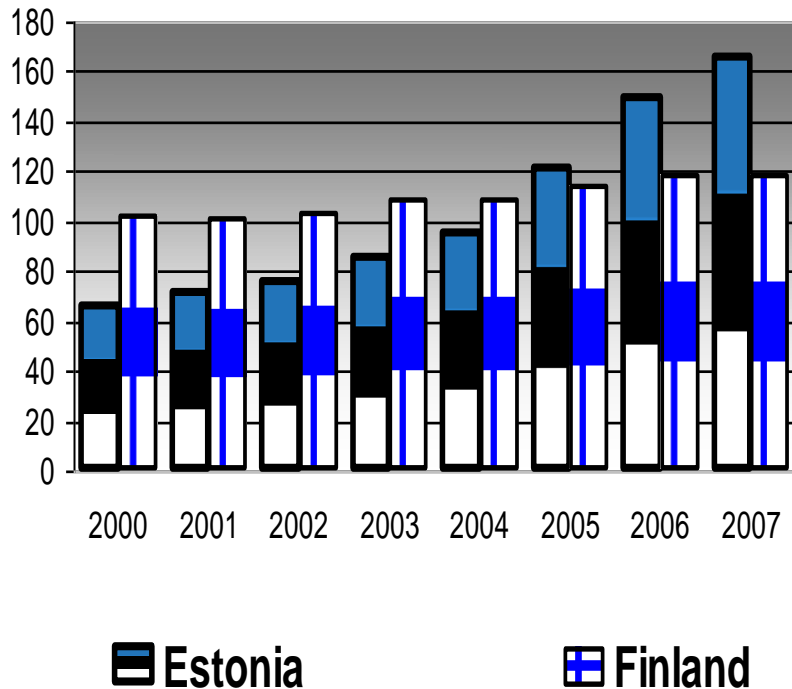
Figure 9. Estonia debt ratio evolution whole economy, Non-financial enterprises and households



Data Source: EURO Stat; UCL calculation. Note: data are percentage of GDP.

## 2. Real Estate Growth

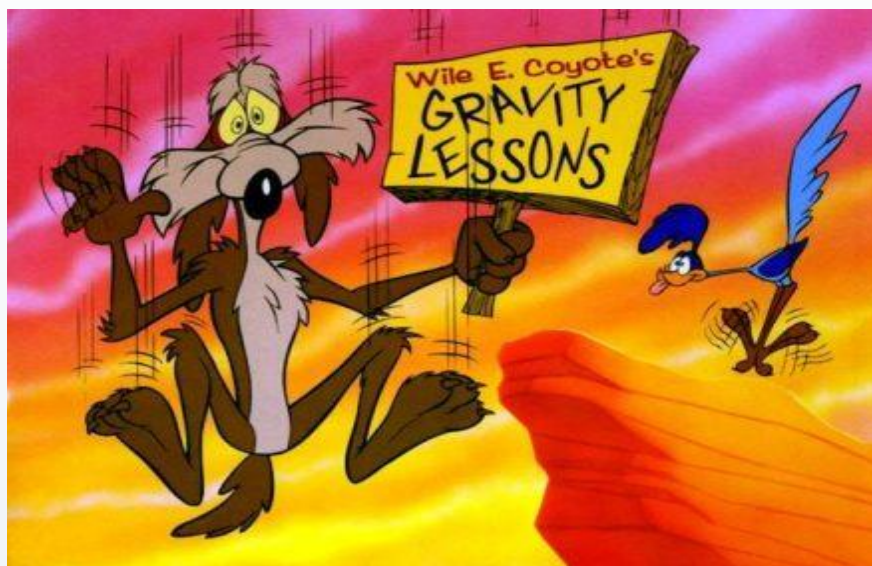
%GDP Loan Liabilities



Data Source: EURO Stat; UCL calculation. Note: Whole Economy Consolidated Financial Position, percentage of GDP. Left Figure: Data Source: Estonian Central Bank (Eestii Pank); UCL calculation

## 2. Real Estate Growth

The Economist: "...Yet, like Wile E. Coyote running over the edge of a cliff, financial services kept on going..."



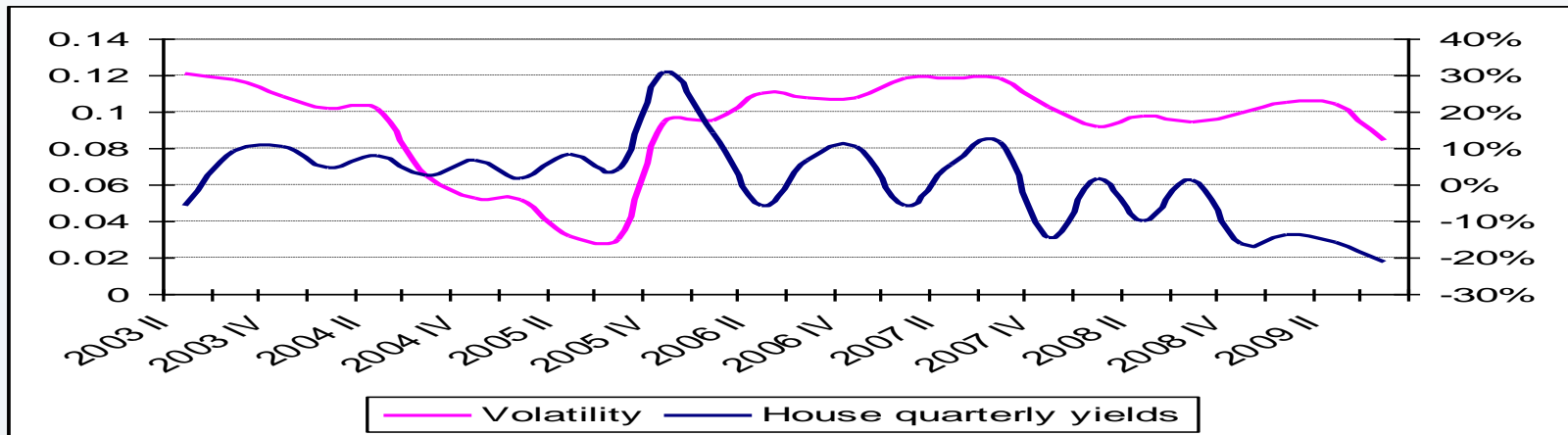
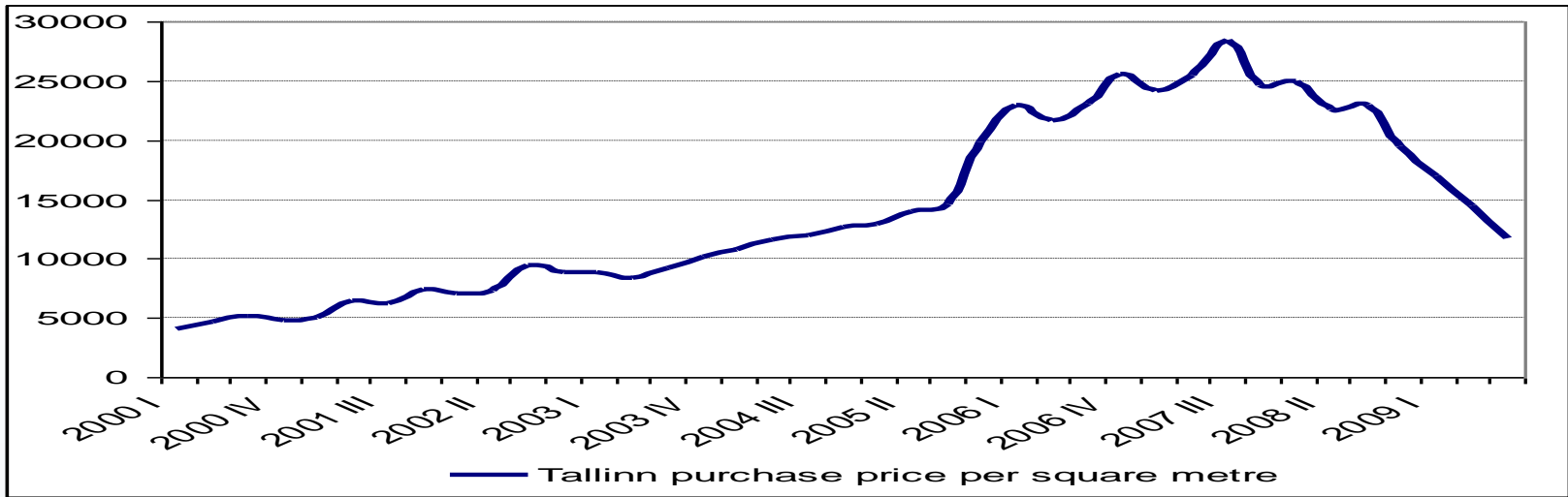
*"If the price is high today it is only because investors believe that the selling price will be high tomorrow - when 'fundamentally' it does not seem to justify such a price - then a bubble exists" (Stiglitz, 1990)*

## 2. Real Estate Growth

### Cross Correlation between main economic indicators and house prices

Cross-Correlation	House Price 2000:1 - 2004:4	House Price 2005:1 - 2009:3	Description
CONS	0,979	0,573	<i>Total expenditure per household member in a month of non durable goods.</i>
SAVE	0,784	0,475	<i>Net saving in the whole economy</i>
DFI	0,278	0,291	<i>Direct Foreign Investment</i>
HCPI	0,965	0,064	<i>Consumer price index expresses the change in the price of consumer goods and paid services</i>
BNKPL	0,669	0,433	<i>Bank Profit and Losses</i>
Interest rate	-0,869	0,004	<i>Inter-bank interest rates: weighted average annual interest rates of claims on credit institutions</i>
Loans	0,966	0,371	<i>Total loan stock</i>
FM	0,979	0,302	<i>Total stock of first mortgage</i>
GDP	0,975	0,767	<i>Gross Domestic Product per capita current prices</i>
LC	0,979	0,230	<i>Labour Cost Index Provided by Estonia Statistics</i>
ConstLC	0,971	0,356	<i>Construction Labour Cost Index provided by Estonia Statistics</i>
EMPL	0,822	0,789	<i>Number of employed people</i>

# 3. The real estate bubble in Tallinn



### 3. The real estate bubble in Tallinn

- We define house price as the expected present value of future asset inflows, which we assume to be the future rent, at discounted rate:

$$p_t^* \approx \sum \beta^i r_{t+i} \text{ with } i \text{ that goes from one to infinity}$$

where:  $p_t^*$  is the fundamental house price;  $r$  is the future rent,  $\beta$  is the discount rate.

- If the economic agents set house price by including the expectations of future price in their information, we obtain:

$$p_t = p_t^* + b_t$$

$$E b_t | I_{t-1} = \beta^{-1} b_{t-1}$$

### 3. The real estate bubble in Tallinn

1) ADF test	estimated value (a - 1)	$\tau$ stat	p value
<b>House price</b>	-0,571941	-2,0133	0,2812
<b>Rent price</b>	-1,10483	-3,43976	0,009705

2) Cointegration Test	Rank	Eigen Value	Test-T	Test-LM	P-Val
House Price vs Rent Price	0	0,20429	7,66380	5,25600	0,7113
	1	0,09939	2,40770	2,40770	0,1207

1. The ADF can reject the null hypothesis of non-stationarity on house price while cannot reject on rent prices.
2. We can reject the null hypothesis of cointegration between house price and rent price.

## 4. Impact of land tax on real estate prices

- Would Land Value Tax have lessened the effect of the bubble in Estonia?

*“Governments facing speculative phases in their economies should implement measures to influence the volume and the characteristics of investment, such as taxes on short-term bank deposits and other financial assets.” (IMF, 2008)*

- Land value tax and its application in Estonia

## 4. Impact of land tax on real estate prices

- We consider the **present value of land value tax revenue**

$$p_t = \sum \beta E r_{t+i} | I_t + \sum \beta^n p_{t+n} | I_t$$

where:  $p_t$  is the (asset) real estate price at time  $t$ ;  $E(r_{t+i})$  is the future expected rent;  $E(p_{t+n})$  is the expected future sale price.

- The price asset equation becomes:

$$p_{it} = \sum \beta E(r_{i(t+1)}) + \sum \beta E(p_{i(t+1)}) - \sum \gamma (\theta L_{i(t+1)})$$

where:  $\theta$  is the tax rate;  $\gamma$  is the tax discount factor,  $L_{i(t+1)}$  is the taxable amount (also known as the assessed land value).

## 4. Impact of land tax on real estate prices

In order to estimate the value of land in Tallinn we use the sales comparison approach (Kilpatrick et al., 2006; Lentz and Wang, 1997) and then apply the land tax rate.

- We measure the extent to which the land value influences the real estate price in Estonia through a cross-sectional data analysis.

We analyse how land value is capitalised if the land is evaluated every year (Model 1) and if the land is evaluated only in 2001 (Model 2).

# 4. Impact of land tax on real estate prices

## Model 2: Tallinn Apartment Price and 2001 Land Valuation

Fixed-effects model using 320 observations				
Dependent variable: Sale				
	<i>coefficient</i>	<i>Standard error</i>	<i>t-ratio</i>	<i>p-value</i>
<i>const</i>	8.23263	0.0850592	96.79	1.91E-237
<i>Rent</i>	0.265866	0.0204672	12.99	3.17E-31
<i>Land Tax</i>	0.183099	0.0146434	12.5	1.95E-29
<i>Sum squared residual</i>		<b>304.7997</b>	<i>S.E. of regression</i>	<b>0.980568</b>
<i>R-squared</i>		<b>0.676346</b>	<i>Adjusted R-squared</i>	<b>0.674304</b>

# 4. Impact of land tax on real estate prices

## Model 1: Tallinn Apartment Price and yearly Land Evaluation

<i>Fixed-effects model using 320 observations</i>				
<i>Dependent variable: Sale</i>				
	<i>coefficient</i>	<i>Standard error</i>	<i>t-ratio</i>	<i>p-value</i>
<i>const</i>	8.22345	0.0614922	133.7	3.40E-276
<i>Rent</i>	0.0549868	0.012605	4.362	1.75E-05
<i>Land Tax</i>	0.51089	0.0201514	25.35	1.44E-77
<i>Sum squared residual</i>		2.8038	<i>S.E. of regression</i>	0.095103
<i>R-squared</i>		0.877177	<i>Adjusted R-squared</i>	0.873611

## 5. Public Transport Cost: a cushion against real estate crash?



The study is developed through three incremental analytical steps based on three corresponding hypotheses.

1. Is public transport cost capitalised in housing price?
2. Do real estate prices decrease in districts with lower public transport cost?
3. Do districts with lower public transport cost have a less steep decrease in housing price during an economic downturn?

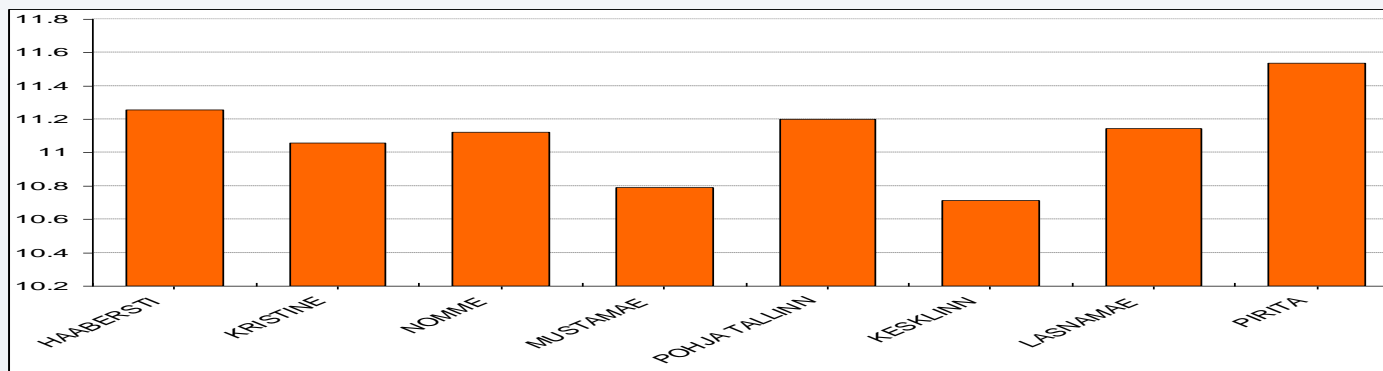
# Public Transport Cost Index

We consider the travel cost incurred by the average commuter who travels from district  $i$  to district  $j$  with mode  $m$ , the formula is given as follows:

$$C_{ijm} = v_m t_{ijm} + d_{ijm} + u_m K_{ijm} \quad (1)$$

Where:

- $T_{ijm}$  is the travel time from district  $i$  to district  $j$  with mode  $m$ ;
- $D_{ijm}$  is the travel distance from district  $i$  to district  $j$  with mode  $m$ ;
- $K_{ijm}$  is the convenience of travelling from location  $i$  to destination  $j$  by mode  $m$ , and it is estimated as a function of the number of transport modes necessary in order to complete the journey and the average waiting travel time;
- $V_m$  value of time is the waiting travel time in minutes for mode  $m$ , multiplied by the walking time in minutes to reach a randomly chosen stop weighted for the journey length in kilometres;
- $C_m$  cost per kilometre which is calculated as the ratio between the cost of travel mode ticket and total route in kilometres for transport mode  $m$ ;
- $U_m$  the inconvenience of travelling with mode  $m$  is estimated as the waiting time in minutes for mode  $m$ , multiplied by travel time and walking time in minutes, weighted for the journey length in kilometres;
- $K_{ijm}$  is the number of interchanges necessary to complete the journey from district  $i$  to district  $j$  with mode  $m$ .



<sup>1</sup> Data from the Tallinn city authority (2010). We follow for the analytical definition the guidelines given by the OECD (OECD, 2009).

# 5.1 Is public transport cost capitalised in housing price?



We develop a hedonic price model of the Tallinn housing price (Rosen, 1982; Chiesura, 2004; McConnell and Walls, 2005; Debrezion et al., 2006; for literature review see Cheshire and Sheppard, 1998).

$$P_i = \beta^1 X_i + \beta^2 Y_i + \beta^3 C_i + \beta^4 T_i \quad \text{where } i = 1 \dots 8$$

Where:

$P_i$  is the housing price in district  $i$ ;

$X_i$  is the rent cost weighted on the housing stock district characteristics;

$Y_i$  is the index district amenity given by the sum of the number of social, cultural, health and leisure activities present in district  $i$ ;

$T_i$  is Tallinn land tax in district  $i$ ;

$C_i$  is Public transport cost in district  $i$ ;

Table 4. Output ordinary least square estimation, equation 2

Dependent Variable: P				
	X	T	Y	C
<b>Coefficient</b>	2.11789	-0.584389	0.469522	-0.13053
<b>T-Ratio</b>	19.33	-3.711	4.357	-2.604
<b>Sum square residual</b> 0.09733				
<b>R<sup>2</sup></b> 0.97				
* all parameters are significant at 5%				

# 5.2 Do housing prices decrease in districts with lower public transport cost?



In order to test our hypothesis we estimate whether districts with lower public transport cost have a higher housing price than districts with higher public transport cost.

$$Y_i = \delta_i C_i + \varepsilon_i \quad i = 1 \dots 8$$

Where:

$Y_i$  is the housing price in district  $i$ ;

$C_i$  is the public transport cost index in district  $i$ ;

$\varepsilon$  is the error term that we suppose to be i.i.d.  $N \sim (0, \sigma^2)$ ;

$i$  is the district of Tallinn.

Table. Output of ordinary least square estimation equation 3

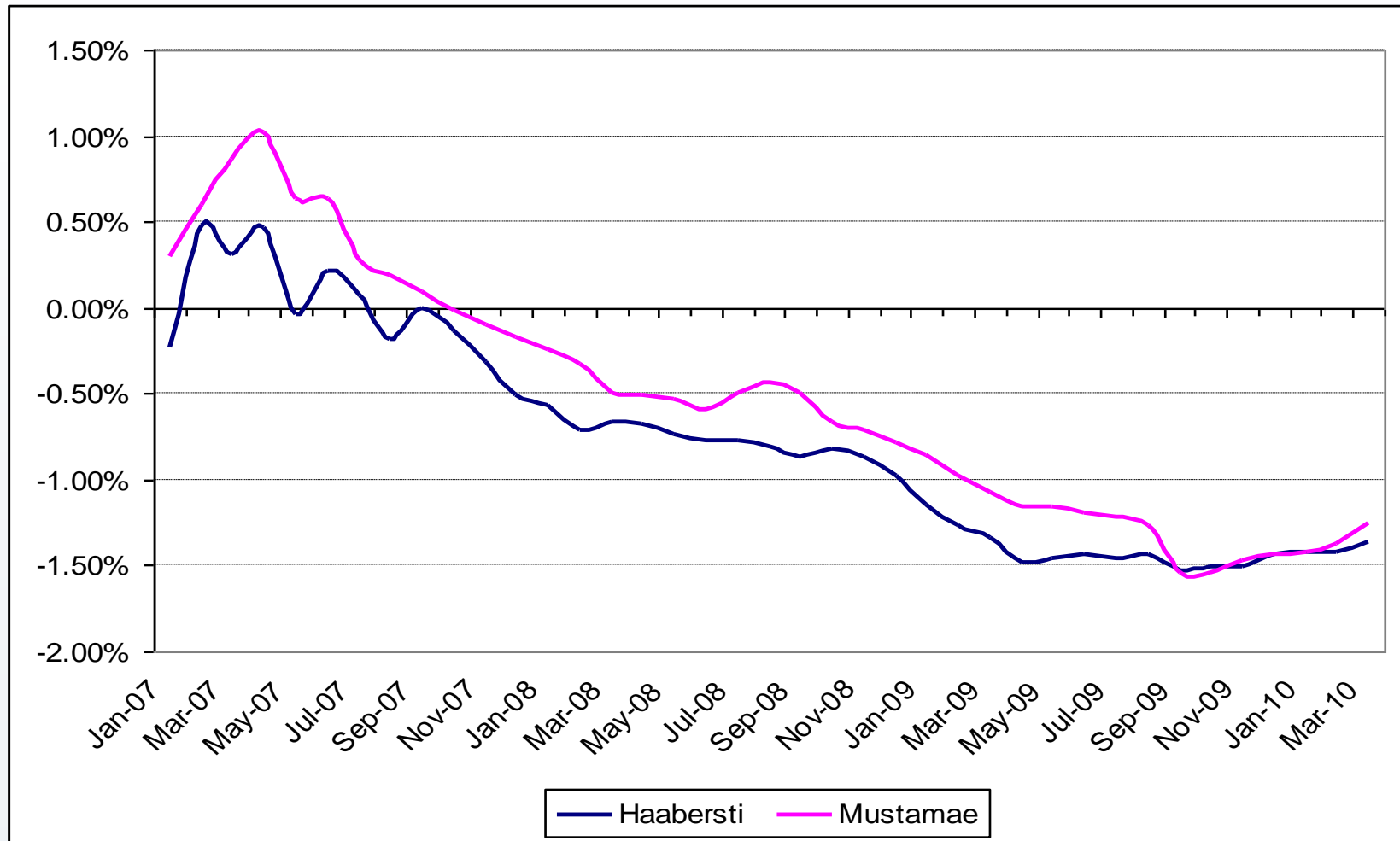
Dependent Variable: (Y) Housing Prices	
Regressor	T.C.I.
Coefficient	-0.1754519
T-Ratio	-14.51
Sum square residual	0.177212
R squared	0.96
* all parameters are significant at 5%	

*UCL calculation*

# 5.3 Do districts with lower public transport cost have a less steep decrease in housing price during an economic downturn?



Figure 10 Average housing price rate in the districts of Haabersti and Mustamäe



Source: city24.ee, UCL calculation

## 5.3 Correlation evidences

PRE CRISIS		CRISIS		POST CRISIS	
12/2006	0.73024458	09/2007	-0.189972874	09/2008	0.212425238
01/2007	0.857174038	10/2007	-0.945729096	10/2008	0.476470804
02/2007	0.221916682	11/2007	-0.63258887	11/2008	-0.434738429
03/2007	0.333046452	12/2007	-0.244258097	12/2008	0.604958116
04/2007	0.628844851	01/2008	-0.222578775	01/2009	0.917913048
05/2007	0.806680722	02/2008	-0.435348576	02/2009	0.954851653
06/2007	0.659445703	03/2008	0.730768983	03/2009	0.709660157
07/2007	0.710997109	04/2008	0.643647928	04/2009	0.923820889
08/2007	0.867804838	05/2008	-0.28503342	05/2009	0.983297322
		06/2008	-0.550030919	06/2009	0.991948458
		07/2008	-0.48197653	07/2009	0.972130854
		08/2008	-0.655177434	08/2009	0.924669702

## 5. Conclusions

- Sharp economic growth matched by a highly leveraged position of the Estonian economy.
- Presence of a speculative bubble in the Estonia real estate market.
- Adoption of a yearly land assessment would have greatly impacted on the house price.
- Public transport in Tallinn is capitalised in the housing price in the city.
- Public transport cost index has an inverse effect on property values.

## 5. Policy Issues

### ■ **Three** important results of our analysis:

- 1) It is paramount to identify in the context of economic fluctuations the presence of specific speculative bubbles, as in the real estate market case.
- 2) The merit of a comprehensive tax reform, in particular land/property tax is explicit not only as a revenue source but also as an economic stabiliser to cushion and mitigate the negative effects of economic downturn.
- 3) Land value financing mechanism may be suitable as an earmarked tax toward transport investment source for transport investment but another possible consequence of this fiscal implementation may be greater acceptance of the land tax by the Estonian citizens.

**Thank you**

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