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Capital flows and the boom–bust cycle: The case of Estonia

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ABSTRACT

During 2000–2007, Estonia was among the fastest growing emerging market economies, but in late-2008 entered a deep recession. This paper examines shocks, institutions, and policies that have made Estonia's boom–bust cycle so severe. It finds that an open capital account, the prospect for EU entry, and the currency board facilitated massive capital inflows, which led to credit and real estate booms. In late-2008 a domestic slowdown was greatly amplified by the global financial and economic crisis. To resume sustainable growth, the country will need to regain competitiveness and rebalance resources to exports. Estonia's experience underscores the importance for other emerging market economies to retain some flexibility in their macroeconomic frameworks and approach capital account liberalization cautiously.

1. Introduction

From 2000 to 2007, Estonia's real GDP grew faster than in most emerging market economies (EMEs) and converged rapidly towards the income levels of the euro area. However, growth was unbalanced and driven by an over-expansion of non-tradable sectors, particularly real estate and construction.[1] It was financed by large capital inflows, which led to high current account deficits and private debt. External financing fuelled rapid domestic credit growth, mainly to households for real

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[1] The share of employment in construction in total employment increased from 7% in 2000 to 12.3% in 2007, while the share of manufacturing decreased from 26.5 to 22.9% during this period.

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estate purchases in the form of foreign currency loans with variable interest rates. From 2004 on, procyclical fiscal policy and wage growth above productivity amplified the cycle.[2]

Following this period of exceptional growth, Estonia fell into an unprecedented recession, due to a combination of factors: Beginning in late-2007, Nordic lenders reassessed risks related to the Estonian economy and started tightening credit conditions. At the same time, rapidly declining domestic demand and plummeting consumer confidence resulted in lower demand for credit. By the end of 2008, the global and financial crisis greatly amplified the slowdown of economic activity through (i) a "sudden stop" of capital inflows reflecting the global credit crunch and (ii) the collapse of import demand from the country's main trading partners.

Estonia's particularly volatile boom–bust cycle has prompted the following questions: What were the shocks, institutions, and policies that have made its recession so severe? And what are some of the lessons going forward, both for Estonia and for other emerging and developing countries? This paper strives to answer these questions by examining Estonia's experience since regaining independence and especially since 2000, when EU entry became likely. It concludes that, against the background of the currency board and the goal to adopt the euro, the economy's return to sustainable growth will require a larger export sector and less domestic absorption. In the absence of a flexible exchange rate, increased flexibility of the labour and product markets are required to regain external competitiveness. In addition, policymakers should gradually move to a rule-based countercyclical fiscal policy and phase out distortions in the housing finance market that amplified the cycle and reduced domestic savings. Moreover, cooperation with the Nordic banks on cross-border supervision will also need to be strengthened to prevent future excessive private borrowing.

The paper contributes to three strands of academic literature. First, it provides a case study of a small European emerging market economy (EME) with large capital inflows that were followed by a severe capital account balance contraction. It adds to work of, for example, Calvo (1998) and Edwards (2000) for Latin America, Ito (2000) for East Asia, and Von Hagen and Siedschlag (2008) for Central and Eastern Europe (CEE). Estonia's case is particularly relevant in the context of the global financial and economic crisis, which hit the CEE region the hardest. Second, the paper contributes to the literature on boom–bust cycles in the run-up to the euro adoption of Blanchard (2006) and others, with Estonia experiencing a particularly severe cycle. Third, the paper provides background facts for the evolving theoretical literature on the causes of "sudden stops" and banking and financial crises, namely: (i) financial fragility (Minsky, 1995; Kalantzis, 2005); (ii) financial acceleration and credit cycles (Kiyotaki and Moore, 1997), and (iii) asymmetric information (Mishkin, 1996; Hahm and Mishkin, 2000). Estonia's case study also relates to the burgeoning debate on policy responses to the global financial crisis in EMEs and developing countries (Boorman, 2009; Frenkel and Rapetti, 2009; and others).

The paper is organized as follows: Section 2 highlights the various factors that contributed to turning Estonia's boom into a bust, including external shocks, and policy responses adopted by mid-2009. Section 3 takes a broader view of Estonia's experience by comparing it with other crises, relating it to existing analytical frameworks, and reflecting on the role of capital flows. Section 4 discusses policies that would help put Estonia back on a sustainable growth path. Section 5 concludes, also drawing some lessons for other emerging market countries.

2. How did Estonia's boom turn into bust?

2.1. Domestic factors

Between 2000 and 2007, Estonia's output grew faster than in most European advanced and other EMEs (Fig. 1). In contrast with the Central European countries, where growth was largely driven by exports, Estonia's growth acceleration was mostly driven by domestic demand, and especially by a private investment boom, predominantly in real estate (Table 1). Especially since 2003 the largest part

[2] Utilizing the typology of Dooley et al. (2004), Estonia resembles a "periphery" (small open EME), but in its neglect of competitiveness and persistently high current account deficits its behaviour was akin to that of the United States. However, the small Estonian economy has been much more exposed to the changing sentiment of investors when obtaining funding for the current account deficits than the US economy.

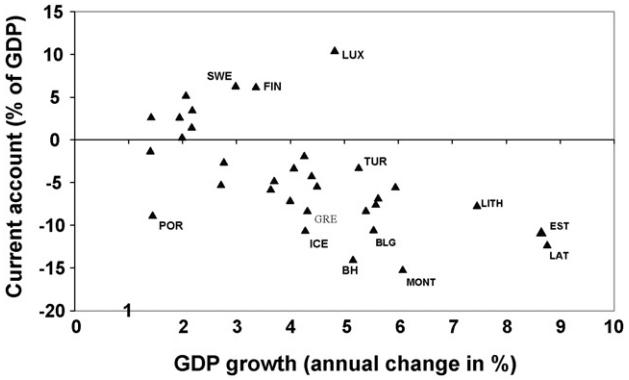

Fig. 1. European economies: GDP growth and current account balances, 2000–2007.
Source: IMF WEO database (April 2009) and authors' calculations.

of overall investment took place in the non-tradable sector, particularly in residential housing and construction. The recent strong investment has thus not directly raised productivity, export capacity, or competitiveness. In fact, TFP productivity growth in construction and real estate, sectors which received the bulk of the investment, declined during 2005–2007 (Lamine, 2008).

Capital inflows fuelled this investment boom, both directly (through FDI) and indirectly (through cross-border loans to domestic branches of foreign banks). Estonia's success with establishing a modern market economy, its EU accession, and a benign international environment stimulated these flows. They were facilitated further by the combination of a completely convertible capital account and the currency board, and encouraged by improved scores from credit rating agencies.[3] As the composition of capital flows shifted to loans, the stock of private external debt ballooned, exceeding 100% of GDP at the end of 2007. Similar to other new EU members with fixed exchange rates, these capital flows also resulted in inflation, real exchange appreciation, loss of competitiveness, and ultimately exchange rate pressures (Hegerty, 2009).[4]

The massive capital inflows caused extremely high current account deficits during 2000–2007 (Fig. 1), well above sustainable levels.[5] The "equilibrium" level of a country's liabilities that foreign investors are willing to finance typically rises after successful reforms, but deficits of Estonia's magnitude indicated that a substantial correction would likely be necessary.

Privately owned commercial banks dominate Estonia's domestic financial system, and most of them have been foreign-owned since the early-2000s. The market concentration is high, with the four largest banks accounting for more than 95% of the financial market's total assets at end-2007. While financial integration has brought the Estonian economy significant benefits, it has also raised concerns about contagion risks from international financial developments. The strong presence of foreign banks has increased the country's dependence on cross-border credit and its vulnerability to changes in parent banks' risk assessment or their ability to raise funds on international markets.

Starting from a low base, private credit surged between 2000 and 2007, and by the end of 2007 Estonia's stock of credit relative to GDP was among the highest in EMEs (Fig. 2). Financial liberalization and integration, especially in the aftermath of the Russian crisis when Nordic banks acquired domestic banks, played a key role in this credit boom. Searching for new sources for profits, foreign (Nordic) banks took increased risks, stimulated further by the highly competitive banking sector. While the

[3] Kaminsky et al. (2004) found that credit ratings tend to be procyclical for the EMEs in general.
[4] Real exchange rate appreciated by 10 percentage points between January 2007 and February 2009.
[5] The broad rule in Edwards (2000) and others suggests that the long-run sustainable capital inflow (current account deficit) should approximately satisfy $C/y = gk^*$, where C is the current account deficit, y is GDP, g is the real rate of growth, and k^* is the ratio to GDP of a country's liabilities that are willingly held by foreign investors. Since by end-2007 the stock of private debt to GDP amounted to about 100% while the average growth rate was above 8%, the implied long-run current account deficit would be about 8%, well below the 18% deficit of 2007.

Table 1
Sources of domestic demand changes during 2000–2007.

Percentage points of GDP						
	Domestic demand/GDP	Investment/GDP		Consumption/GDP		
		Total	Dwelling, res. construction	Total	Private	Public
Estonia	**6.6**	**9.3**	**9.8**	**−2.6**	**0.1**	**−2.6**
Latvia	11.7	12.1	6.1	−0.5	2.5	−3.0
Lithuania	7.1	11.5	8.2	−4.6	0.0	−4.5
Czech Republic	−8.1	−2.9	0.5	−5.1	−4.4	−0.7
Hungary	−5.1	−6.8	n/a	1.6	1.5	0.2
Poland	−3.7	−1.1	−0.6	−2.7	−3.2	0.6
Slovak Republic[a]	−1.3	1.7	0.6	−2.9	−0.2	−2.8

Source: AMECO statistical database (2008).
[a] Dwellings and other buildings.

banks set nominal interest rates at levels comparable to their home markets, real interest rates turned negative for Estonian borrowers with the substantial rise in local inflation. As common during booms, the Nordic banks under-priced risks of their loans to the Estonian branches due to an overly optimistic assessment of the country's growth prospects, largely related to EU accession. They may also have overestimated the liquidity or collateral values in higher risk loans extended by their Estonian branches.

In addition to financial integration, the currency board supported the credit surge. While the board served Estonia well in the early stages of transition for macroeconomic stabilization, it constrained the Bank of Estonia's ability to mitigate the large capital inflows and curtail domestic credit growth during the boom years. Measures which the bank adopted, such as increases in the minimum reserve requirement ratio from 13 to 15% in 2006 and in capital adequacy requirements, were fully offset by the low rates.[6] Estonia's overall lending conditions were procyclical, consistent with patterns of other EMEs and developing countries (Kaminsky et al., 2004, and Appendix). The lack of flexibility of Estonia's monetary policy framework implied that it was not possible to counter adverse external shocks through exchange rate adjustments while private agents were free to dissave, which eventually created systemic risks through exposure to international refinancing.

As funding by foreign parent banks replaced domestic deposits as the source of loans extended by the Estonian banks, the vulnerability to changes in parents' risk assessment rose. Moreover, about 80% of loans extended to local borrowers were denominated in foreign currency, creating currency mismatches in the households' (and corporate) balance sheets and further increasing the exposure to overall external risks. While the predominance of Nordic banks in the banking sector has reduced liquidity risks in normal times, foreign exchange risk remains important, since not all Nordic currencies joined the euro. However, the contagion risk still rose in case – as materialized in 2008 – the parent institutions themselves experienced funding difficulties on international markets.[7]

Mortgages drove credit growth, accounting for 40% of total credit to the private sector at the end of 2007 (IMF, 2009a). While Estonian households were credit constrained in the first half of the 1990s (Sults, 2004), the supply of credit eased, as discussed, with financial liberalization and opening up to foreign (Nordic) banks during 2000–2005. On the demand side, the privatization of the housing stock in the mid-1990s formed the collateral base for mortgage finance (OECD, 2005). Subsequently, rising incomes, exuberance related to the EU accession, low mortgage rates, and a tax credit for mortgage interest also played a role. New financial products allowing equity withdrawal added further to the demand by letting borrowers repay mortgages more slowly. As the housing supply's response was

[6] Moreover, the parent banks often provided the capital as subordinate loans instead of "regular loans".
[7] Moreover, the predominance of loans in foreign currency limits the options of macroeconomic policy. In particular, it makes devaluation of the exchange rate to regain competitiveness very expensive for borrowers and leaves the euro adoption as the only desirable exit strategy from the currency board arrangement.

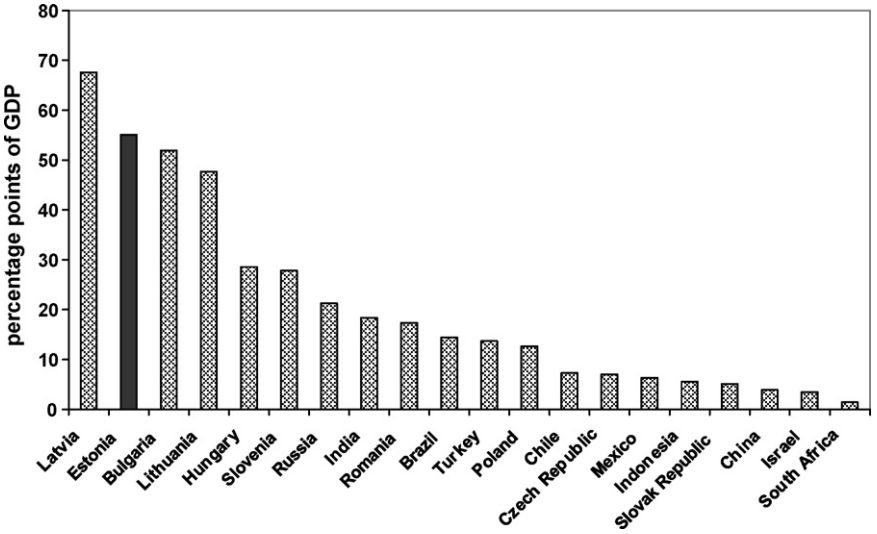

Fig. 2. Private sector credit growth in EMEs, 2001–2007.
Source: IMF World Economic Outlook, IFS, and the Bank of Estonia. a/ Bold is to highlight Estonia relative to other countries.

limited by capacity constraints, house prices soared. The circle was closed by increases in the value of the underlying collateral, fueling further mortgage borrowing.

With the rising demand for housing and related credit, but limited supply, real estate prices skyrocketed. Prices started to gradually climb in late-2002, rose dramatically during 2003–2006, and reached record highs in September 2007 before collapsing in 2008 and 2009 (below).[8] Overall, house prices in Tallinn increased by more than 600% in nominal terms between March 1997 and September 2007. Prices in Estonia grew more rapidly than in most OECD countries, the Nordic neighbours, and regional peers, such as Slovenia (Table 2), calling into question whether fundamentals of demand and supply were driving these developments or a bubble had formed in the housing market.

Econometric evidence (see Appendix) suggests that the house price changes during 1995–2007 were in part driven by some fundamentals, namely rising household incomes and declining after-tax real interest rates, but there were also signs of a bubble. As Lamine (2009) points out, the ratio of rents to house prices also seems to point at fundamental factors: "...while rents in Estonia remained relatively low in comparison with other countries of continental Europe, 23 years of rent were needed to buy a 120 m^2 property in early-2009, close to the EU average." However, according to the estimates in Appendix, house prices rose about 10% above their equilibrium value from late-2005 to mid-2007, likely because of expectations of further price increases and speculative purchases. Moreover, the ratio of price per square meter to disposable income *per capita* was around 35% higher in Estonia than in the EU-15 countries, suggesting a bubble (Lamine, 2009). Hence, market fundamentals alone do not fully explain the extraordinary rise of house prices during this period. The analysis of house price developments is further blurred by the observation that some of the fundamentals were distorted by the prevailing institutional set up (including the currency board); therefore, the fundamentals themselves during this period were either unusually high (income) or low (real interest rates).

Given the rapid deterioration of the fundamentals, the observation that house price changes seem mostly justified by movements in real income and after-tax interest rates does not imply that the ongoing correction would necessarily be moderate. In addition, just as speculative factors and momentum trading led to some overshooting of prices during 2005 to mid-2007, they may lead to undershooting during the correction period. Indeed, data from Statistics Estonia indicate that by

[8] The start of a housing crisis is defined as the peak of houses prices within a window of 8 years, followed by a price decline of at least 7.5% in the next 4 years. The housing crisis in Estonia started in the 4th quarter of 2007.

Table 2
Real house price changes and some of the underlying factors, 2004–2006[a].

	Real house prices[b]	Real GDP growth, 2002–2006[b]	Real mortgage rates[c]	Housing loans to GDP[d]
Estonia	**23.0**	**8.4**	**0.1**	**16.8**
Slovenia	10.3	4.2	3.6	3.6
Finland	6.1	3.0	2.6	5.8
Ireland	9.2	5.5	1.5	13.3
Spain	10.2	3.3	0.3	15.8
Sweden	9.0	3.2	1.9	5.9

Source: ECB; Hypostat, 2008.
[a] Based on ECB (2003), Table 2.4.
[b] Average annual growth rates, in %. For Estonia, only Tallinn prices were used.
[c] Average over the period, in %.
[d] Cumulative change in percentage points.

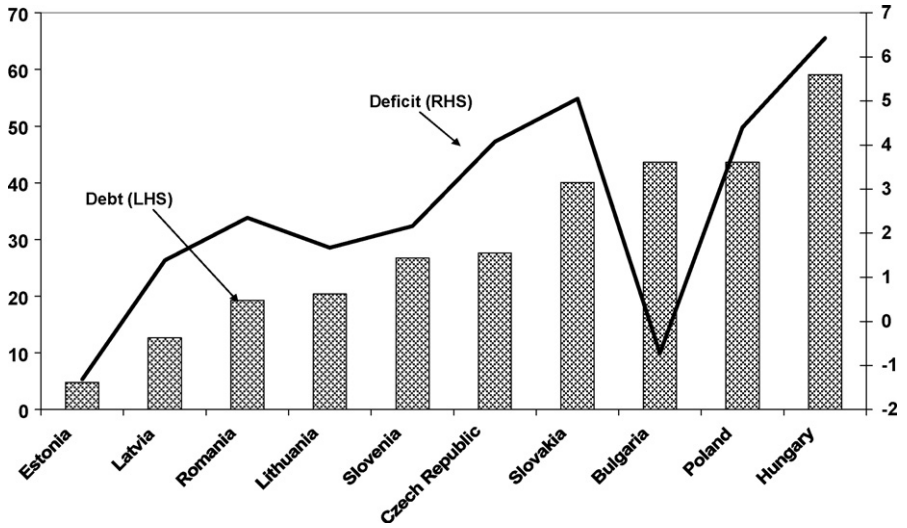

Fig. 3. Gross public debt and government budget deficit, 2000–2007.
Source: Eurostat and authors' calculations.

March 2009, average house prices in Tallinn had already declined by 40% from their peak in September 2007.

With the currency board and a liberalized capital account, fiscal policy was the only remaining macroeconomic tool. However, even here, policy flexibility was severely constrained, as the government adhered to the rule of approving balanced annual budgets since the early-1990s, when the currency board was introduced. While this strict discipline contributed to Estonia's reputation for fiscal prudence and its extremely low public debt (Fig. 3), such rules have been criticized for increasing output volatility and creating a procyclical bias (Fatas, 2005). While the fiscal surpluses during 2001–2007 built up some reserves in the Stabilization Fund, large ad hoc increases in spending with long-term effects were also adopted, such as a rise of wages and pensions by a cumulative 24% in real terms in 2007–2008.

The co-movement of the cyclically adjusted budget balance with the output gap (Eurostat) suggests that the fiscal stance was indeed either neutral or procyclical during 2000–2007; IMF calculations suggest the same for 2004–2007 (OECD, 2009, and Table 3). The procyclical policy continued in 2009 with several rounds of expenditure cuts and selected VAT increases, as the government tried to meet the Maastricht fiscal criterion while the revenue base was shrinking.

Table 3
Selected fiscal indicators, 2003–2007.

	2003	2004	2005	2006	2007 (prel)
General government balance	2.5	1.6	1.6	3.3	3.0
Cyclically adjusted balance	2.3	1.0	−0.1	0.7	−0.3
Net transfers from the EU	0.6	1.4	0.5	1.1	1.8
Cyclically adjusted balance, with EU transfers	1.7	−0.4	−0.6	−0.4	−2.2
Fiscal impulse	**−0.8**	**2.1**	**0.2**	**−0.1**	**1.7**
Output gap	**0.4**	**1.9**	**5.8**	**8.6**	**10.1**

Source: IMF.

Table 4
Cyclical properties of government consumption, wages, and private consumption, 1995–2007.

Country	Relative standard deviation (in % of the mean)		Correlations		
	Output	Private consumption	Real wage growth and output gap[a]	Government expenditures and output, 1995–2007[b]	Government expenditures and output, 2000–2007[b]
Czech Republic	13.5	12.2	0.12	0.29	–0.17
Estonia	**30.6**	**27.9**	**0.52**	**0.17**	**0.75**
Hungary	17.9	17.9	–0.20	0.79	0.65

Source: IFS and authors' calculations.
[a] Correlation of real wage growth with the Eurostat's output gap.
[b] Correlation of the cyclical component of real expenditures with the cyclical component of real output, obtained with HP filter.

Changes in real government consumption (Kaminsky et al., 2004), an alternative for evaluating the fiscal stance, also point to procyclical spending policies during the run-up to the crisis (Table 4). In addition to procyclical lending conditions and fiscal policies, which amplified the cycle, overall real wage growth also accelerated during 2004–2007 and stimulated domestic demand and private consumption. At the same time, competitiveness was eroded by increased labour costs and an appreciating real exchange rate. The wage growth contributed to the higher volatility of output and private consumption in Estonia (measured by relative standard deviation) than, on average, among its regional peers (Table 4).

Driven by mortgages, household debt grew from 14% of GDP in 2002 to almost 50% in 2007. While some of the borrowing was a rational response to favourable lending conditions and consumption smoothing, the degree of indebtedness at the end of 2007 far exceeded that of regional peers with similar *per capita* income, such as the Czech Republic (where household debt stood at 23% of GDP in 2007). By end-2007, household loans amounted to almost 100% of their financial assets (compared to only 30% in the Czech Republic).[9] Another aspect was the financing of the debt—household bank deposits covered only 45% of the debt, well below 216% in the Czech Republic.

The share of Estonian housing loans to GDP was comparable to levels of the Nordic countries (Fig. 4). Predominantly variable-rate loans increased the sensitivity of households to interest rate changes through larger mortgage payments and smaller net income. Even if households do not default on loans, interest rate increases reduce their disposable income, affecting overall economic activity.[10]

As a consequence, when the Nordic banks reassessed Estonia's economic outlook including debt sustainability of the private sector in late-2007, they tightened lending conditions. Higher interest rates lowered demand for credit, which was already weakening because of concerns about future real estate prices. As a result, growth of housing loans decelerated from 74% in March 2006 (year-on-year)

[9] High household debt was accompanied by a heavily indebted corporate sector. The coexistence of high corporate and household debts separates Estonia from the euro area countries, where household savings increased (IMF, 2008).
[10] For banks, the variable rate loans replace the interest risk by higher client default risk. Since the fixed-rate loans entail an interest rate risk for the lender, a premium is imposed, and they are often more expansive *ex post*.

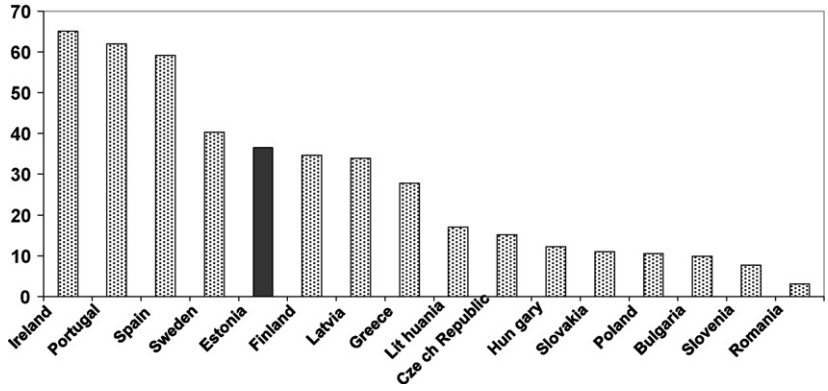

Fig. 4. Stock of housing loans, end-2007.
Source: ECB database and authors' calculations. a/ Bold is to highlight Estonia relative to other countries.

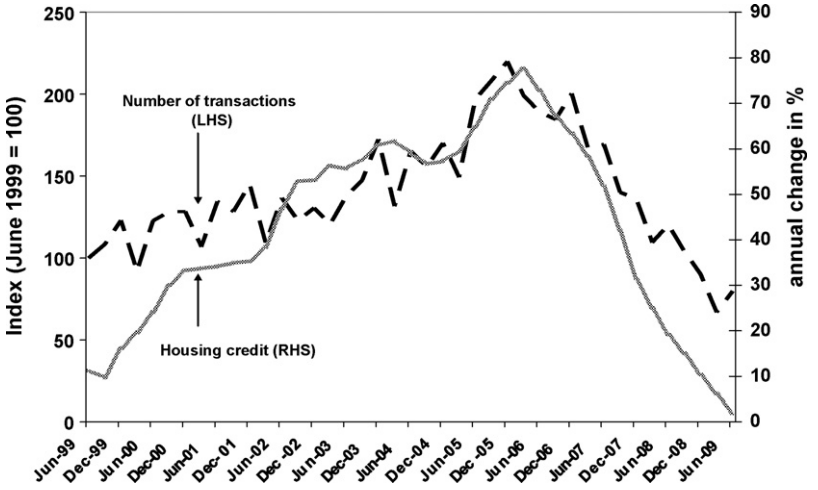

Fig. 5. Credit to households and number of real estate transactions, June 1999–June 2009.
Source: Bank of Estonia, Statistics Estonia and authors' calculations.

to 11% in December 2008 (Fig. 5). The credit crunch in turn led to a deceleration of real estate transactions and was followed by rapidly declining real estate prices. The plummeting real estate prices and transactions initially led to a decline in output and jobs in construction, finance and real estate services, and eventually spilled over to other sectors. The abrupt fall of GDP growth that Estonia experienced after the housing bust is consistent with the earlier evidence from OECD countries that developments in the housing market can have a significant influence on a country's business cycle (Leamer, 2007).

This said, several factors have mitigated the risks stemming from household indebtedness and thus of spillovers from the real back into the financial sector. First, a large part of debt is held by high-income households, which are less exposed to unemployment or interest rate risks. Second, as the maturity of housing loans lengthened since the mid-2000s, monthly payments declined.[11] Finally, a well-capitalized banking sector provides a buffer against rising non-performing loans (IMF, 2009a).

[11] However, longer maturities and lower minimum down payment requirements also made housing loans accessible to lower income households. As the loan-to-value ratios increased with the falling house prices, some of the newer borrowers ended up with negative equity.

2.2. Global financial and economic crisis

After years of remarkable growth, Estonia was among the first economies in Europe to enter recession in 2008. The slowdown started with the unwinding of a loan-financed over-expansion of domestic demand as outlined above. Even though the current account imbalances of preceding years called for a correction, the speed and size of the output adjustment were faster and deeper than expected by analysts and policymakers. Towards the end of 2008, the domestically grown slowdown was greatly exacerbated by the global financial and economic crisis, which affected Estonia through the following channels:[12]

(i) *Capital flow channel*—The tightening of credit conditions by Nordic lenders was followed by drying up of credit from international financial markets to all EMEs. As in other EMEs, the "sudden stop" was accompanied by an outflow of short-term debt (Table 5). The massive adjustment of capital flows, the fixed exchange rate, and limited downward flexibility of wages meant that the cost has been born mostly through rising unemployment (below).

(ii) *Trade channel*—Being a small open economy (exports and imports amount to about 150% of GDP in 2007), Estonia has been particularly vulnerable through this channel. Collapsing exports by the end of 2008 (Fig. 6) contributed to rising unemployment and declining consumption and wages. The real sector also feeds back into the financial sector through rising overdue loans (the stock increased from 4.4% of total loans outstanding at the end of 2007 to 11.5% in June 2009; the ratio was the highest in the construction sector). On the positive side, the financial sector has built up buffers by exceeding the capital adequacy and reserve requirement ratios and saving profits, and should be able to weather losses foreseen even under the more pessimistic scenarios.[13]

(iii) *Psychological factors*—With escalating unemployment and a weak global outlook, indicators of economic confidence have lingered at the low levels of end-2008, contributing to the downturn (Fig. 6).

The impact of the external shocks from the global crisis on the already shrinking economy was devastating—real GDP contracted by 3.6% in 2008 compared to 2007 and 15.1% in the first quarter of 2009 relative to the same period in 2008 (Fig. 6). Estimates of *Statistics Estonia* indicate that GDP declined by 16.6% in the second quarter of 2009, mostly driven by a slump in manufacturing, construction and financial intermediation. Reacting with a lag, the unemployment rate increased from a situation of labour shortages and unemployment rate of 4% in mid-2008 to 13.5% by mid-2009, a level comparable only to the aftermath of the Russian crisis. Simultaneously, the current account reached balance in the first quarter of 2009, compared with a deficit of 18% of GDP in 2007. In sum, Estonia's 2000–2009 boom–bust cycle has become one of the most severe among EMEs.

By mid-2008, it became clear that Estonia, a country successful in establishing a modern market economy, had encountered its most challenging economic situation since the early-1990s. However, the macroeconomic tools available to the Estonian policymakers to address it were limited. The currency board arrangement prevented the central bank from easing monetary policy; in this respect Estonia fully relied on the ECB's policy. Because of monetary base constraints, the Bank of Estonia was unable to serve as a lender of last resort and give financial aid to troubled banks during the crisis, if needed. At the same time, the aim to adopt the euro as early as possible led to fiscal tightening, plunging Estonia further into recession.

In most EMEs, policy responses consisted of measures to enhance reserves, strengthen the financial sector, introduce fiscal stimulus packages where feasible, and in some cases implement protectionist trade measures. Despite some reserves in the Stabilization Fund, Estonia's fiscal policy space has been severely limited. The resources of the Fund did not exceed 10% of GDP, and hence would be rapidly wiped out by growing deficits. The room for countercyclical policies was further constrained by the

[12] Boorman (2009) discusses channels by which the global crisis has been transmitted to EMEs. He underscores that even countries that – like Estonia – pursued prudent macroeconomic policies and created buffers for a less favorable external environment have been hit hard, with the European EMEs taking the hardest hit in 2009. In mid-2009, the countries most strongly affected outside of Europe were expected to be newly industrialized countries of Asia.

[13] According to data of the Bank of Estonia, the capitalization of the banking sector continued to be high in mid-2009 (with the adequacy ratio of 21%, well above the required 10%); banks used their earlier profits to create buffers.

Table 5
Net capital flows, 2002–Q1 2009.

Millions of EEK	2002	2003	2004	2005	2006	2007	2008	Q1 2009	Average, 2002–2008
Total	12,419	17,575	21,594	19,188	36,915	39,700	29,597	−2,688	25,284
% of GDP	*10*	*13*	*14*	*11*	*18*	*17*	**12**	**−5**	*11*
Equity	3,533	11,214	7,984	6,200	7,776	7,188	10,050	508	7,707
Debt	8,886	6,361	13,610	12,987	29,140	32,511	19,547	−3,196	17,577
% of total	*72*	*36*	*63*	*68*	*79*	*82*	*66*	–	*66*
Of which									
Short-term	6,682	703	4,278	12,866	14,566	−8,534	21,344	−2,730	7,415
% of GDP	*6*	*1*	*3*	*7*	*7*	*−4*	*9*	*−5*	
Long-term	2,203	5,658	9,332	121	14,573	41,045	−1,797	−465	10,162
Memorandum item:									
GDP	121,372	136,010	151,012	173530.2	205,038	238,929	248,149	52,229	

Source: Bank of Estonia.

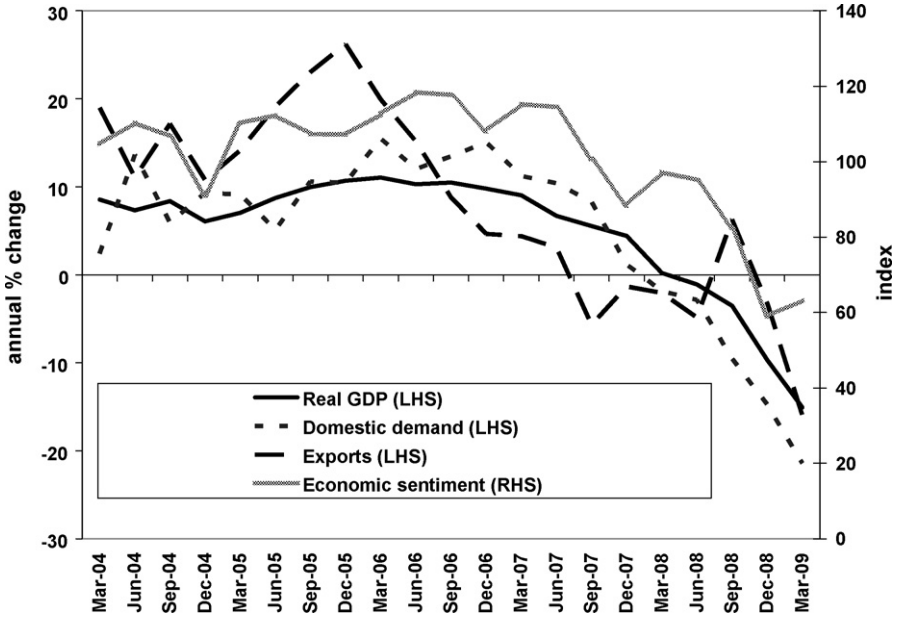

Fig. 6. Real GDP, domestic demand, exports and economic confidence, March 2004–March 2009.*Source*: Statistics Estonia and the Estonian Institute for Economic Research. a/ Real GDP is highlighted relative to other indicators.

underdeveloped government bond markets and, more generally, the lack of experience with raising official funds on the international markets. Moreover, restrictive fiscal measures adopted at end-2008 and in early-2009 were driven by the goal to adopt the euro as early as possible, rather than stimulating the economy: Amidst a collapsing GDP and revenue base, several rounds of substantial expenditure cuts were introduced to keep the budget deficit below the 3% Maastricht criterion, thus delaying rather than easing the recovery.[14]

[14] According to Bank of Estonia estimates in mid-2009, it will take 4–5 years to reach the GDP level before the crisis. The timing of the recovery is uncertain because of the changing global environment.

At end-2008 and in early-2009, Estonia's anti-crisis efforts focused on enhancing reserves and strengthening the financial sector. There was a run on one of the Nordic-owned banks in late-2008, but the situation was stabilized quickly due to swift action of the home country central bank and the Estonian counterparts (IMF, 2009a). In February 2009, the Bank of Estonia enhanced reserves by signing a precautionary agreement (bilateral swap) with the Swedish Central Bank that provides access to additional foreign exchange liquidity, if needed.[15] In addition to the precautionary agreement with the *Riksbank*, the rapidly narrowing current account deficit helped ease liquidity concerns, and EU structural funds have stepped in as a source of foreign funding. Deposit insurance was also increased from 20,000 to 50,000 euro in late-2008, aiming at supporting banks' capital and increasing confidence in the banking sector.

3. The broader context: other crises and analytical frameworks

3.1. Comparison with past crises

Jannsen (2009) examined the effects of housing crises on the business cycle, based on 23 housing crises in 15 OECD countries during 1970–2002. He found that housing crises usually trigger a long lasting recession and a considerable loss in output. In addition to declining GDP growth, other economic indicators (private consumption, residential and business investment) tend to drop sharply at the beginning of a housing crisis and take more than four years to reach pre-crisis level.[16] So far, the Estonian fall in GDP has been deeper than in the OECD countries during 1970–2002.

The boom–bust cycle during 1984–1995 in Finland and Sweden, which was more volatile than the average boom–bust pattern, can shed some light on Estonia's case. The driving force behind both cycles was financial deregulation combined with a fixed exchange that contributed to: (i) a more marked overheating during the boom phase, with rising inflation and loss of competitiveness; and (ii) a financial crisis during the bust phase, with falling output and rising unemployment. Financial developments triggered by deregulation – credit growth, asset prices and real after-tax lending rates – were the key factors behind the cycle (Jonung et al., 2006). Both countries experienced domestic banking and currency crises, which were eventually partly solved through devaluation. While the bust phase was considerably deeper than in the OECD countries during 1970–2002, the recovery came earlier and was more rapid.

Even though Estonia shares some similarities with the Swedish and Finnish cycles, there are also important differences that could facilitate a recovery. Just like in Finland and Sweden, the boom phase was driven by credit (and capital inflows), rising house prices, and low or even negative real after-tax lending rates. However, according to the recent Financial System Stability Assessment Update for Estonia, financial indicators point to a sound banking sector, and especially strong asset quality and earnings. The system has also proven its resilience during the Russian crisis and again more recently during a run on one of the large foreign-owned banks in September 2008 (IMF, 2009b). At the same time, the global recession and the inability to utilize exchange rate flexibility could slow Estonian recovery.

3.2. The role of capital flows

To put the magnitude of capital flows to Estonia into perspective, a comparison with the flows to Latin America in the 1990s (specified in Edwards, 2000) is useful. During that period, the highest maximum annual inflow of long-term international private capital in Latin America was received by Peru—10.8% of GDP. In Estonia, the long-term flows amounted to 11% in 2006 and 20% in 2007 (Table 5). While the benefits of the flows for financial deepening and growth have been widely

[15] In the case of Estonia, the currency board arrangement allows the central bank to extend a loan in the amount of foreign reserves above the monetary base that the reserves need to cover.

[16] The author derived the median values of several macroeconomic variables within a time span from 20 quarters before to 20 quarters after the start of a housing crisis. He found that annual GDP reached its bottom in the 2nd year after the price peak with an average growth rate of 0.1%.

discussed, the negative consequences of "sudden stops" have been equally recognized and documented.

With such massive capital inflows as Estonia received during 2000–2007, the issue of their management inevitably arises. Three basic approaches can mitigate possible negative macroeconomic and financial stability consequences of large capital flows: (i) a flexible nominal exchange rate; (ii) sterilized interventions by the central bank, and (iii) controls on capital in- and outflows. Since Estonia was unable to utilize the first two approaches due to its currency board, the possibility of capital controls in principle remains. However, available evidence suggests that controls on outflows encourage corruption and can be easily bypassed. The Chilean experience also shows that controls on short-term capital inflows also distort incentives and have significant costs, especially for small- and medium-sized firms (Edwards, 1999). However, in the Estonian context it is exactly these firms that drove the country's transition to market economy and should be the cornerstone of recovery.

The Tobin tax has long been discussed as a form of capital controls to discourage short term speculation. Its proponents argue that the tax would induce investors to base their decisions more on macroeconomic and structural fundamentals rather than cyclical factors. However, in addition to creating various distortions for individuals and especially small firms (by raising their costs of capital), the aggregate impact of such a tax would likely be too small to be effective (Haberer, 2003). Moreover, a Tobin tax is politically difficult to implement by an individual country since it would need to be implemented by all countries simultaneously to be effective (Edwards, 1999).

3.3. Analytical frameworks

Following the financial crises in Latin America and East Asia in the 1990s, an extensive literature on sources of financial instability has re-emerged. One approach drew on information asymmetries and incentive problems in financial contracts, such as moral hazard or adverse selection (Hahm and Mishkin, 2000). The other, financial fragility approach, evolved around debt accumulation, speculative excesses and over-indebtedness. This strand of literature is also related to the financial accelerator models of Bernanke and Gertler (1989), Kiyotaki and Moore (1997) and Korinek (2008).

In the financial fragility framework, credit booms lead to increased credit risk for the banks and eventually systemic risk, where shocks in one part of the financial system lead to shocks in other parts, and eventually spill over to the real economy (Minsky, 1995; more recently, Kalantzis, 2005).[17] A key element of the financial fragility approach is an exogenous event that changes investors' views on at least one important sector of the economy, which in Estonia's case has been real estate.

The fragility of the Estonian banking system increased during 2005–2007, as evidenced by the unprecedented credit boom, pressures on the exchange rate, rising overdue loans and finally the bank run at the end of 2008. The credit and housing boom, stimulated by investors' exuberance, suggests that the financial fragility approach is more suitable. Estonia's experience of recent years has also illustrated how shocks to real estate prices reduce the value of collateral and hamper the ability to borrow. Declining asset prices also lowered the value of the banks' capital and reduced their willingness and ability to lend, thus intensifying the credit cycle and providing additional negative feedback to the real economy, as in Kiyotaki and Moore (1997). With a massive private debt stock in foreign currency, the Estonian experience also illustrates how households and enterprises failed to take into account the possible effects of their borrowing on macroeconomic volatility, as analyzed in Korinek (2009).

Moral hazard, on the other hand, was somewhat limited due to a deregulated financial sector and the Bank of Estonia's limited role as the lender of last resort. Some moral hazard risk undoubtedly existed as well, stemming from, for example, the national deposit insurance scheme and agreements with the Swedish central bank on crisis prevention and resolution actions. However, the fact that the

[17] The insights from Kalantzis (2005) on financial fragility in EMEs are pertinent. In an overlapping generations model with multiple equilibria, he analyzes how structural factors, in particular firm balance sheets and the productive structure, may lead to a financially fragile state. This occurs if the financial accelerator effect is particularly strong (i.e., firms are sufficiently leveraged) and/or if the productive structure of the economy is sufficiently oriented toward the production of nontradable goods, as has been the case in Estonia.

bank run in the fall of 2008 was swiftly contained before spreading to other banks suggests that information problems did not play a major role. On balance, the "sudden stop" in Estonia seems to have resulted from a variety of factors, and the two approaches – financial fragility and information asymmetry – are complementary.[18]

4. Policies for sustainable growth

During the boom phase, output and employment shifted disproportionately to the non-tradable sectors, such as construction and housing. The resulting external imbalances have narrowed somewhat in 2008 and 2009, but at the expense of contracting imports. To restore sustainable growth, Estonia will need to shift production to tradables and re-establish competitiveness. However, the fixed exchange rate regime and the inherited real exchange rate appreciation of the kroon will make this challenging, especially given the devaluations in some partner countries.

As wages and prices are rigid, the main adjustment costs will be borne by unemployment, which has already shot up. The speed of the Estonian recovery will depend not only on the pace of economic rebound of its main trading partners, but also on increasing the flexibility of its economy, i.e., how quickly labour and enterprises are able to relocate to new productive activities. Over the medium term, fiscal policy should move to countercyclical stance, to avoid exacerbating welfare reducing boom–bust cycles.[19] Measures to improve cross-border financial supervision (and reduce regulator failure) and strengthen incentives in the housing finance market should also be helpful in this regard.

4.1. Cross-border banking supervision

Throughout the boom period, Estonia faced challenges in cross-border coordination of banking supervision with the Nordic counterparts. It has been long recognized that the mostly nationally based supervisory systems and safety nets often do not capture negative externalities involved in cross-border supervision.[20] Effective supervision and regulation therefore require coordination and enhanced information sharing between the host and home country supervisory institutions (Schoenmaker and Oosterloo, 2006).

In the context of the global crisis and given the underdeveloped government bond markets and the dominance of foreign banks in the financial sector, the cross-border banking arrangements are key to manage liquidity risk. The close linkages and long-standing cooperation are on balance to Estonia's advantage, also because an abrupt parents' withdrawal from the Baltic subsidiaries could damage other Nordic financial institutions and trigger a loss of confidence in the financial systems of these countries. The February 2009 swap agreement notwithstanding, crisis prevention measures could be strengthened. While in 2006 the Estonian Financial Supervision Authority signed regional agreements (Memoranda of Understanding) with foreign supervisory bodies in the Nordic countries, they are not legally binding and were fairly general. Thus, a coordinated regional agreement could (i) clarify the division of responsibilities among countries; (ii) help evaluate banks' viability in an early and comprehensive manner; (iii) put into place coordinated restructuring measures, including cost coverage by home and host authorities (IMF, 2009b).

4.2. Housing finance market

Several tax incentives worked as subsidies for investment in real estate during the boom phase, such as the tax deductibility of mortgage interest payments, tax exemption of capital gains from selling residential property (homes and summer houses), and the housing loan guarantees provided by the Credit and Export Guarantee Fund. Some of these incentives were rolled back in 2005 and 2006,

[18] Moreover, the cross-border financial flows have highlighted the need for enhanced cooperation on banking supervision; the loopholes in this area fall into "regulatory failure" literature.

[19] For detailed recommendations in the fiscal policy area in Estonia, see OECD (2009).

[20] The recent IMF Financial Sector Assessment Program and Update concluded that there are no serious weaknesses in Estonian bank supervision and regulation (IMF, 2009a).

Table 6
Institutional characteristics of national mortgage markets.

	Financial sector indicators		Mortgage products			
	Maximum LTV (%)	Typical maturity (years)	Typical rate (fixed/variable)	Equity withdrawal (Y/N)	Restrictions on early payments (Y/N)	Mortgage bond markets (Y/N)
Estonia	95	20–30	Variable	Yes	Yes	No
Czech Republic	70–100	20–25	Fixed	No	Yes	Yes (limited)
Hungary	100	15	Variable	Yes	No	Yes (limited)
Poland	>100	20	Variable	Yes, but rarely used	Fees allowed, but rarely used	Yes (limited)
Slovak Republic	70	15	Variable	Yes, but rarely used	No	Yes (limited)
Latvia	100	20–40	Variable	Yes	No explicit regulations	Yes (limited)
Lithuania	100	20–25	Variable	Yes	No	No
Finland	75–80	15–20	Variable	Yes	Creditor compensated	Yes (limited)
Sweden	60–80	<30	Variable	Yes	No	Yes (limited)

Source: IMF and OECD.

but major distortions remained.[21] While the elimination of these subsidies during the recession could deepen it, a phasing out of fiscal incentives and exemptions as well as a strengthening of real estate taxation over the longer term should be considered to mitigate future housing cycles (OECD, 2009; Lamine, 2009). For example, in Estonia, land value is taxed, but not the value of buildings.

Institutional characteristics of mortgage markets reflect the local conditions of the financial sector and prevailing products, and thus vary widely across countries. The Estonian housing loan market has been dominated by foreign-owned commercial banks; the four largest banks accounted for 97% of the market in 2007 (Tamm, 2007). Such high concentration exceeds that of most European EMEs, where 70–80% of the housing market share is captured by the 5 largest banks. It is comparable to Denmark and Sweden, where the 5 largest banks account for more than 90% of the housing market. The housing loan market has been characterized by variable-rate loans denominated in foreign currency, with high maximum LTV ratios and long maturities (Table 6). Countries with mostly adjustable-rate mortgages experience higher house price growth and volatility than countries with mostly fixed-rate mortgages (IMF, 2004).

On the demand side, borrowers usually opted for variable interest rate mortgages in foreign currency as the risks of such loans may have been underestimated during years of mostly declining interest rates and a stable exchange rate. In addition, an environment with declining interest rates, together with myopic expectations (i.e., looking only at initial monthly payments or assuming the interest rates will remain low), high refinancing costs, and limitations on early loan repayment likely encouraged households to opt for variable-rate loans.

Factors on the supply side of mortgage markets also explain the prevalence of adjustable-rate mortgages. In contrast to most other European emerging market economies, Estonia has no mortgage bond markets. Banks have thus relied mostly on short-term deposits for financing long-term housing loans, supplemented by short-term loans from parent bank groups. Under such conditions, lenders tend to offer variable-rate mortgages to reduce their own interest risk, which is passed on to the customers. The share of variable-rate loans could thus be reduced by shifting to long-term capital market funding and narrowing the term gap between funding and lending. The development of mortgage securities markets, in particular markets with covered bonds, would also help to this end.

[21] In 2005, the government reduced the maximum rate of the housing loan interest deductible from the income tax by 50%. In 2006, housing loan regulations were tightened, including through increasing the risk weighting of housing loans in the capital adequacy calculations.

The above risks could be further reduced through mortgage covered bonds, where bonds backed by mortgages pooled by lenders are sold to investors through a secondary market. Loan assets – and hence credit and prepayment risks – remain on the lender's balance sheet, enhancing incentives for prudent assessment of these risks. The use of mortgage bonds in financing mortgage loans has two merits. One is that bond issues normally can raise longer term funds than the deposits (shorter term in Estonia) or short-term foreign loans. This should help alleviate the duration mismatch between the assets and liabilities of the banks, improving their risk management. The other merit – once the markets stabilize – is the possibility of attracting more funds from foreign investors (OECD, 2005). Such bonds would also contribute to the development of securities markets, which are still in the early stages in Estonia. In this context, the development of the government bond market, currently almost nonexistent, would provide a useful benchmark.

5. Conclusions

The current recession notwithstanding, Estonia's longer term economic performance has been strong, with one of the highest growth rates among EMEs and declining poverty. However, the country, previously given as an example of successful transition to a market economy, is now in an exceptionally deep recession. This boom–bust cycle was driven by massive capital inflows under the currency board, which fuelled a credit and housing boom. A tightening of lending conditions led to a steep contraction of the real estate sector, which has spread to other sectors. At the end of 2008, these domestic factors were further exacerbated by the impact of the global economic and financial crisis, mostly through a "sudden stop" of capital flows and collapse of trade. While Estonia's longer term prospects are still positive due to solid fundamentals such as a strong business environment, a number of policy measures could help bring the economy back on a sustainable growth path and mitigate future cycles.

Estonia's exceptionally volatile experience highlights several policy lessons for other emerging market economies. First, its much more severe GDP contraction compared to other CEE countries with flexible exchange rate regimes and less procyclical fiscal policy (such as the Czech Republic) points to the importance of leaving flexibility in the macroeconomic framework to engage in effective countercyclical policy.[22] In this context, the case of Estonia shows the importance of developing well-functioning government bond markets. Second, small open economies that depend heavily on exports should focus on external competitiveness and avoid distortions leading to an excessive allocation of resources to the non-tradable sector. This includes distortions that encourage excessive private borrowing, such as mortgage interest deductibility or allowing excessive risk-taking by households. As Estonia's experience illustrates, under a fixed exchange rate regime, an expansion of the non-tradable sector tends to lead to high current account deficits, which can lead to excessive borrowing in foreign currency, with its own set of risks. Third, countries with heavy foreign ownership in their banking sector need to engage in effective cross-border supervision and financial sector regulation, including crisis prevention and contingency plans for crisis resolution. In that context, Estonia's case also shows that building up reserve buffers in the boom times helps maintain confidence in the banking sector during the periods of economic slowdown.

Finally, frontier emerging market economies that are just entering the international financial markets need to carefully weigh the policies pursued in opening their capital markets. Many economists have long argued, and the experience of numerous countries confirms, that the lifting of capital controls should be the last step of market-oriented reforms, and should be undertaken only when domestic financial markets are sufficiently developed and sound supervision (including across borders) is in place. The current financial crisis has also revived the debate on restricting capital mobility to reduce macroeconomic volatility, including through a "Tobin" global tax on foreign exchange transactions. Such topics of capital controls are intriguing, but beyond the scope of this paper and left for further research.

[22] The empirical research suggests that countries with more flexible exchange rate regimes can accommodate shocks resulting from "sudden stops" of capital flows more easily than countries with fixed exchange rates (Edwards, 2004).

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Appendix A. Empirical investigation of house prices determinants

This appendix analyzes drivers of Estonian house prices. The econometric analysis is based on a standard framework (Meen, 2002, and others) where house prices are determined by flexible housing supply and demand in the long run, but stable supply in the short run. Demand is captured by households' real disposable income and the housing cost per representative house owner. It rises with income and decreases with housing cost. Supply is measured by the available housing stock per person.

More formally, the housing demand function is described by:

$$H^D = f\left(\frac{V}{P}, Y\right), \quad \text{where} \quad f_1 < 0, \quad f_2 > 0 \tag{1}$$

where H^D is the housing demand, V is the total housing cost for a representative house owner, P is the index of prices of goods and services other then housing, and Y is the households' real disposable income. The housing cost for an owner–occupier is the value of goods foregone because of owning and occupying a dwelling:

$$\frac{V}{P} = \frac{PH}{P} BK = \frac{PH}{P}[i(1-\tau) - \pi] \tag{2}$$

where PH is the nominal price of an average dwelling, BK is the user cost (real after-tax housing loan interest rate), i is the nominal interest rate, τ is the income tax rate, and π is the inflation rate. The housing supply, denoted H, is stable in the short run. PH equates housing demand and supply. Households' income and housing stock per person were rising during most of the years between 1997 and 2007, while interest rates were decreasing.

The empirical estimation is carried out using the time series of quarterly data on house price and housing loan interest rate deflated by consumer prices from mid-1997 to early-2008.[23] An error correction model is utilized; the focus is on long-run results.[24]

Table A1 summarises the main results.[25] It shows that, indeed, house prices over the long run are explained mainly by increased household income and very low real after-tax interest rates, whereas the lack of housing supply does not seem to have been a major factor determining house price growth. This can be partly explained by the slow response in the total available housing to price changes, consistently with evidence for OECD countries.

The response of house prices to income changes is fairly high. The estimated income elasticity is around two, i.e., a 1% increase in income leads to around a 2% rise in prices. This is somewhat higher than recent OECD estimates for Ireland and Sweden—two small open economies that have also

[23] The quarterly dwelling stock series were obtained by extrapolating data on completed dwellings. All variables except the interest rate are in logarithms. Standard unit root tests indicate that all the variables are non-stationary, i.e., there may exist a co-integration relationship between them.

[24] The error correction model is estimated using: (i) Engle–Granger two-steps approach; (ii) the two-step approach with dynamic OLS; and (iii) estimating an error correction model using the auto-regressive distributed lag (ARDL).

[25] The error correction term is negative in all the estimations showing that differences between actual and long-run house prices based on key are corrected over time. The adjustment of actual house prices to their long-run level is relatively rapid in the Estonian housing markets, i.e., the error correction term is large.

Table A1
Results for house price regressions.

	OLS	DOLS	ARDL
Real disposable income	1.76***	2.10***	2.00**
	(3.5)	(3.3)	(2.1)
Real after-tax mortgage rate	−2.84***	−2.24**	−2.31*
	(−2.9)	(−2.2)	(−1.8)
Housing stock per person	0.01	−3.02	−1.81
	(0.0)	(−0.4)	(−0.2)
ECT	−0.83***	−0.66***	−0.85***
	(−5.7)	(−4.3)	(−4.5)
No. obs.	40	40	40
AdjR^2	0.48	0.34	0.42

Note: * denotes variables significant at 5%; ** denotes variables significant at 10%.

experienced a housing boom. The effect of a one percentage point increase in the after-tax interest rate is estimated to vary between 2 and 3%, which is close to OECD estimates for Ireland and the Netherlands.

As Table A1 shows, households' real disposable income and real after-tax interest rate have the expected signs and are statistically significant, but the housing stock is not statistically significant in any of the specifications.[26] The results are robust to change in the estimation method. All estimations include constant and seasonal dummies.

To check the robustness of the results, several different specifications were estimated. Specifically, to capture the impact of potential first-time buyers, the population for the 25–29 age group was considered and the housing stock was divided by the number of persons in this age group. The quarterly population series for the age group 25–29 were derived by linear extrapolation and using quarterly data on age groups in the EuroStat Labour Force Survey. In addition, real wages were considered instead of real disposable income. Finally, the effect of differences in the period of analysis was examined. The results are relatively robust to these changes in the baseline specifications.

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[26] Excluding the housing stock as a regressor does not change the results pertaining to the households' income and after-tax interest rate.

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