STAREBEI: DELIVERABLE 2

The Estonian Speculative Real Estate Market: The boom and bust cycle

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Abstract The economic growth of the Baltic region after independence has largely been realized through numerous reforms and capital market liberalization. The Estonian economy in the past two decades was highly leveraged and was characterized by increases in real estate prices. This *increase in prices* had the pattern of a *speculative* bubble. Our objective in this work is to evaluate through standard econometric analyses the effects of the speculative trend in real estate prices in Tallinn. We examine the Estonian business cycle in particular in order to assess the presence and development of speculative bubbles in the financial and real estate markets. The analysis is extended to evaluate how the Estonian land fiscal system failed to prevent the market distortion. We demonstrate in the conclusion that a more rigorous implementation of the Estonian land tax could have diminished the effects of the boom and bust dynamics in the real estate market in Estonia.

1. Introduction

Asset boom-and-bust cycles have played a key role in macroeconomic fluctuations, particularly among developing countries. In cases where emerging markets have experienced episodes of boom and bust, we note that the following concurrent market dynamics are also present: financial liberalization, an increase in foreign capital inflow, and high levels of lending liquidity (Kopits and Offerdal, 1994). As Bernanke et al. (1998) have argued credit cycles coincide with cycles in economic activity and with property market values, thus indicating a strong correlation between economic growth and boom and bust cycles in the real estate market. This is particularly interesting in the case of Estonia, where between 2003 and 2008 we witness a rapid economic growth and a steep rise in housing demand and housing prices. In the Estonian context, an increase in private credit supply in addition to substantial competition within the banking sector has occurred simultaneously with a steady increase in the amount of loan values.

The objective of this paper is to illustrate Estonian business cycle phases through an analysis of private investment and asset inflation. We anchor our analysis on the concept that whenever a speculative bubble takes place along with a high level of debt between different economic units (i.e., households and enterprises), the bust phase can threaten the stability of the financial system and lead to a contraction of the whole economic system (Borio and Lowe, 2020; West, 1987; Blanchard and Watson, 1982; Minsky, 1982, 1975). From this perspective, purchases in the real estate market, that are financed through loans or other bank products, raise the risk that banks can become illiquid during a decrease in real estate prices, thereby undermining financial and economic stability on a large scale. As Dubnikovas et al. (2009) argue "*the Baltic stock exchange indices suffered in 2007 a very strong break away from fundamental value demonstrating a bubble formation*". We aim to demonstrate that the credit supply has been pro-cyclical in the Estonian economic fluctuation case, and as consequence, has amplified the business cycle fluctuation in the real estate market. In so doing we will analyze the Estonian boom-and-bust crisis between 2004 and 2009 by paying particular attention to the housing market and loan demand, and other economic structural variables such as wages, inflation, foreign investment, and consumption.

The paper is organized as follows. In Section 2 we review the main features of the business cycle and the boom-and-bust cycle under financial stability, portfolio assets and liability allocation decisions of economic units. In Section 3 we analyze the Estonian economy through different dataset analyses and econometric models and test the speculative bubble of the real estate market of Tallinn, the capital of Estonia. In Section 4 we evaluate the implementation of a land tax as a mechanism to reduce the speculative trend in the housing market. Section 5 provides some concluding remarks and policy implications.

2. Boom and bust cycles: The Estonian case

The term "speculative bubble" refers to a situation in which excessive public expectation of future price increases causes prices to be temporarily elevated above their fundamental value (Engsted, 2006; Case and Shiller, 2002; Flood and Hendrick, 1986). To emphasize the term "speculative bubble," we note that speculative refers to the process of selecting investments that are usually linked to higher risks in order to profit from an anticipated price movement. "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). The growth path of a speculative bubble is similar among several cases and may be characterized by its distinct phases: generally it begins with financial liberalization or a conscious decision by central bank(s) to increase lending. The result is a strong expansion in credit volume and in monetary aggregates, and a consequent price increase in asset prices such as real estate. The constant asset price increase causes over the short-run, a higher yield return, which in turn attracts a large number of investors. In the final phase the bubble bursts and asset prices collapse, often within a short period, a few days or months, and numerous firms and other agents who have borrowed in order to buy assets enter into default (Fisher, 1933).

In our analysis of the Estonian business cycle we consider the logarithms quarterly datasets between 1995:1 and 2009:3 in order to characterize the fluctuation of the business cycle in terms of volatility, co-movement and persistence. We de-trend the macroeconomic variables through the use of a Hodrick and Prescott (HP) decomposition filter (1997). The HP filter is similar to a double-side moving average filter, since we decompose the gross domestic product time series into two components: one is the trend or growth component, GDP_t^g, and the other is the cyclical component, GDP_t^c.

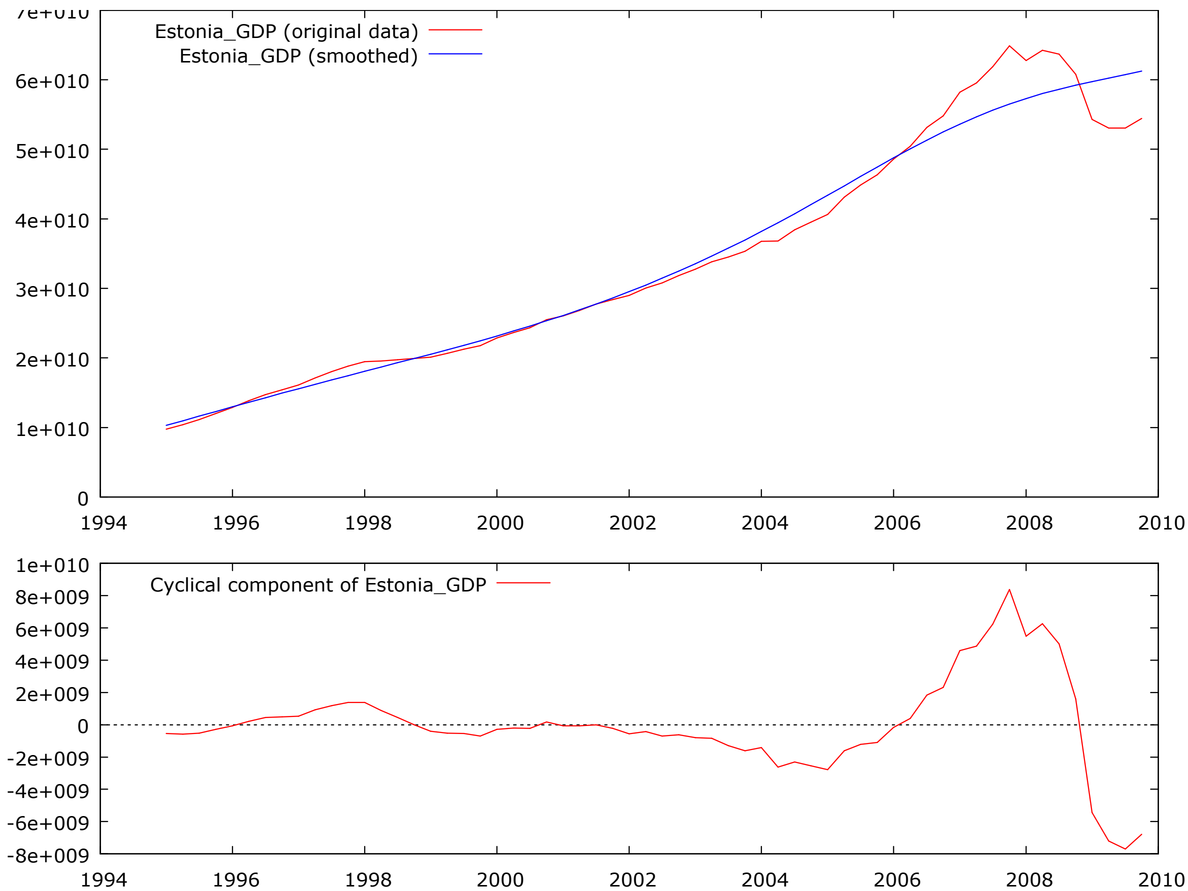
$$GDP_t = GDP_t^g + GDP_t^c$$

We then minimize:

$$\text{Min: } \sum (GDP_t - GDP_t^g)^2 + \lambda \sum \; [(GDP_t^c - GDP_{t-1}^c) - (GDP_{t-1}^c - GDP_{t-2}^c)]^2$$

where λ is the smoothing parameter. A high value of the λ parameter implies a smooth trend component and an erratic cyclical component, while the reverse is true for a lower value of λ.
We set the value of λ at 1600, as stipulated by Hodrick and Prescott (1981) (Figure 1).

Figure 1. The Estonian GDP cyclical and trend component

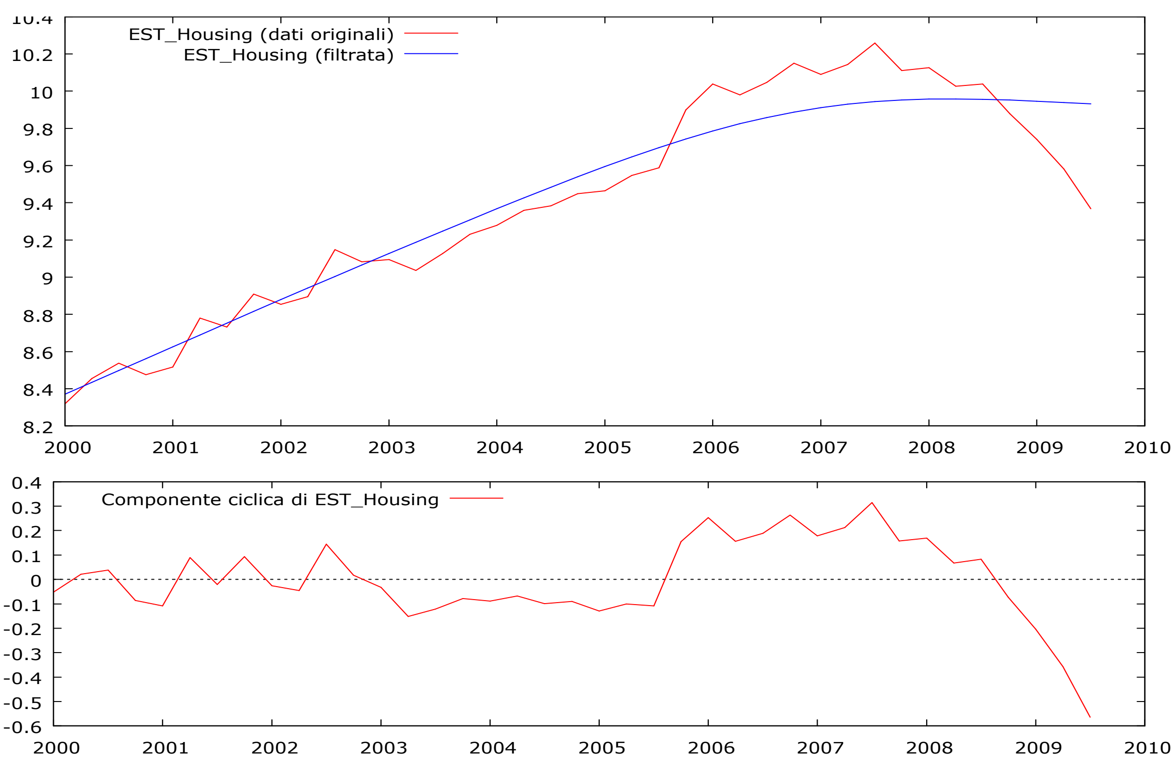


Data Source: EURO Stat; UCL calculation

In Figure 1 we decompose the series into a cyclical component and a growth component. Since the filters eliminate the secular trend component, the cyclical component of the observed time series should be tested for stationarity to ensure that any long-term trend is offset (Hodrick and Prescott, 1997; West, 1987). To verify the stationarity condition we test the cyclical component and provide a Dickey-Fuller augmented test. In so doing, we examine the volatility of the series and the amplitude of fluctuations, and thereby indicate the magnitude of the contribution of the variables and their sensitivity to aggregate fluctuations. Finally, through the cointegration test we assess the presence of the speculative bubble in the real estate market in Estonia. In other words, we can then verify the cyclicality of the real estate market with other components of the Estonian economy by analyzing the co-movement of the contemporaneous output series. We consider data provided by EuroStat, the Estonian Statistics Office and the Estonian Central Bank; we use quarterly data transformed to cancel trends and non-stationarity components, that is, variables transformed into growth rate[1] (at annual rate) or to first difference[2].

Mishkin (2007) finds that increases or decreases in house price fundamentally affect economic activity and economic fluctuations, and can as a consequence, alter the business cycle. Moreover, the housing and real estate markets in general account for a significant share of national aggregate wealth; real estate assets are more diffused than other asset markets. Thus, to a large extent the development of the real estate market is inextricably linked to the condition of the banking sector, and to financial and credit markets as well as the fiscal structure of the country (Case and Shiller, 2003). Since independence in 1991, Estonia has realized numerous fiscal and financial reforms such as capital market liberalization. From 1994 to 2010 the Estonian economy displayed several business fluctuations, but most relevant to our analysis are Estonia's significant expansion and recession phases between 2005 and mid-2007 (Figure 2).

Figure 2. Tallinn housing price trends and cyclical components



Data Source: EURO Stat; UCL calculation.

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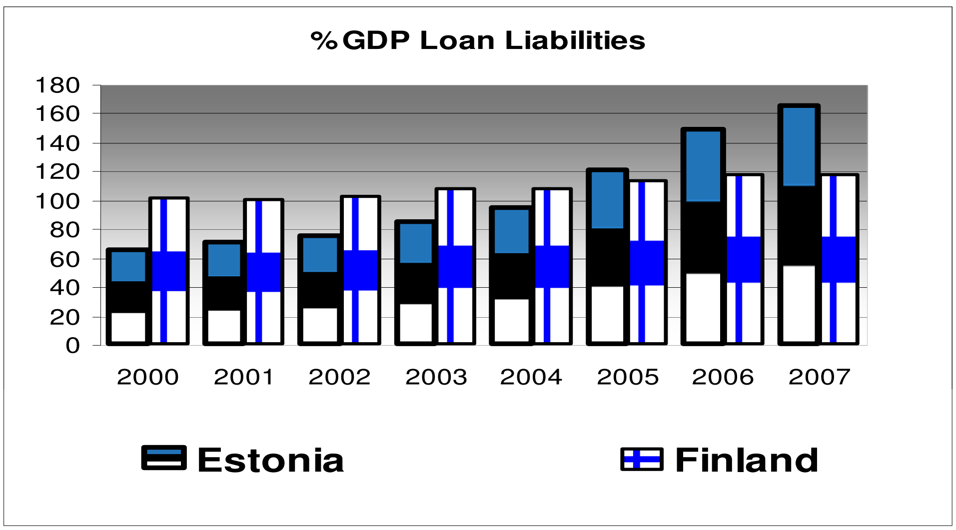
[1] Given the X_t variable, growth rates have been calculated as $[\ln(X_t/X_{t-4})]*100$.

[2] For a given variable Y_t, growth rates have been calculated as X_t-X_{t-4}.

In the past decade in Estonia the major driver of the rapid growth in internal demand has been the financial sector, in particular, the banking sector. In the aftermath of the Russian crisis, Nordic banks in Finland and Sweden began to acquire the main components of Estonia's financial system. As a result, competition increased and the mortgage loan market became the most relevant activity in the portfolio of Estonian banks. The financial sector was thus primarily facilitated by foreign capital inflows (where debt instruments owned from abroad have increased on average by 30% year-on-year[3]) and foreign direct investment; for instance in 2000, FDI was equal to €140 million and in 2007 reached €1273 million. Notwithstanding, the financial sector showed an attitude of undervaluation of risk and of low interest rates. If we compare the liability/GDP ratio between Estonia and Finland, we observe that the ratio for Finland was nearly stable, whereas for Estonia we can notice that the ratio overtook Finland's in 2005 and then increased continuously (Figure 3).

Figure 3. Total economic liabilities in percentage of GDP: A historical comparison between Estonia and Finland

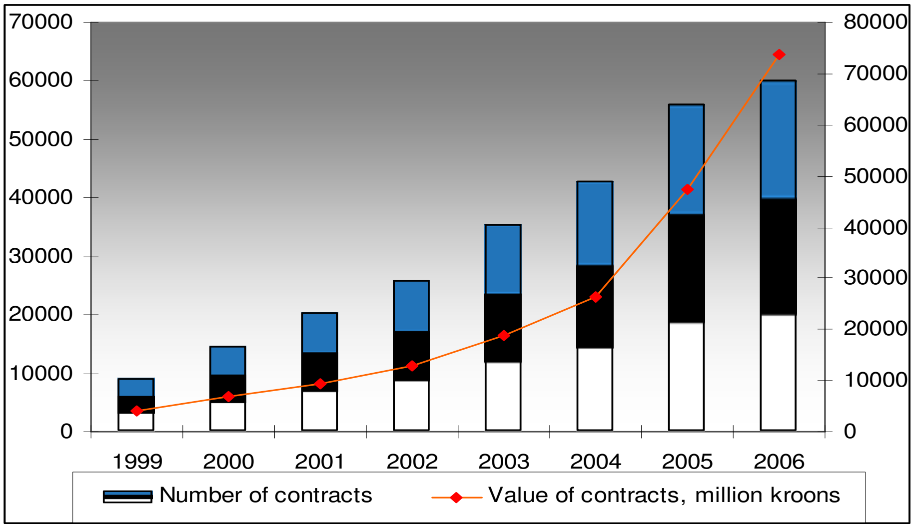


Data Source: EURO Stat; UCL calculation. Note: Whole Economy Consolidated Financial Position, percentage of GDP.

At the same time this increase fuelled a low aggregate saving and a general debt economic position. That is, expansionary monetary policy in the form of lower interest rates stimulated the demand for housing, leading to higher house prices. This is especially true when we examine how housing wealth spread much more evenly over the population than other assets in the stock market, therefore the consumption effects due to the increase in housing wealth was more substantial in Estonia than the consumption of other assets, particularly equities (Figure 4).

[3] *Data Source*: EURO Stat. UCL calculation.

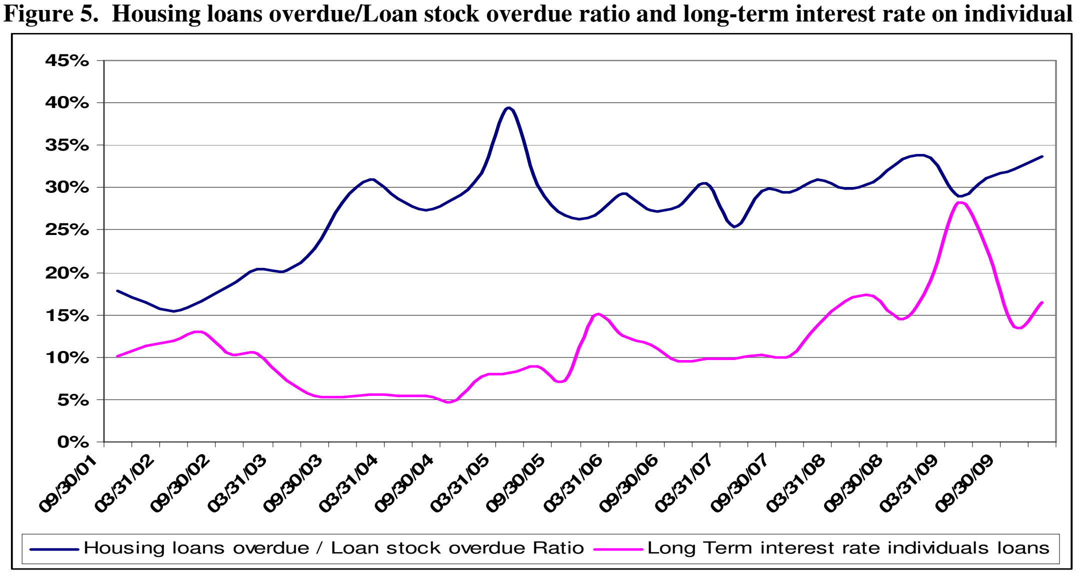
Figure 4. Estonian housing purchase sale contracts: Number and value



Source: Estonia Statistics; UCL calculation. Note: on right axis, value is in millions of Kroon, volume is shown on the left axis.

The rise of house prices caused an increase in wealth and led to a higher value of marginal collateral for the homeowners who were able to request additional borrowing, thus creating a bias in the structure of credit risk assessment. As Figure 5 shows, Estonia faced an increase in overdue housing loans between 2003 and 2006, but the interest rates on long-term individual loans nonetheless remained low and did not account for the increases in counter-party risk.

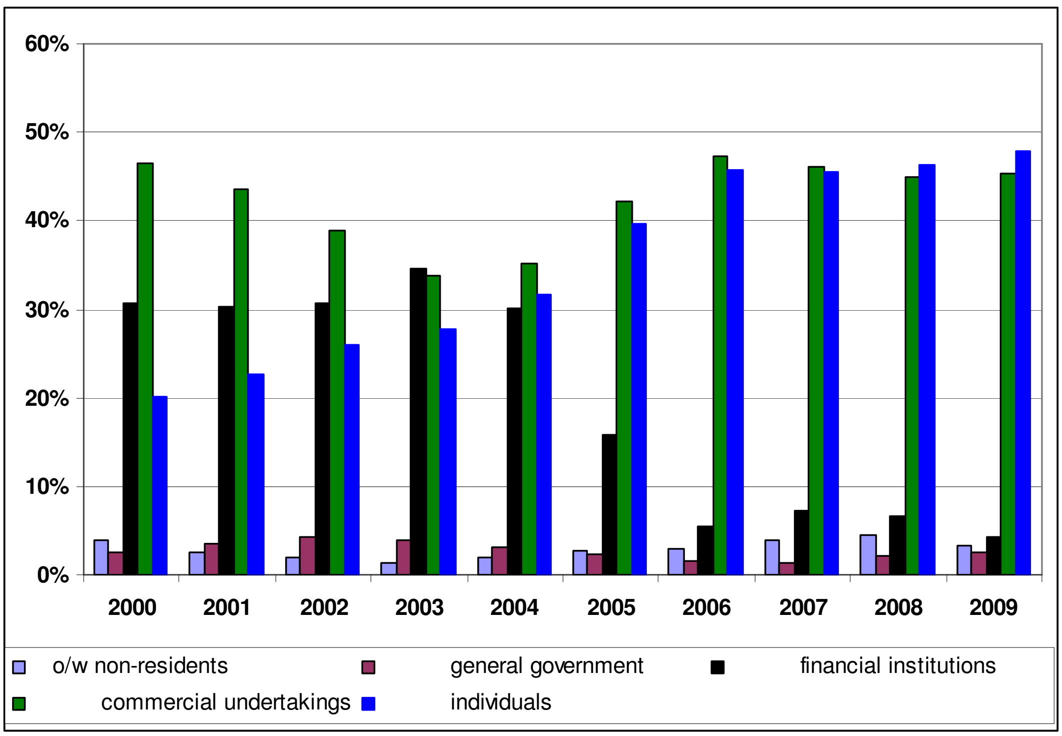
Figure 5. Housing loans overdue/Loan stock overdue ratio and long-term interest rate on individual loans



Data Source: Estonian Central Bank (Eestii Pank); UCL calculation

Due to the global economic downturn, the contraction and unravelling of Estonia's rapid property boom presented high systemic risks to the banking system connected to losses on loans and borrowing. When the crisis began to impact on the Estonian economy in mid-2007, the total amount of long-term loans in financial institution asset portfolios was approximately 272 billion Kroon; while short-term loans[4] consisted of 35 billion Kroon, thus implying a high value risk for the Estonian banking system and consequently for potential financial instability. As shown in Figure 6, the level of individual loans increased sharply between 2000 and 2006, while after the burst of the speculative bubble in mid-2007, private credit declined, reflecting both lower demand and lower supply; the former was due to a reallocation in household portfolio preference, and the latter was due to a higher perceived financial risk.

Figure 6. Aggregate structure of Estonian debts



Data Source: Estonian Central Bank (Eestii Pank); UCL calculation

The strong and intertwined connection between the banking system and the real estate market produced in the economic downturn more significant negative impacts than the equity price fall, in particular, when we analyze the impact of the real estate market on consumption (Table 1). In order to examine these trends and to compare the volatility of the Hodrick and Prescott (HP) cycle filtered

[4] According to Estonian accounting law, corporations (except credit institutions and leasing companies) have long-term loans when original maturity is more than one year, and short-term loans when maturity is less than one year.

data, we have sub-sampled the data in two sets: 2000:1 to 2004:4 (period ex-ante boom-and-bust cycle) and 2005:1 to 2009:3 (period of boom-and-bust cycle).

Table 1. Volatility of main economic and financial variables

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

Data Source: EURO Stat; UCL calculation.

In Table 1 we provide the standard deviations of HP cyclical filtered components of the variables under examination. We can observe significant differences between the first and second samples, but the highest values of volatility are shown in *Direct Foreign Investment (DIF)* and *Bank Profit and Losses (BPL)*. Moreover, between sample 2000:1 to 2004:4 and 2005:1 to 2009:3, we must point out the increase in the following variables: house price volatility, *First Mortgage (FM)*, and *Estonian Gross Domestic Product (GDP)*.

In Table 2 we show the cross-correlation between the studied variables and house price. It is interesting to notice how the correlation between the two samples sharply weakens over time, and in particular we have at first a condition where the variables are highly correlated with house price level, and a second condition (2005-2009) in which the cross-correlation decreases significantly, in that the co-movement between house price and economic fundamentals is disconnected.

Table 2. Cross-correlation between two periods of time

Cross-Correlation	*House Price 2000:1 - 2004:4*	*House Price 2005:1 - 2009:3*	*Description*
CONS	0,979	0,573	***Total expenditure*** *per household member in a month of* ***non durable goods****.*
SAVE	0,784	0,475	*Net saving in the whole economy*
DFI	0,278	0,291	*Direct Foreign Investment*
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EMPL	0,822	0,789	*Number of employed people*

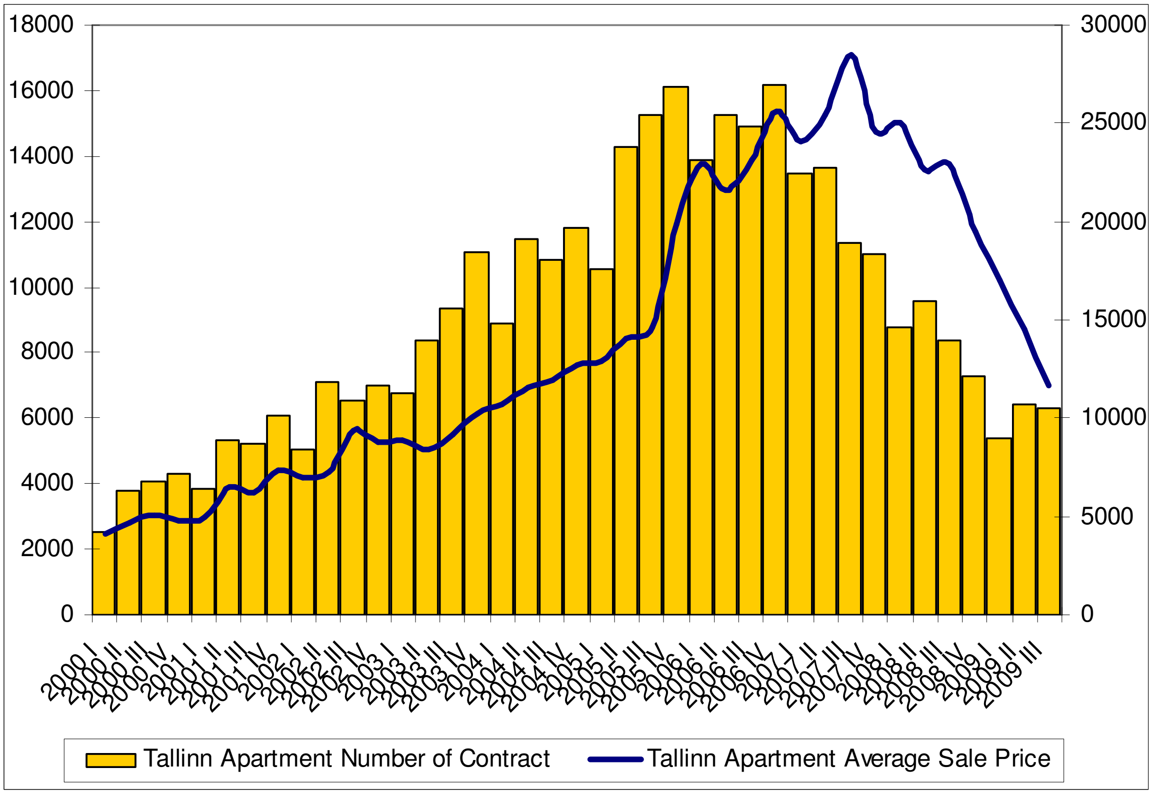
Data Source: EURO Stat; UCL calculation

The cross-correlation between house price and construction cost index sharply declines in the second period while at the same time GDP and house price are highly correlated in both samples. This latter observation allows us to confirm the presence of a significant cyclical relationship between the two variables. In the next section we examine the fluctuation of Estonian economic activity by examining it through the lens of house price. Our analysis will focus on the city of Tallinn, the capital of Estonia, in order to assess the impact of the speculative real estate bubble.

3. The Bubble in the Estonian Housing Market

Financial liberalization can explain the increase in capital inflows and the prolonged lending boom that may create a high leverage effect in emerging markets, thus making them more vulnerable even to small shocks (Case and Shiller, 2003; Krugman, 1995). In Estonia, the liberalization process, together with an increase in investment through the internet network and the introduction of several innovative financial products (such as ETF or the MSCI index), has led to a constant increase in foreign capital inflows. For instance, between 2000 and 2003, large volumes of foreign capital inflows arrived in Estonia and a large amount of these foreign funds was used to expand the housing market. Foreign capital inflows were acquired by banks that lent to the domestic market at higher interest rates.

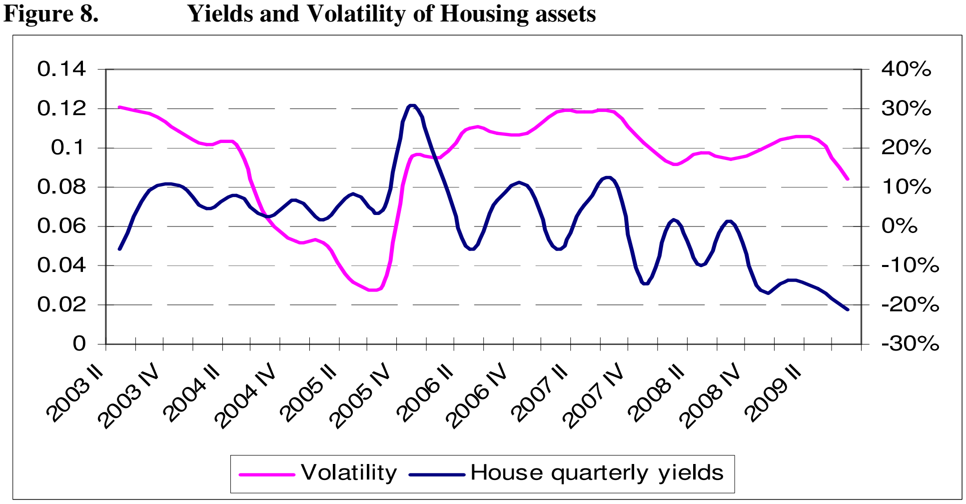
Figure 7. **Tallinn purchase price per square meter**



Data Source: EURO Stat; UCL calculation

From 2000, house prices in Tallinn grew rapidly and after reaching their peak in mid-2007, suffered a steep decline (Figure 7). We can also notice (Figure 8) that between 2004 and 2005 a significant decrease in the variation of prices is matched by an increase in yearly housing asset yields.

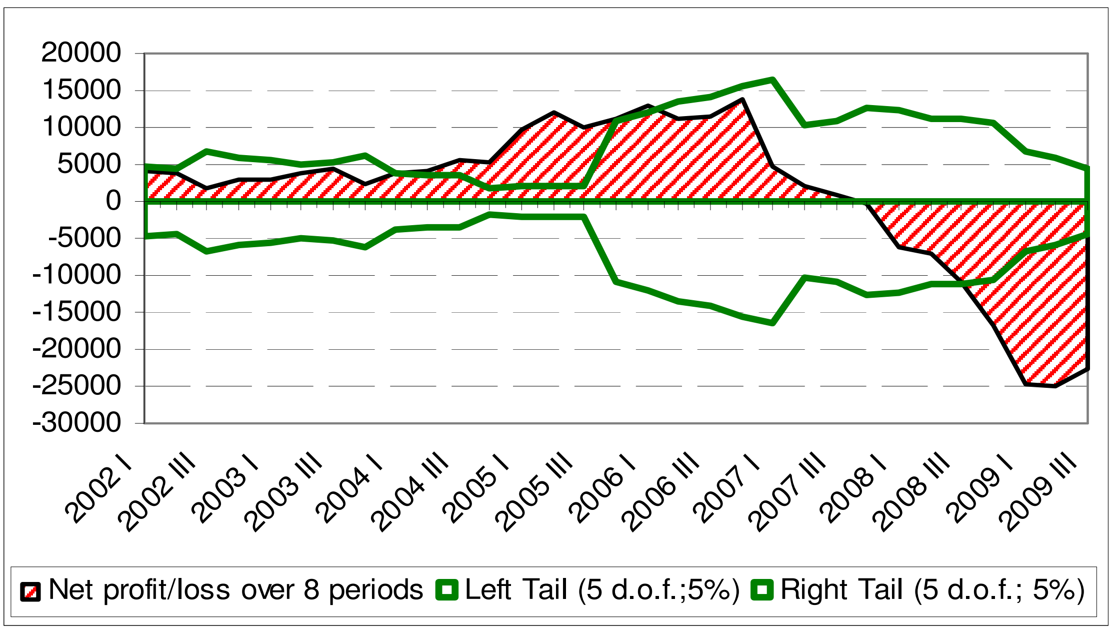
Figure 8. **Yields and Volatility of Housing assets**



Data Source: EURO Stat; UCL calculation

In order to analyze the house price volatility we develop a simulation model based on the concept of rolling window regression (Brooks, 2008). We consider the set of observations in a range of one year and a half (6 observations); we then calculate the quarterly returns of house price within this window. For the given period we estimate the number of times the net price profit/loss exceeds the confidence level of 5%. We demonstrate in (Figure 9) that the 5% confidence level has been exceeded positively several times during the boom phases between 2004 and 2006, while it has been exceeded negatively several times in the period between 2007 and 2008, when the speculative bubble burst. In particular, all observations surpassed the upper confidence level on the right tail by 30% during 2004:1 to 2006:2. And the lower confidence level was exceeded by 13,33% during the period between 2008:3 and 2009:3. This behaviour is certainly indicative of a real estate speculative bubble.

Figure 9. Profit-loss distribution and confidence level



Data Source: EURO Stat; UCL calculation

There is a wide literature dealing with linear model (Case and Shiller, 1989), non-linear model (Miles, 2007), and non-linear hedonic price regression and spatial heterogeneity (Brunauer et al., 2009) in order to investigate the informational efficiency of the housing market. To empirically assess the presence of a speculative bubble, we analyze the relationship between house price and rent price and then provide a stationarity test (augmented Dickey-Fuller test, ADF) and a cointegration test. The tests proposed by Mankiw, Romer and Shapiro (1985, 1991) and by West (1987) have on the one hand difficulty in evaluating the error I type (the error of reject the null hypothesis when it is true), and on the other hand under-estimate the fundamental values (Gurkaynak, 2005; Shea, 1989) and therefore these approaches are not well suited to our objective.

We assume that the real estate market is a perfect market, with well informed economic agents who sell and buy houses. House price reflects all the public information available. Under these assumptions there are no arbitrage gain possibilities and the house and rent price should share a common growth trend. The basic idea of the ADF and cointegration tests is to compare the house price component and the fundamental price component, in other words, rent price and house price should both be stationary in order to illustrate the absence of a speculative bubble. We define house price as the expected present value of future asset inflows, which we assume to be the future rent, at discounted rate:

$p_t^* \approx \sum \beta^i r_{t+i}$ *with i that goes from one to infinity* (1)

where:
p_t^* is the fundamental house price;
r is the future rent;
β is the discount rate.

Under the conditional expectation of the ex-post rational price, and by including a possible variation in price, the actual house price at time t is expressed as follows:

$$p_t = \beta E(p_{t+1} + r_{t+1})|I_t \quad (2)$$

Given $\beta < 1$, we can show that, in the long-run period, the price may be set as:

$$p_t^* = \sum \beta E\ (r_{t+i})|I_t \quad (3)$$

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

$$p_t = p_t^* + b_t \quad (4)$$

$$E\ b_t|I_{t-1} = \beta^{-1} b_{t-1} \quad (5)$$

Term b captures the speculative bubble effects. Under the assumption that dividends grow more slowly than rent value, we obtain that the market fundamental price p_t* converges while the bubble part is non-stationary.

The ADF test on the two variables house price and rent price fails to reject the null hypothesis of non-stationarity. We proceed with the first difference of our time series and remake the test. The rent price is generated by a stationary process whereas the house price series contains a unit root; therefore, we cannot reject the null hypothesis of non-stationarity as shown in Table 3. The test confirms the presence of a speculative bubble in the real estate market in Tallinn.

Table 3. ADF Test House price and Rent price

ADF test	estimated value(a - 1)	τ stat	p value
House price	-0,571941	-2,0133	0,2812
Rent price	-1,10483	-3,43976	0,009705

UCL calculation

We corroborate our finding of the existence of a speculative bubble obtained by the ADF test by applying the cointegration test. In this case we examine whether there is a long-term relationship between house price and rent in order to verify the existence of the bubble in the Tallinn real estate market. We expect that the speculative bubble affects asset prices and thus disrupts the long-term relationship with the economic fundamentals (Johansenn, 1988). The cointegration test for the long-run relationship among the variables shows whether two variables share a common stochastic trend. We assume that deviation from the relationship is temporary and limited; and the variables share both prolonged upward and prolonged downward movements. We test house and rent price for the non-stationarity at 5% level of significance. We obtain that we cannot reject the null hypothesis of cointegration between house price and rent price, thus confirming a difference between the asset price and the economic fundamentals (Table 4).

Table 4. Cointegration test House price and Rent price

COINTEGRATION TEST	RANK	EIGEN VALUE	TEST TRACE	TEST LMAX	P-VALUE
House Price vs Rent Price	0	0,20429	7,66380	5,25600	0,71130
	1	0,09939	2,40770	2,40770	0,12070

UCL calculation.

The intuition behind this test is that we assume that house price is cointegrated with rent price and a bubble develops in the housing market; house price then rises without a corresponding increase in rent price, thus implying the severing of the long-term relationship between house price and rent price. We can conclude that there was a bubble in the housing market after 2005, because we are able to find that rent price is not cointegrated with house price. In the next section we illustrate how a fiscal tool like a land tax could have reduced the effect of the bubble.

4. Would Land Value Tax have lessened the effect of the bubble?

As suggested by the IMF (2008), 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. At this point in our analysis we examine how land value taxation may affect the real estate price such that it avoids sharp price increases.

The Land Value Tax (LVT) was implemented in Estonia in 1993. Between 1993 and 1996 the revenue of this tax was divided between the Estonian central government and local authorities, but after 1996 it became a local tax and the entire revenue was designated for municipal and local budgets. The Land Value Tax is based on the value (estimated) of the entirety of Estonian land, and in particular, is defined by law as a land value tax where the market value of the plot is taxable. The estimated value is determined in an agreement with the Land Valuation Act (1994), with information received from the corresponding local government and the Estonian Land Board; the tax is evaluated based on the open market capital value of the land[5]. The valuation assessment is periodic, and is carried out by a Land Valuator (appointed by law) on the basis of data of land transactions.

As discussed in the previous sections, between 2001 and 2007 the national real estate market grew rapidly, especially in the cities of Tartu, Tallinn and Parnu, where between 2004 and 2007 the value of their dwellings increased by more than 30% a year. However, if the revenue on land tax between 2004 and 2009 increased as a result of the estimation of new land, it nonetheless did not capture the significant price rise of dwellings (Figure 10).

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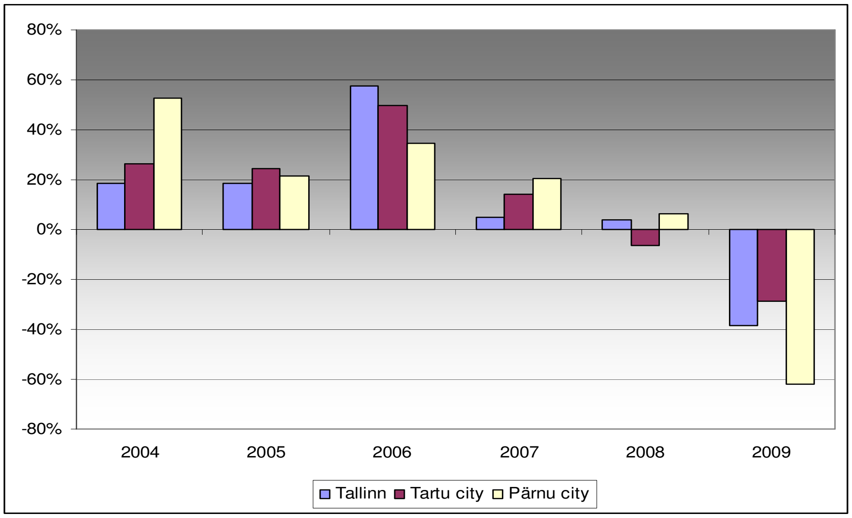
[5] Open market value is often defined on the basis of property best and/or highest value. This has the advantage of ensuring that the valuation authorities are able to consider all available evidence before arriving at their valuation, but this approach allows for dispute between taxpayers and authorities, particularly in commercial areas where the properties.

Figure 10. Percentage year variation on average purchase-sale price per square meter of dwelling



Data Source: Estonia Statistics; UCL calculation.

Within this context, an important issue in the valuation of the asset price is the capitalization of the tax levied on the entire value of the asset and the extent to which property taxes affect real estate prices. Since taxes reduce the capitalized price of the real estate asset, one would expect house price to be negatively related to property tax rates. Among the different property taxes levied on the real estate value, there is wide agreement among economists that land value tax is an efficient fiscal tool which allows governments to recapture increments in land value stemming from public investment, encourages a balanced urban development, and reduces speculative behavior in the real estate market (Wuensch et al., 2000; Capozza et al., 1989). Despite these several advantages, sometimes the enforcement of land value tax encounters a lack in administrative and institutional capacity and therefore the tax effectiveness is compromised with a less than ideal implementation. For instance, in Estonia the last land value assessment was carried out in 2001 when the real estate bubble started its boom and bust cycle.

In the analysis of the impact of land tax on real estate price, we assume that the household is rational when taking investment decisions. Land taxes are paid every year by households so that they will capitalize it as a future cost and enter directly in the house price equation. We consider the present value of land value tax revenue, since we first model the revenue without any improvements in land value assessment. We then peg the tax base to the land value which changes every year. As previously argued, we express the (asset) real estate price as the expected present value of future asset inflows, which we assume to be future rent, at a discounted rate, as follows:

$p_t = \sum \beta Er_{t+i}|I_t + \sum \beta^n p_{t+n}|I_t$ (6)

where:

t (p_t) is the (asset) real estate price at time;

Er_{t+i} is the future expected rent;

Ep_{t+n} is the expected future sale price.

In order to assess the impact of taxes on the house price, our objective is to estimate the square meter price of an apartment in Tallinn as a function of rent, apartment price and land value tax. We calculate the land value tax by following the directives of the Estonian Land Valuation Act (ELVA, 1994) by considering the transactions of the land register for all districts as at 30th June for three years (2006-2010). Land is divided into value zones. The ELVA stipulates that the value of land in each value zone shall be determined by type of intended purpose in the value zone; and the unit used shall be Kroon per square meter of a plot of land, per hectare of a plot of land, or per square meter of the building rights of a plot.

We assume that the Estonian government pegs the land price to real estate and that appraisals are carried out every year on the 30th of June. Our price asset equation becomes:

$$p_{it} = \sum \beta \, E\left(r_{i(t+1)}\right) + \sum \beta \, E\left(p_{i(t+1)}\right) - \sum \gamma\left(\theta \, L_{i(t+1)}\right) \quad (7)$$

where:

θ is the tax rate;

γ is the tax discount factor,

$L_{i(t+1)}$ is the taxable amount (also known as the assessed land value).

We measure the extent to which the land value influences the real estate price in Estonia through a cross-sectional data analysis. We analyze how land value is capitalized if the land is evaluated every year (Model 1, Table 5) and if the land is evaluated only in 2001 (Model 2, Table 5) 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.

Table 5. Model 1: Tallinn Apartment Price and yearly Land Evaluation

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

Table 5. Model 2: Tallinn Apartment Price and 2001 Land Valuation

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

The results of the estimation show (Tables 5 and 6) that if the land is evaluated each year, the tax is capitalized with a higher rate than in the case of the single evaluation model. Indeed from Model 1 we can observe a higher parameter for Land Tax while the parameter is less significant in Model 2. In other words, in Estonia, given its implementation, the land tax was less capitalized in the house price and its impact was not so relevant in reducing the effect of house price increases. In conclusion we can observe that if the land tax had been correctly implemented, it would have acted as a valuable mechanism against the real estate speculative bubble.

5. Conclusion

There are no easily identifiable general reasons to explain why the speculative real estate bubble has grown rapidly in Estonia between 2000 and 2009. The pull of increased volume of foreign capital inflows, mainly converted into investments and loans, has not only instigated a substantial credit expansion and increase in risk taking but has also stimulated a sharp increase in house price. Given the highly leverage position of the Estonian economy, real estate prices in particular between 2001 and mid-2007, began to develop a pattern of a speculative bubble, and in June 2007 the bubble burst.

In this work we have evaluated the presence of a speculative bubble in the Estonia real estate market by conducting two econometric tests (ADF and cointegration). We have then examined the impact of a rigorous implementation of the land tax as a fiscal mechanism to lessen the speculative behaviour of the real estate market in Tallinn. By considering the period 2006-2010 the complete dataset of transaction sales of Tallinn apartments, we have been able to conclude that the adoption of a yearly land assessment would have greatly impacted on the house price. In fact, the models show that the tax is capitalized with a higher rate in the house price when the land assessment is conducted with regular frequency and not under a one-off framework.

We therefore highlight two important results of our analysis. First, it is paramount to identify in the context of economic fluctuations the presence of specific speculative bubbles as in the real estate market case. Second, the merit of a comprehensive tax reform, in particular land/property tax with advanced tax administrations, established accounting practices and enforceable laws, is explicit not only as a revenue source but also as an economic stabilizer to cushion and mitigate the negative effects of economic downturn.

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