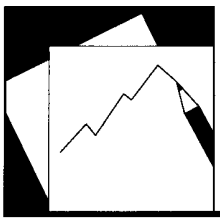
WP/10/250



IMF Working Paper

Assessing the Risk of Private Sector Debt Overhang in the Baltic Countries

Valerie Herzberg

INTERNATIONAL MONETARY FUND

 WP/10/250

European Department

Assessing the Risk of Private Sector Debt Overhang in the Baltic Countries

Prepared by Valerie Herzberg[1]

Authorized for distribution by Christoph Rosenberg

November 2010

Abstract

Between 2000 and 2007 nonfinancial private sector credit expanded rapidly in the Baltic countries, resulting in a non-negligible build-up of debt. Could this legacy debt hold back the economic recovery of the region? This paper analyzes the setting in each of the three countries and, with the help of an experimental Debt Overhang Index (DOI), draws tentative conclusions for domestic demand.

JEL Classification Numbers: G00, G20

Keywords: credit, private sector debt, Baltic economies

Author's E-Mail Address: vherzberg@imf.org

[1] The author thanks Christoph Rosenberg, James Morsink, Jerome Vacher, Jacques Miniane, Juan Zalduendo and participants at the European Department Seminar and at a seminar held at the Eesti Pank in October 2009 for many useful comments and suggestions.

CONTENTS **PAGE**

I. Executive Summary and Introduction 4

II. How Indebted is the Nonfinancial Private Sector in the Baltic Countries? Some Stylized Facts 4

III. Will Private Sector Debt Weigh on Domestic Demand? Indications from a Debt Overhang Index 9

IV. A Preliminary Assessment of the DOI in the Baltic Countries 16

V. Conclusion and Policy Challenges 19

Tables

1. Volatility of Operating Surplus 7
2. Debt Overhang Index for the Household Sector 12
3. Debt Overhang Index for the Corporate Sector 13
4. Construction Volumes and Office Vacancies 16

Figures

1. Private Sector Domestic Bank Credit 5
2. Nonfinancial Private Sector Loans over GDP, 2008 6
3. Leverage Ratios of the Household Sector 6
4. Leverage Ratios of the Nonfinancial Corporate Sector 7
5. Debt-to-Equity of Nonfinancial Corporate Sectors, 2008 8
6. Debt Service Ratios 6
7. Debt Deleveraging Experience in 1990s Sweden and Post-Asian Crisis 10
8. Distribution of Consumption and Leverage by Income Quintile 13
9. Distribution of Corporate Investment and Leverage by Sector 14
10. Cash Flows of Quoted Baltic Companies 15
11. GDP and Domestic Demand Since 2007/08 Peak 17
12. Household Consumption and Gross Capital Formation in Euro Area 17
13. Consumption in the Baltic Countries 17
14. Investment in the Baltic Countries 19

Annexes

I. Credit Growth, House Prices and FDI in the Baltic Economies 21
II. Construction of the Debt Overhang Index 22
III. OLS Regressions of Household Consumption and Corporate Investment in the Baltic Countries and the Euro Area 27

References 35

I. Executive Summary and Introduction

Between 2000 and 2007 nonfinancial private sector credit expanded rapidly in the Baltic countries. Could this legacy debt hold back the economic recovery of the region? This paper analyzes the setting in each of the three countries, and, with the help of an experimental Debt Overhang Index (DOI), draws some tentative conclusions for domestic demand.

There is empirical and theoretical literature linking debt overhang to economic activity. Overleveraged households tend to cut back spending when hit by a shock that changes their perception of permanent income and wealth.[2] Investment can also suffer because shareholders with debt overhang are unwilling to take up new projects if the returns solely benefit existing debt holders.[3] Overindebtedness can also impair the lending capacity of financial intermediaries. A deteriorating credit portfolio undermines banks' willingness and ability to lend.[4] Finally, asset price busts are relatively costly for economic activity. Particularly, house prices busts tend to be longer lasting and are associated with greater output loss than other asset market corrections.[5]

The paper finds:

- When comparisons of individual leverage indicators provide ambiguous messages it may be useful to consider jointly a range of balance sheet measures, taking also into account distributional effects, both in relation to balance sheet health and contribution to demand. The proposed DOI does that, facilitating a consistent, broad-based assessment across countries and sectors.
- All Baltic countries appear to be at risk of debt overhang, but there are differences across sectors and countries. Due to limited financial assets, this risk could be more acute in the household than in the corporate sector. Taking account of the distribution of leverage in the household sector and relative shares in consumption further increases this risk in Estonia, while lessening it in Lithuania. Turning to the corporate sector, the evidence suggests an aggregate problem of overstretched balance sheets mainly in Latvia. For Estonia, the analysis finds that distributional factors mitigate risks further, with sectors contributing considerably to investment not exhibiting particularly high levels of leverage. Finally, even though not captured in the DOI,

---

[2] Fisher (1933) and King (1994). Glick and Lansing (2009) and Mian and Sufi (2010) recently provided empirical evidence on the behavior of US household spending resulting from balance sheet deleveraging.

[3] Myers (1977).

[4] Ghosh and Ghosh (1999).

[5] See IMF World Economic Outlook, October 2009, Chapter 3.

foreign corporate ownership could also play a small role in alleviating debt overhang problems in the Baltic economies.

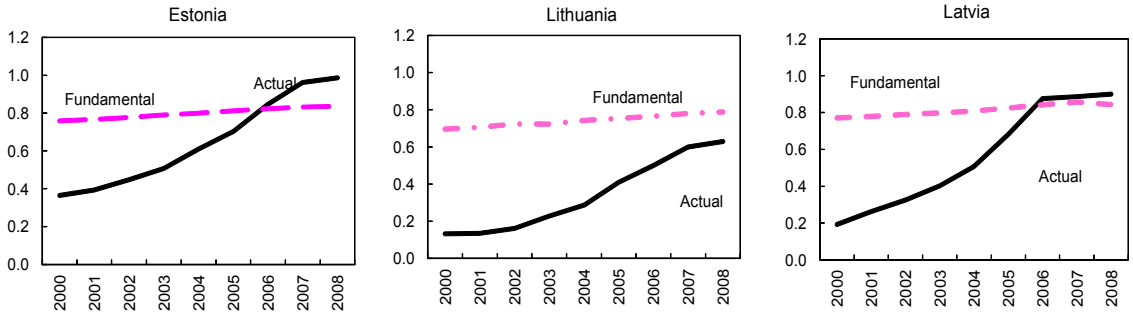
- It is too early for a comprehensive testing of the predictive power of the DOI on the Baltic countries. And given data constraints, cross-country or over time assessments of the DOI using other private sector debt episodes (e.g., East Asia in the 1990s) present difficulties. Still, so far, preliminary results based on partial information up to mid-2010 indicate that the behavior of consumption and investment in the Baltic countries is overall consistent with the predictions of the DOI. Regarding consumption, since peaking pre-crisis, preliminary proxies for debt overhang induced losses have averaged around 3 percent of GDP in the Baltic countries. Regarding fixed investment, as suggested by the DOI, the rough estimate suggests potential losses in Latvia worth about 4 percent of GDP and the absence of major effects in the other two countries. Regardless, in the years to come it will be important to confront the DOI with the full economic experience of the Baltic countries as they settle towards their new steady states.

II. How Indebted is the Nonfinancial Private Sector in the Baltic Countries? Some Stylized Facts

Between 2004 and 2007–08 the Baltic countries experienced considerable expansions of private sector credit (Annex 1).[6] Bank credit to the private sector as a percent of GDP doubled in Lithuania and rose by 60–80 percent in Estonia and Latvia. The share of household borrowing in bank credit rose in all three countries, accounting for close to half at end 2009 and up from around 30–35 percent five years earlier.

While some models estimate that only in Estonia credit vastly exceeds levels commensurate with fundamentals, these estimates may give an incomplete picture of balance sheet health (Figure 1). According to these models, Lithuania would still be

Figure 1. Private Sector Domestic Bank Credit
(Percent share of GDP)

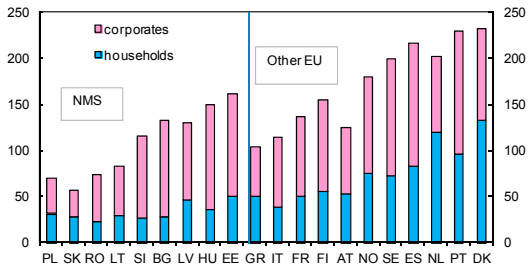


Sources: IFS; and Staff calculations.

[6] Bakker and Gulde (2010) and the European Commission (2010).

considerably below its fundamental level of credit depth, while Latvia roughly in-line.[7] The shown estimates, however, ignore the substantial amount of nonbank and debt from nondomestic creditors.[8] This paper therefore focuses exclusively on measures of total indebtedness, rather than bank credit only.[9]

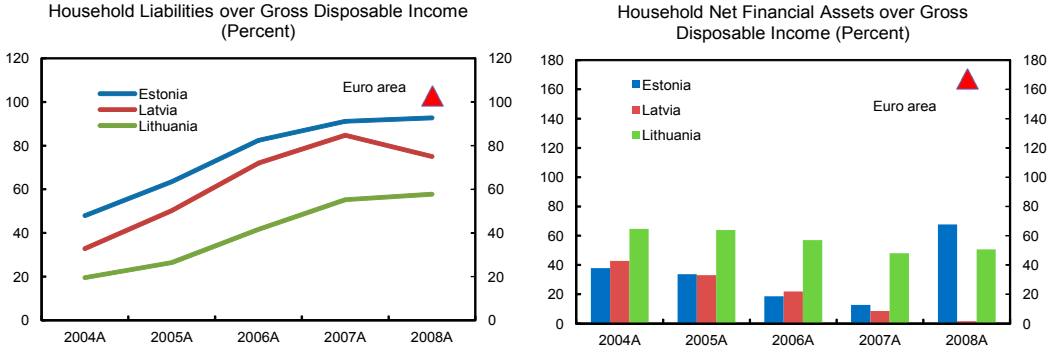
Figure 2. Nonfinancial Private Sector Loans over GDP, 2008
(Percent)



Source: Eurostat; and Bank of Estonia.

Simple cross-country comparisons may also provide ambiguous results. Estonia and Latvia recorded among the highest levels of private sector indebtedness across EU new member states (Figure 2). But across Europe more broadly, and across countries and sectors with different income levels, there is significant variation in private sector debt ratios. It is thus not straightforward to conclude on the health of Baltic balance sheets. More in-depth analysis, especially at sectoral level, is required.

Figure 3: Leverage Ratios of the Household Sector



Source: Eurostat, Bank of Estonia.

Even though Baltic household indebtedness does not yet exceed the euro area average, unlike in the euro area, debts are not matched by financial wealth (Figure 3). Capital (household liabilities over gross disposable income) and income gearing (interest service as a percent of gross disposable income) appear similar to levels observed on average in the euro zone. In contrast, the net financial asset position relative to disposable income is less than 70 percent, as opposed to considerable net wealth, 170 percent of income, in the euro

[7] Cottarelli et al (2003).

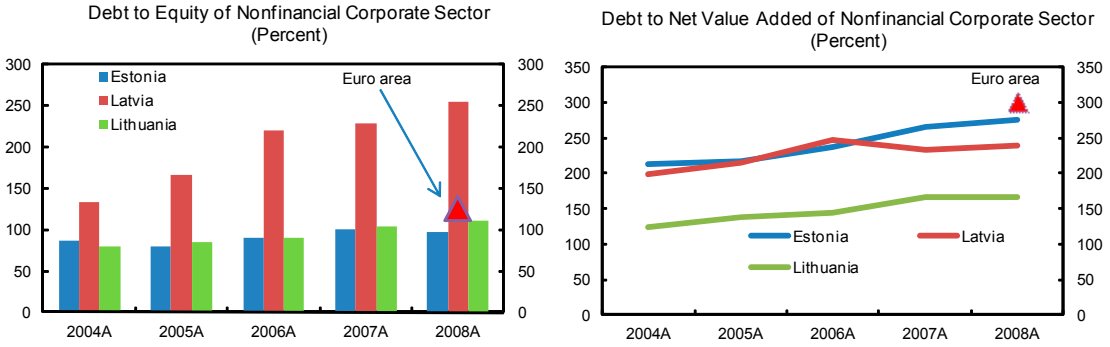
[8] Large foreign corporate debts reflect real and financial integration of the Baltic economies with each other and with the other Nordic countries. In Estonia, for example, about 40 percent of corporate debt comes from abroad, reflecting intragroup, trade finance, and other foreign bank debt.

[9] The Cottarelli (2003) methodology could not be applied to total private debt as it was calibrated on domestic bank credit.

zone.[10] Households in the Baltic countries borrowed mainly to purchase real estate, not included in financial assets. While the upgrading of a dilapidated post-Soviet housing stock is welfare enhancing in the long run, the large correction in house prices—between 50-80 percent from their peaks—has also severely diminished current housing wealth (Annex 1).

Across the Baltic countries debts were mainly accumulated by higher income households and yet, in some cases, these households have remained little indebted. In Estonia, 30 percent of the top income quintile households reported to be indebted compared with well below 2 percent for the lowest quintile. Similar, though perhaps less stark, differences in distributions of debt apply in the other two countries.[11] Yet, in Estonia and Latvia, high income households still have below average debt service ratios in contrast with Lithuania, highlighting the importance of comparing liabilities to repayment capacity (Annex 2).

Figure 4. Leverage Ratios of the Nonfinancial Corporate Sector



Source: Eurostat, Bank of Estonia, European Central Bank.

Source: Eurostat, Bank of Estonia.

Gearing levels of the nonfinancial corporate sector are at or below levels in the euro area, except for Latvia, whose debt-to-equity ratio is more than double that in the other two countries (Figure 4). High gearing ratios (in terms of debt-to-equity) need not be problematic when income streams are stable. But pre-crisis corporate revenues in the Baltic countries were not less, but instead more volatile than in the euro area and hence may not justify such elevated levels of capital gearing (Table 1).

Table 1: Volatility of Operating Surplus
(Standard deviation of quarterly changes; 2002Q2-2008Q3)

Estonia	Lithuania	Latvia	Euro area (12)
9.01	16.76	14.16	0.60

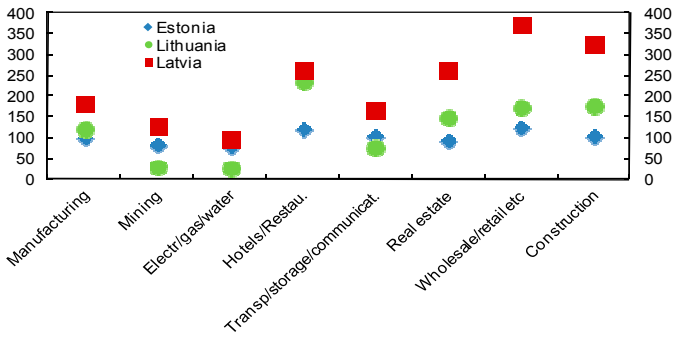
Source: Datastream

[10] It should be noted that the measurement of financial wealth poses difficulties. It can be subject to large revisions and is dependent on volatile movements in share prices. This may also affect the validity of cross-country comparisons at a given point in time. The sharp jump in financial assets of Estonian households in 2008, for example, reflects a methodological change in measuring share holdings, starting in that year.

[11] Mitra et al (2009) and Lithuanian Central Bank Financial Stability Review 2009.

The distribution of leverage across corporate sectors differs, including across countries (Figure 5). Latvia and Lithuania display considerable variation, which is less the case in Estonia. While Lithuania appeared only moderately indebted on an aggregate basis, sectoral data point to pockets of considerable leverage. Hotels and restaurant sectors, retail wholesale, real estate and construction record the highest leverage ratios in Latvia and Lithuania.

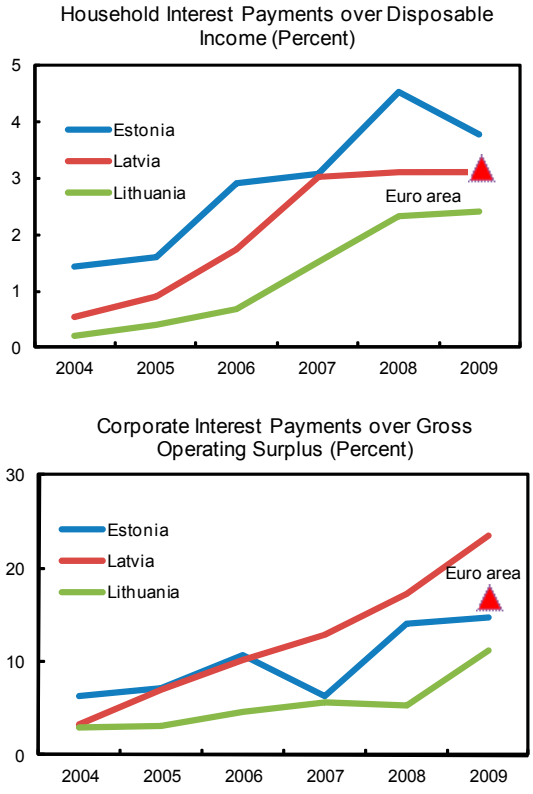
Figure 5. Debt to Equity of Nonfinancial Corporate Sectors (2007)
(Percent)



Source: National Statistical Offices.

Declining private sector incomes and deflationary pressures have increased the debt burden during the crisis, but the impact of this increase has been kept in check thanks to extensive euroization of debt contracts (Figure 6). In all countries, it is estimated that interest service payments fell during 2009 as monetary policy was loosened in the eurozone.[12] [13] In Lithuania, however, with only 70 percent foreign-currency denominated compared with over 90 percent in Latvia and Estonia, this may not have been enough to compensate for ongoing high local currency rates and falling incomes. The debt service burden may have also increased in the Latvian corporate sector, as profits fell by more than debt service.

Figure 6. Debt Service Ratios



Source: Eurostat, National Central Banks, European Central Bank and Staff calculations.

Banks have also been rescheduling debt service payments into the future, alleviating pressures in the short-term. Rescheduling of debt service or principal would typically, however, be compensated by the borrower posting more collateral or paying higher interest rates in the

[12] Most mortgages in the Baltics are at variable rates and indexed to six-month euribor, reset twice a year.

[13] Ideally, one would also incorporate amortization payments. These data are however not easily available.

future, resulting in an unchanged net present value of the level of debt.

All in all, the stylized facts have been giving somewhat conflicting messages. For example, single indicators, such as household debt-to-income or estimates of 'fundamental' bank credit, would not have indicated a risk of debt overhang in the case of Latvia or Lithuania, while others such as household assets over income would have done so. It seems therefore difficult, based on individual measures only, to reach a conclusion across countries and sectors. A comprehensive and consistent organizing framework that considers jointly a range of indicators is therefore called for.

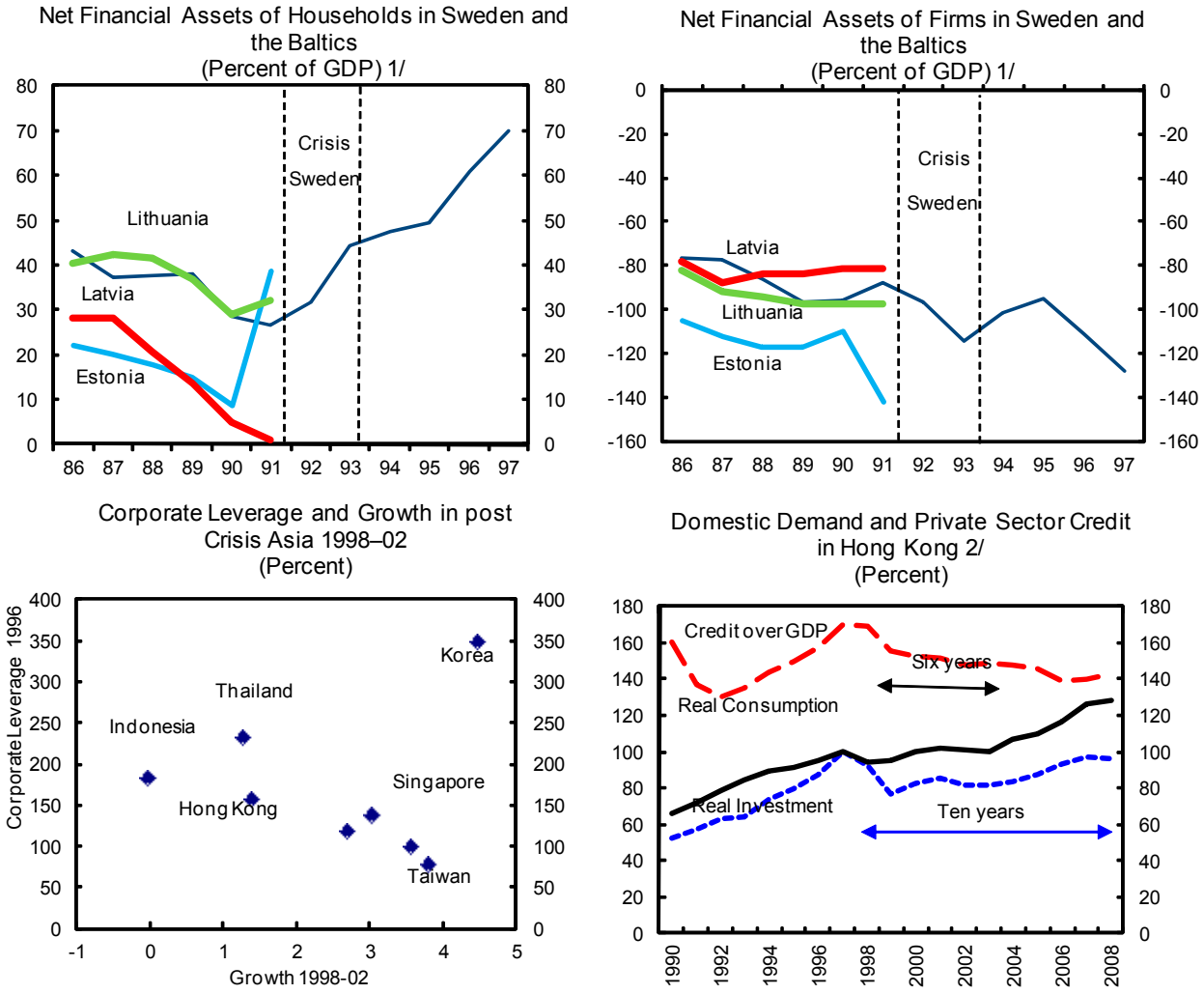
III. Will Private Sector Debt Weigh on Domestic Demand? Indications from a Debt Overhang Index

The concentration of nonperforming loans during the crisis in highly leveraged sectors already reveals some degree of undue sectoral indebtedness. Real estate development, construction and hotels sectors, for example, recorded the highest ratios of overdue loans in Latvia.

But given the negative repercussions of default (e.g., in terms of credit history, social stigma, etc.) agents often do not default even if debts are taxing, but instead curtail other spending. Debts may weigh on aggregate consumption and investment if indebted firms and households are (or are expecting) to spend an 'excessive' proportion of (future) incomes on debt service and if, in addition, overindebted agents account for a relatively large share of demand. In short, debt overhang effects on demand kick in.

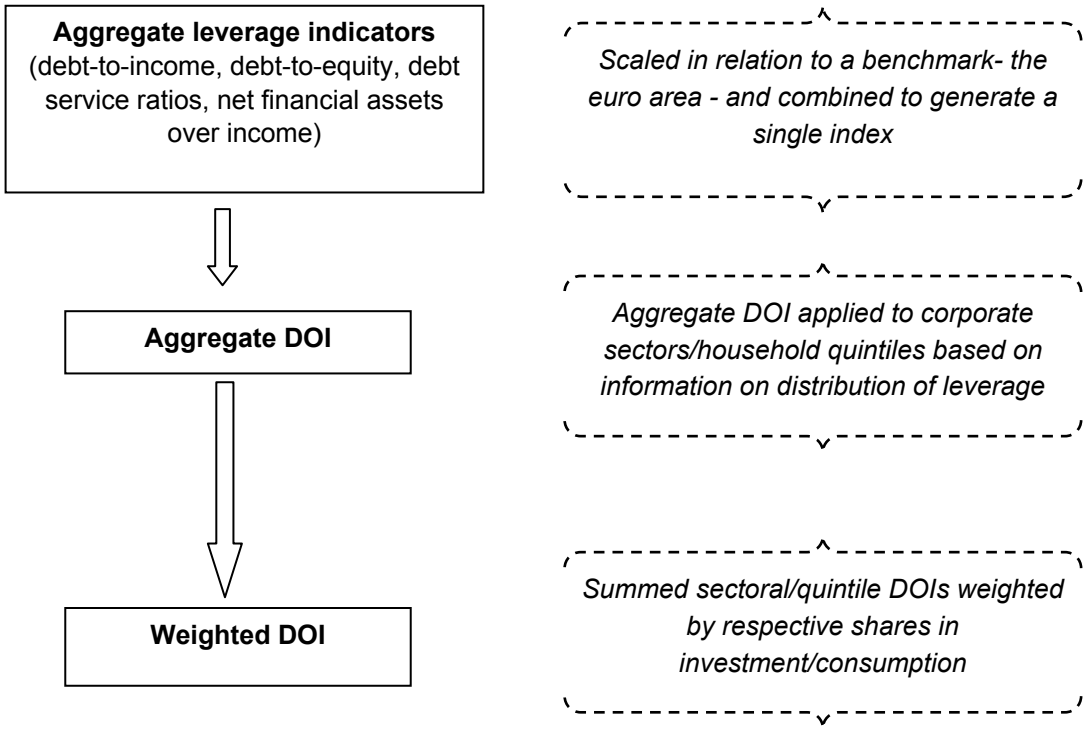
Evidence from other country experiences indicates that balance sheet adjustments in the context of deflation can indeed be protracted (Figure 7). In Hong Kong, a country with also a fixed exchange rate regime, deflation and the legacy of a property and credit boom weighed on domestic demand and growth for many years in the aftermath of the Asian Crisis, even though China's rapid economic development supported the tradable sector. Real investment has not yet returned to the 1997 level. Elsewhere in the Asian region, growth was also inhibited by necessary balance sheet adjustments. Sweden's revival from the 1992 crisis, in turn, was relatively fast because export-oriented firms benefited from exchange rate devaluation and strong external demand. Corporate deleveraging was quick and relatively short-lived, in contrast to households rebuilding financial assets for a number of years.

Figure 7. Debt Deleveraging Experience in 1990s Sweden and Post-Asian Crisis



Sources: Eurostat, Swedish Statistical Offices and Bank of Estonia; Aric; DataStream; and IMF staff calculations.
1/ Data on Baltics are from 2003–08.
2/ For real consumption and real investment, year 1997=100.

The next section brings together the various pieces of balance sheet information from above to construct a Debt Overhang Index (DOI) for the corporate and household sectors in each of the three economies. The DOI is a composite index of different flow and stock measures of aggregate indebtedness, scaled relative to the euro area average (aggregate DOI), and weighted in relation to the share in demand of different sectors or households (weighted DOI) (Annex 2). Schematically, the construction looks as follows:



This can be expressed as:

Aggregate $DOI_j = \sum_{i=1}^{3} 10 x_{ij} / x_{ijeurozone}$ with j=household or corporate sector; x_i= balance sheet indicator i, covering 3 indicators.

Weighted $DOI_j = \sum_{m=1}^{M} (DOI_j \times (y_{jm} / y_{j)} \times (D_{jm} / D_{j)})$ with y_m=debt indicator of sector/quintile m; D_m=demand of sector /quintile m; M=5 for household sector; M=9 for corporate sector.

The DOI is not a precise measure of debt overhang, but a simple organizing framework for a joint comparison in a broad-based and consistent fashion of balance sheet situations across countries and sectors. It aims to take stock of balance sheet conditions on the eve of the crisis

in the Baltic countries, and hence most, especially stock variables, are based on data before 2009. The DOI is subject to a number of limitations. For a start, euro area gearing ratios should probably be seen as upper end benchmarks given that the euro area nonfinancial private sector itself is considered relatively highly leveraged.[14][15]

Reflecting the low level of financial assets, the Baltic household sectors score relatively poorly relative to the euro area, indicating a relatively high risk of debt overhang (Table 2). Latvia scores over three times the level in the euro area, Lithuania and Estonia nearly double.

Table 2: Debt Overhang Index for the Household Sector

	Estonia	Latvia	Lithuania	Euro area
Aggregate	49.4	92.2	47.8	30
Weighted	52.5	93.1	40.9	…
Percent difference	6.3	1.0	-14.5	…

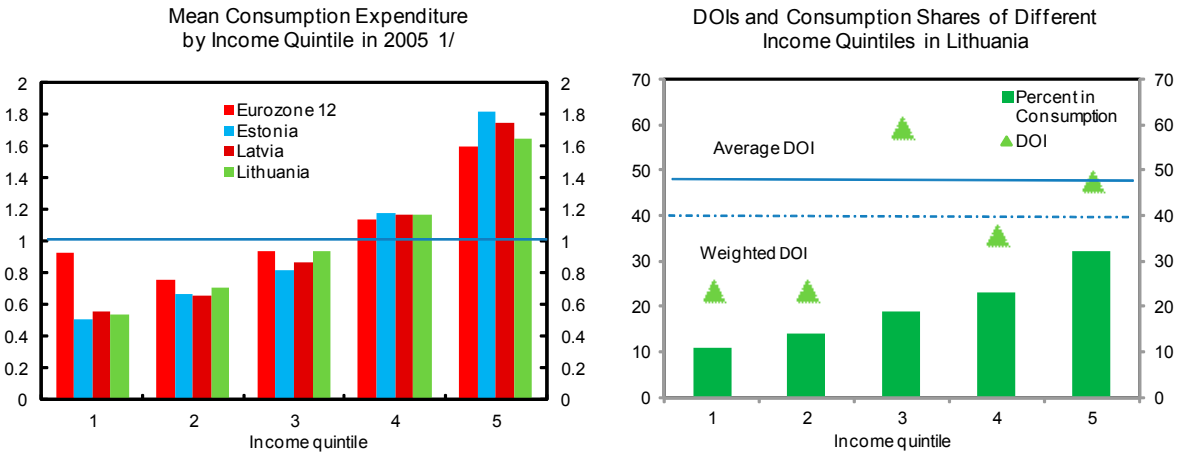
Source: Staff calculations.

Further, the distribution of debts in Estonia and Lithuania may be influencing the degree of debt overhang in the household sector—in Estonia further aggravating it (a 6 percent increase of the DOI), while lessening it in Lithuania (a 15 percent reduction of the DOI). Across the region, low income households account for a smaller share of consumption than high income households (Figure 8). In some cases, their DOIs are also lower than that of high income households, i.e., they are less indebted than high income households. In Lithuania the first, second, and fourth quintile have below average DOIs, but account together for a larger share of consumption than the third income quintile who has an above average DOI (Figure 8). In contrast, Estonia's low income households are leveraged above average and account for a sufficiently large share of consumption to raise the weighted DOI above the aggregate.

[14] The current measure, for example, also imposes arbitrarily equal weighting and proportional scaling of indicators and relies on dated information on consumption shares by income quintiles.

[15] See ECB (2008) and (2009) and European Commission Directorate General of Economic and Financial Affairs (2009) on private sector leverage in the EU.

Figure 8. Distribution of Consumption and Leverage by Income Quintile



Sources: Eurostat; and IMF staff calculations.
1/ Mean consumption equalised to 1.

Though not considered in the DOI, negative housing equity could also weigh on household consumption even if the prevalence of owner-occupied housing should mitigate this risk. Reflecting the sharp decline in house prices in 2008 and 2009, 15 percent of total mortgage contracts (25 percent of exposures) in Estonia were in negative equity in 2009:Q2 (Annex I). In Latvia, the proportion is likely to have been even larger given the greater housing market correction, the increase in late 2009 in house prices notwithstanding.[16] Research suggests that the collateral channel—one of the channels through which house prices can affect consumer spending and investment—can indeed be important, albeit time varying.[17]

In contrast to the household sector, the Baltic corporate sector DOIs are more heterogeneous (Table 3). Latvia, due to the high debt-to-equity ratio, is well above the euro area average, while Lithuania and to a lesser extent Estonia are well below.

Table 3. Debt Overhang Index for the Corporate Sector

	Estonia	Latvia	Lithuania	Euro area
Aggregate	25.2	40.6	20.3	30
Weighted	22.1	38.3	20.4	…
Percent difference	-12.4	-5.7	0.3	…

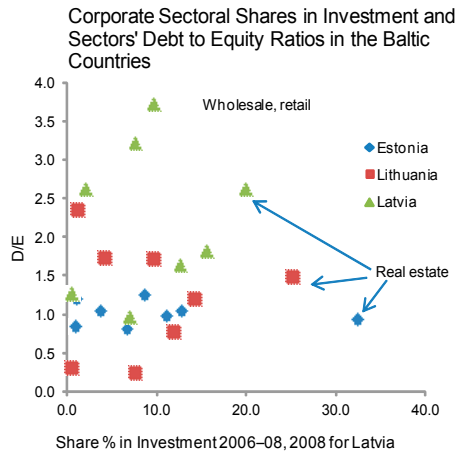
Source: Staff calculations.

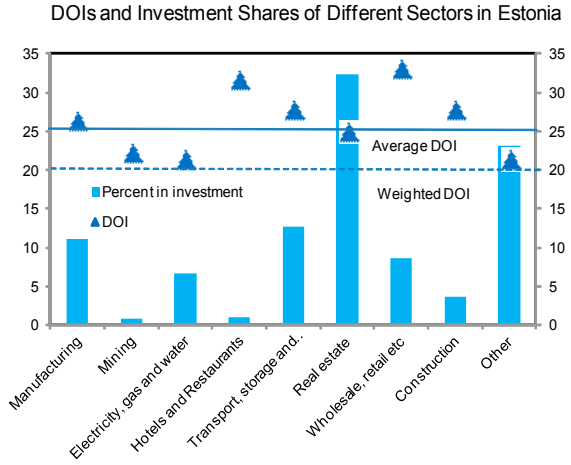
[16] At end June 2009, Swedbank reported that 54 percent of its mortgages in Latvia were in negative equity, compared with 37 percent for Lithuanian mortgages and 24 percent for loans granted in Estonia.

[17] See Summer 2006 Bank of England *Quarterly Economic Bulletin.*

The weighted DOI, to account for sectoral differences in leverage and in their contribution to investment, lowers the score significantly in Estonia (Figure 9). This partly reflects the fact that 'other sectors', which account for a large share in investment, have a below average DOI.

Figure 9. Distribution of Corporate Investment and Leverage by Sector



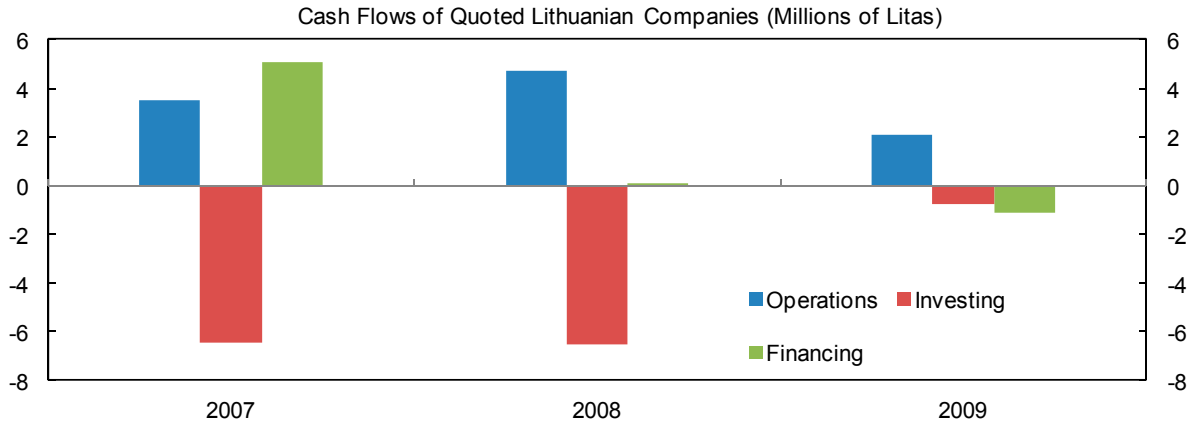


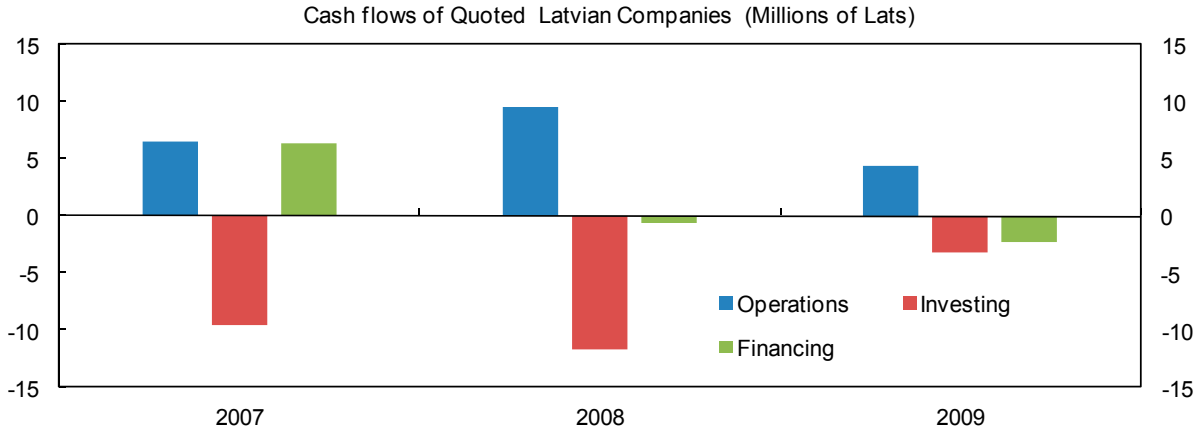
Sources: National Statistical Offices and Staff calculations.

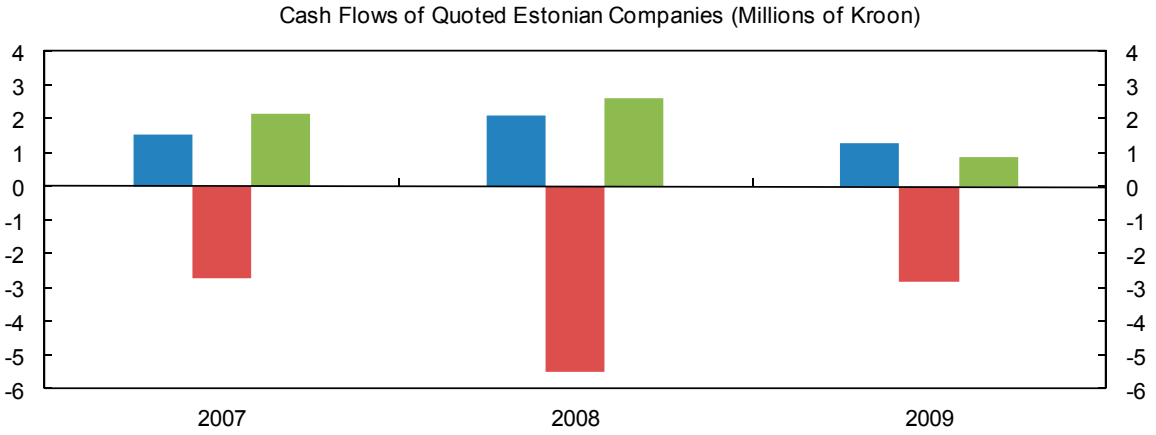
The following factors, not captured in the DOI, but with implications for investment also deserve attention:

- **Corporate investments have been partly financed through outside borrowing, not just cash flows, highlighting the importance of bank credit for investment.** Analysis of corporate accounts from companies listed on the local stock exchanges suggest that while cash from operations has played a role in financing investments, outside borrowing has also been important (Figure 10). Banks may curtail new lending if they consider corporate balance sheets to be overstretched with implications for business investment.

Figure 10. Cash Flows of Quoted Baltic Companies.







Source: Bloomberg and Staff calculations.

- **Construction and real estate sectors were facing excess supplies in 2009, which typically take a while to be absorbed (Table 4).** With office vacancy rates in respective capitals of between 20–30 percent (higher outside) and construction activity still at 50–80 percent of the average in the previous two years, investment in housing is thus unlikely to resume quickly.

Table 4: Construction Volumes and Office Vacancies
(Percent)

	Estonia	Latvia 1/	Lithuania 2/
Construction activity in 2009 relative to the averages in 2006-2008	50.8	52.2	80.4
Office vacancy rates in the capital in Q3 2009	20.0	27.0	18.0

Sources: Datastream; National Statistical offices and Ober-Haus Real Estate.

1/ Office vacancy rate for Latvia refers to Q4 2009.
2/ Construction data for Lithuania refers to non-residential only.

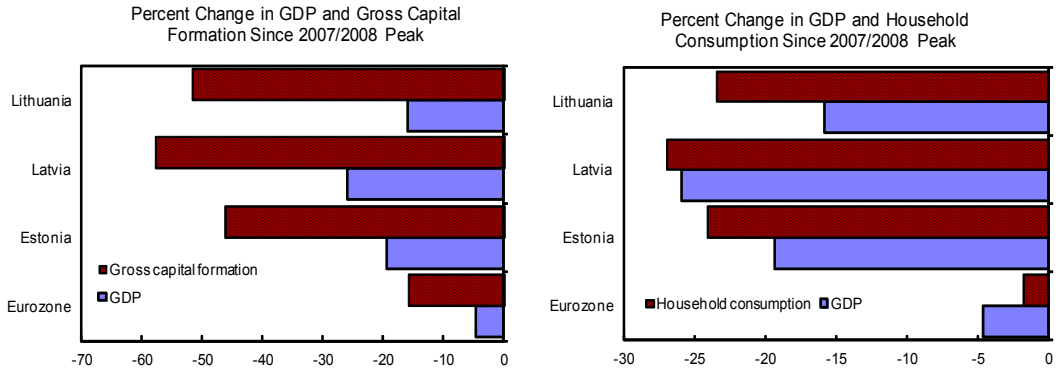
- **Leverage seems to be also present in foreign-owned firms, where debts could be taken over by the parent disposed with a larger and presumed healthy balance sheet.** In Estonia, 10 percent of total corporate debt is estimated to be owed to affiliated foreign firms, the share could be similar for Lithuania given that 16-18 percent of all corporate debt is owed to the rest of the world. Foreign ownership reaches 70–95 percent in the financial sector. Similar information is, however, not available for other sectors. Based on sectoral FDI stocks one would expect, however, foreign ownership of the corporate sector to be well below that in the financial sector, especially in Latvia and Estonia (Annex I). The leveraged hotels and restaurant sectors and construction seemingly did not attract much FDI and may therefore be mainly domestic-owned. Higher relative FDI stocks in the leveraged real estate and wholesale retail sectors could, however, suggest the possibility of a 'parental' safety net.

IV. A Preliminary Assessment of the DOI in The Baltic Countries

At this stage, only a very preliminary assessment of the DOI is possible. Following a number of severe shocks, the economic adjustments, including via sharp declines in credit growth, are still ongoing (Annex 1) and each of the economies has yet to return to its new steady state. Information on the demand of different income groups also only becomes available with long lags. Still, a comparison of consumption and investment aggregates since the onset of the crisis in the euro area and the Baltic countries could shed some light on the quality and usefulness of this indicator. In particular, in the case of consumption, given the relatively high DOIs, one would expect consumption in the Baltic countries to be weaker since late 2007 and early 2008 than indicated by past relationships with traditional determinants, but excluding the DOI or other leverage measures. In the case of investment, we would only anticipate major overpredictions in Latvia.

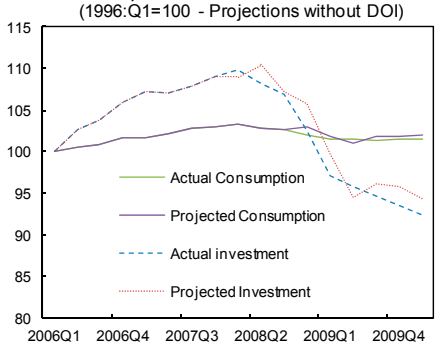
The decline in consumption across the Baltic economies is broadly consistent with the DOI predictions. Consumption in all three countries contracted from their respective 2007 or 2008 peaks by more than GDP, in contrast with the eurozone where the contraction was less than GDP (Figure 11). This conclusion is confirmed in regression analysis when controlling for changes in income, unemployment and financial conditions. Using data starting in the late 1990s to just before the crisis (see Annex 3), quarterly changes in household consumption were regressed on lagged quarterly changes in income, lagged changes in consumption, augmented with lagged short-term euribor interest rates, and lagged changes in the unemployment rate. Out-of-sample (static) projections for the period 2008–10 indicate persistent overprediction of consumption of about 4 to 8 percent in cumulative terms for the three countries, in contrast to the absence of projection bias for the eurozone (Figures 12 and 13). In contrast to the DOI, however, the overprediction is the largest for Lithuania, not for Latvia. As the goodness of fit of these equations (R2 between 0.2 and 0.5) is not particularly high, it is advisable not to overinterpret differences in the size of estimation gaps across countries. The gist—that consumption was

Figure 11. GDP and Domestic Demand Since 2007/08 Peak



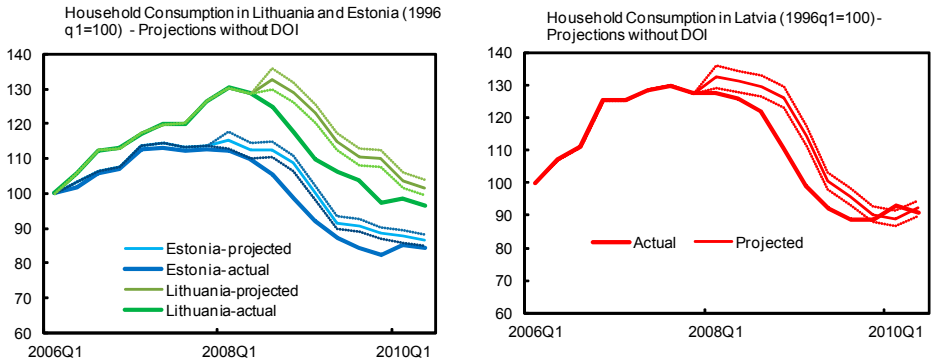
Source: Haver and Staff calculations.

Figure 12. Household Consumption and Gross Capital Formation in Euro Area
(1996:Q1=100 - Projections without DOI)



Source: Haver and Staff calculations.

Figure 13. Consumption in the Baltic Countries



Dashed lines show standard error bands.

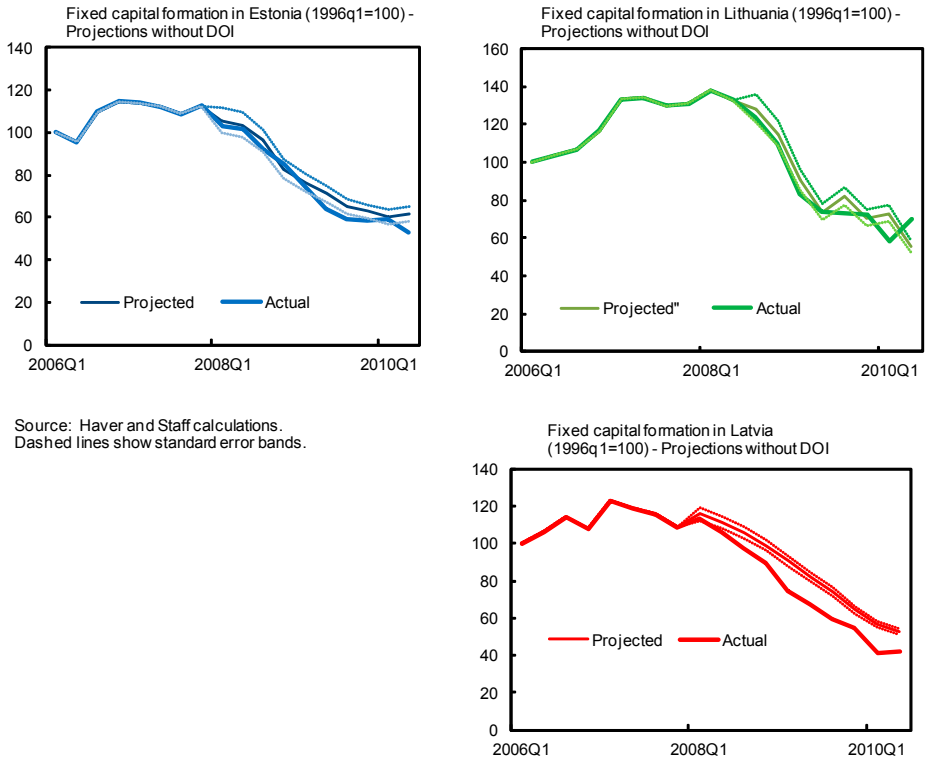
Source: Haver and Staff calculations.

weaker than predicted—was indeed robust to different specifications, such as changes in the sample period (starting 1999 or 1995) and choice of explanatory variables (interest rates, gross disposable income, GDP, unemployment rate, level or changes).[18] The on average 6 percent estimation gap could thus be interpreted as a rough proxy for lost household consumption resulting from debt overhang. It compares to overall reductions in personal consumption by one quarter in both Lithuania and Estonia and close to one third in Latvia. Given the share of private consumption in GDP, everything equal, the proxy for debt overhang indicates a reduction in GDP in the Baltic countries by around 3 percent.

Consistent with the DOI, investment underperforms based on historic relationships solely in Latvia (Figures 12 and 14). Quarterly changes in real gross capital formation were regressed on lagged quarterly changes in GDP (or gross operating surplus), lagged changes in capital formation and augmented with lagged short-term euribor interest rates, again using data just up to the crisis. As for consumption, the results were robust to changes in the specification. The cumulative 14 percent gap between actual and projected gross capital formation between end-2007 and mid 2010 for Latvia is large, consistent with the high DOI. This compares with an overall 60 percent decline in investment over that period. Again, the 14 percent investment gap—equivalent to around 4 percent of GDP—could be interpreted as a proxy for the amount of lost fixed capital formation incurred as a result of firms' above average leverage. It should be noted though that a portion of the overprediction could also be attributable to estimation errors. Finally, in the case of Estonia and Lithuania, there is no systematic overprediction, in-line with the DOI indicators.

[18] The projection errors could of course also reflect other variables missing from the equation. Most factors, such as wages or uncertainty are, however, highly correlated with variables included in the regression, such as GDP, unemployment or the interest rate. Debt overhang, in contrast, is a stickier variable and hence less correlated with variables included in the regression.

Figure 14. Investment in the Baltic Countries



V. Conclusion and Policy Challenges

The DOI permits synthesizing and comparing the risk of debt overhang for domestic demand across sectors and countries, taking into account jointly flow and stock indicators of household and corporate sector indebtedness, and their distribution. This is useful especially when different leverage indicators and comparisons fail in telling a consistent story.

All Baltic countries appear to be at risk of debt overhang, but there are differences across sectors and countries. Due to limited financial assets, this risk could be more acute in the household than in the corporate sector. Taking account of the distribution of leverage in the household sector and relative shares in consumption further increases this risk in Estonia, while lessening it in Lithuania. Turning to the corporate sector, the evidence suggests an aggregate problem of overstretched balance sheets mainly in Latvia. For Estonia, the analysis also finds that distributional factors mitigate risks, with sectors contributing considerably to investment not exhibiting particularly high levels of leverage. Finally, even though not captured in the DOI, foreign corporate ownership could also play a small role in alleviating debt overhang problems in the Baltic economies.

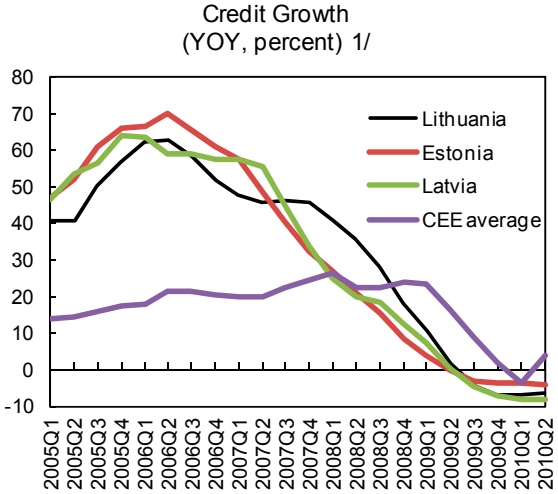
It is too early for a comprehensive testing of the predictive power of the DOI on the Baltic countries. And, given data constraints, cross-country or over time assessments of the DOI using other private sector debt episodes (e.g., East Asia in the 1990s) present difficulties. Still, so far, preliminary results based on partial information up to mid-2010 indicate that the behavior of consumption and investment in the Baltic countries is overall consistent with the predictions of the DOI. Regarding consumption, since peaking pre-crisis, preliminary proxies for debt overhang induced losses have averaged around 3 percent of GDP in the Baltic countries. Regarding fixed investment, as suggested by the DOI, the rough estimate suggests potential losses in Latvia worth about 4 percent of GDP and the absence of major effects in the other two countries. Regardless, in the years to come it will be important to confront the DOI with the full economic experience of the Baltic countries as they settle towards their new steady states.

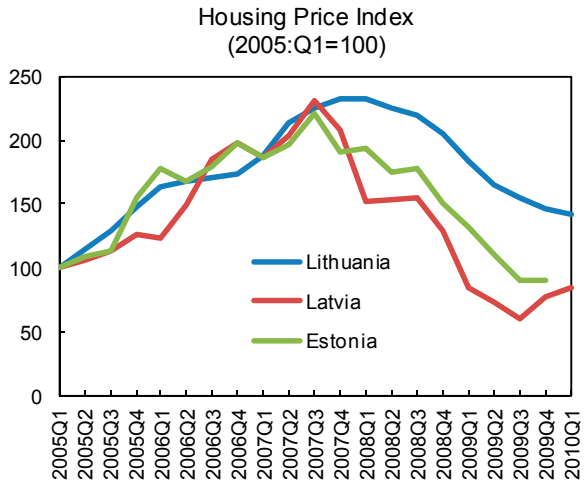
Meanwhile, the debt overhang confronts policy makers with a number of challenges. At the macro level, they face the tension of deflating the economy to restore competitiveness and promoting debt deflation, further weakening demand and hence growth. Extensive wage cuts, both in the public and private sector are helping correct previous imbalances between sectors and in aggregate, but are also fueling deflationary pressures as the real value of debt rises. However, the policy pay-off, if restored competiveness is rewarded with a permanently higher contribution of net trade to GDP growth, is itself dependent on exogenous factors such as demand developments in key export partners.

At the micro level, policymakers can be torn between the desire to optimize bankruptcy legislation to generate debt relief and ensure orderly processes that preserve value, and the concern to protect private contracts and limit fiscal costs.[19] In Estonia and Lithuania personal bankruptcy lasts for at least five years before debts are discharged, longer than in many other countries. Bankruptcy for both households and corporations typically result in liquidation rather than reorganization, which may not be always efficient. But proposals to optimize the legal landscape can be interpreted as populist borrower-friendly bail-outs, undermining payment discipline, while weakening the credibility of private contracts. Across the region, courts' lack of familiarity with insolvency procedures may also be a factor undermining the speedy exit of nonviable firms and rehabilitation of viable ones.

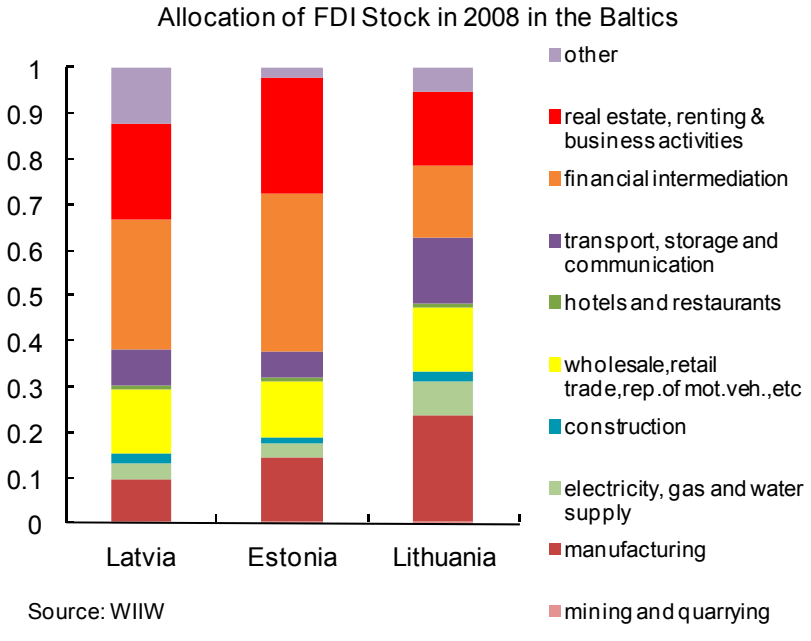
[19] See IMF staff position note by Laeven and Laryea (2009).

ANNEX I. CREDIT GROWTH, HOUSE PRICES AND FDI IN THE BALTIC ECONOMIES





Source: Haver; and Global Property Guide.
1/ The CEE average is the average on Poland, Czech. Rep., and Hungary since data before 2007 on Bulgaria and Romania are not available.



Source: WIIW

ANNEX II. CONSTRUCTION OF THE DEBT OVERHANG INDEX (DOI)

The DOI aggregates indicators of leverage in the household and nonfinancial corporate sector in relation to a benchmark (aggregate DOI), takes account of distributional differences in leverage and is then reweighed in relation to the share of different segments of the population in demand (weighted DOI). D stands for debt, GDI for gross disposable income, R for debt service and NFA for net financial assets. NVA represents net value added and GOS gross operating surplus. Unless indicated otherwise, ratios involving stock variables (e.g. D/GDI or NFA/GDA) refer to 2008, while ratios based on flow variables (e.g. R/GOS or R/GDI) refer to observations in 2009.

Using the household sector DOI for Lithuania as an example, the following explains in more detail the steps. We start with three aggregate balance sheet indicators. The euro area serves as benchmark with each indicator attributed a score of 10. The total for the euro area is thus 30. Debt-to-gross disposable income in Lithuania is 60 percent, compared with 100 percent for the euro area. Hence, it scores six on this indicator. The same is done for the other indicators and all three scores are summed, resulting in a score of 48. This is the aggregate DOI. Next, this score of 48 is allocated to the different income quintiles, based on available information on debt service ratios. An income quintile with a higher debt service ratio than average is attributed a proportionally higher DOI (e.g., the third income quintile has a debt service ratio 30 percent above average; hence its DOI rises to 60). Finally, each income quintile DOI is weighted by the share of each quintile in consumption and then summed to generate a consumption/quintile weighted DOI, which is equal to 41 for Lithuania. The calculations for the corporate sector are based on the same principle: instead of quintiles and consumption, the reweighting of the DOI reflects sectoral leverage and shares in corporate investment.

Household Sector DOI:

For Latvia, the ratio of net financial assets to gross disposable income is capped at the ratio of the next lowest country in terms of NFA/GDI in the eurozone, Slovakia, with a ratio of 0.23. The intuition is that beyond a certain threshold the effect of a lower NFA/GDI on demand falls to zero. The capping has no effect on the thrust of the results.

Leverage Ratios in the Household Sector, 2008–09

Shares	Estonia	Latvia	Lithuania	Euro area
D/GDI	0.9	0.8	0.6	1
NFA/GDI	0.6	0.02	0.5	1.7
R/GDI	0.038	0.033	0.025	0.032

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Aggregate Household Debt Overhang Index

Shares	Estonia	Latvia	Lithuania	Euro area
D/GDI	9.2	8.0	6.0	10
NFA/GDI	28.3	73.9	34.0	10
R/GDI	11.9	10.3	7.8	10
Sum	49	92	47.8	30

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Estonia

Debt service per quintile (2007)

Quintile	1	2	3	4	5	Average
Percentage debt service/income	10.0	8.0	5.0	6.0	6.0	6.0
Relative to average	1.7	1.3	0.8	1.0	1.0	1.0

Consumption per quintile (2005)

Quintile	1	2	3	4	5	Total
Share	0.1	0.1	0.2	0.2	0.4	1.0

DOI per income quintile

Quintile	1	2	3	4	5
	82.3	65.9	41.2	49.4	49.4

Weighted DOI by share in consumption

Quintile	1	2	3	4	5	Total
	8.2	8.6	6.6	11.4	17.8	52.5

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Latvia

Debt service per quintile (2007)

Quintile	1	2	3	4	5	Average
Percentage debt service/income	10.0	10.0	8.0	7.0	5.0	7.0
Relative to average	1.4	1.4	1.1	1.0	0.7	1.0

Consumption per quintile (2005)

Quintile	1	2	3	4	5	Total
Share	0.1	0.1	0.2	0.2	0.3	1.0

DOI per income quintile

Quintile	1	2	3	4	5
	131.8	131.8	105.4	92.2	65.9

Weighted DOI by share in consumption

Quintile	1	2	3	4	5	Total
	14.5	17.1	17.9	21.2	22.4	93.1

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Lithuania

Debt service per quintile (2007)

Quintile	1	2	3	4	5	Average
Percentage debt service/income	2.0	2.0	5.0	3.0	4.0	4.0
Relative to average	0.5	0.5	1.3	0.8	1.0	1.0

Consumption per quintile (2005)

Quintile	1	2	3	4	5	Total
Share	0.1	0.1	0.2	0.2	0.3	1.0

DOI per income quintile

Quintile	1	2	3	4	5
	23.9	23.9	59.8	35.9	47.8

Weighted DOI by share in consumption

Quintile	1	2	3	4	5	Total
	2.6	3.3	11.4	8.2	15.3	40.9

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Corporate Sector DOI:

Leverage Ratios in the Nonfinancial Corporate Sector

Shares	Estonia	Latvia	Lithuania	Eurozone
D/NVA	2.7	2.4	1.6	3
D/E	0.96	2.5	1.1	1.3
R/GOS	0.15	0.23	0.11	0.17

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Aggregate Corporate Sector Debt Overhang Index

Scores	Estonia	Latvia	Lithuania	Eurozone
D/NVA	9	7.9	5.3	10
D/E	7.4	19.2	8.5	10
R/GOS	8.8	13.5	6.5	10
Sum	25.2	40.6	20.3	30

Sources: Eurostat; Mitra et al (2009); IMF staff calculations.

Estonia

Debt to Equity Ratios of Nonfinancial Corporate Sectors in Estonia (2007)

	Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Communication	Real Estate	Wholesale, Retail etc	Construction	Other	Average (2008)
D/E	1.01	0.86	0.82	1.21	1.06	0.95	1.27	1.06	0.82	0.96
Relative to Average	1.05	0.89	0.85	1.26	1.11	0.99	1.32	1.10	0.85	1.00

Sectoral DOIs in Estonia

Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Communication	Real Estate	Wholesale, Retail etc	Construction	Other	Average
26.4	22.5	21.6	31.9	27.9	25.1	33.2	27.8	21.5	25.2

Source: Statistics Estonia

Shares in Total Corporate Investment (2006-2008)

	Share
Mining and Quarrying	0.01
Manufacturing	0.11
Electricity, Gas and Water Supply	0.07
Construction	0.04
Wholesale and Retail Trade; Repair of Motor Vehicles etc.	0.08
Hotels and Restaurants	0.01
Transport, Storage and Communication	0.13
Real Estate, Renting and Business Activities	0.32
Other	0.23

Source: Statistics Estonia

DOIs weighted by share of investment in Estonia

Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Communication	Real Estate	Wholesale, Retail etc	Construction	Other	Total
2.9	0.2	1.4	0.3	0.3	8.1	2.8	1.0	5.0	22.1

Source: Statistics Estonia

Latvia

Debt to equity ratios of non-financial corporate sectors in Latvia (2007)

	Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Communication	Real Estate	Wholesale, Retail etc	Construction	Other	Average (2008)
D/E	1.83	1.29	0.98	2.64	1.67	2.64	3.73	3.25	2.38	2.50
Relative to average	0.73	0.52	0.39	1.06	0.67	1.06	1.49	1.30	0.95	1.00

Source: Latvian Statistical Office

Shares in Total Corporate Investment (2008)

	Share
Mining and Quarrying	0.004
Manufacturing	0.154
Electricity, Gas and Water Supply	0.069
Construction	0.075
Wholesale and Retail Trade; Repair of Motor Vehicles etc.	0.096
Hotels and Restaurants	0.020
Transport, Storage and Communication	0.124
Real Estate, Renting and Business Activities	0.198
Other	0.260

Source: Latvian Statistical Office

Sectoral DOIs in Latvia

Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, storage and Communication	Real estate	Wholesale, Retail etc	Construction	Other
29.8	21.0	15.9	42.9	27.1	42.9	60.6	52.8	38.7

DOIs Weighted by Share of Investment in Latvia

Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Communication	Real Estate	Wholesale, Retail etc	Construction	Other	Total
4.6	0.1	1.1	0.9	3.4	8.5	5.8	4.0	10.0	38.3

Source: Latvian Statistical Office

Lithuania

Debt to Equity Ratios of Nonfinancial Corporate Sectors in Lithuania(2007)

	Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Sommunication	Real Estate	Wholesale, Retail etc	Construction	Other	Average (2008)
D/E	1.22	0.32	0.26	2.38	0.78	1.51	1.74	1.75	0.66	1.10
Relative to average	1.11	0.29	0.24	2.16	0.71	1.37	1.58	1.59	0.60	1.00

Source: Lithuanian Statistical Office

Shares in Total Corporate Investment Lithuania (2006-2008)

	Share
Mining and Quarrying	0.00
Manufacturing	0.14
Electricity, Gas and Water Supply	0.07
Construction	0.04
Wholesale and Retail Trade; Repair of Motor Vehicles etc.	0.10
Hotels and Restaurants	0.01
Transport, Storage and Communication	0.12
Real Estate, Renting and Business Activities	0.25
Other	0.26

Source: Lithuanian Statistical Office

Sectoral DOIs in Lithuania

Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Communication	Real estate	Wholesale, Retail etc	Construction	Other
22.4	5.9	4.9	43.9	14.5	27.8	32.0	32.3	12.2

DOIs Weighted by Share of Investment in Lithuania

Manufacturing	Mining	Electricity, Gas and Water	Hotels and Restaurants	Transport, Storage and Sommunication	Real Estate	Wholesale, Retail etc	Construction	Other	Total
3.2	0.0	0.4	0.5	1.7	7.0	3.1	1.3	3.2	20.4

Source: Lithuanian Statistical Office

ANNEX III. OLS REGRESSIONS OF HOUSEHOLD CONSUMPTION AND CORPORATE INVESTMENT IN THE BALTIC COUNTRIES AND THE EURO AREA

Dependent Variable: DLOG(CEURO)

Sample (adjusted): 1999Q2 2007Q4

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004450	0.002108	2.111226	0.0432
DLOG(GDPEURO(-1))	0.351239	0.256644	1.368587	0.1813
DLOG(CEURO(-1))	-0.200550	0.201098	-0.997278	0.3266
DUNEURO	-0.005916	0.005011	-1.180428	0.2471
R(-1)	-0.000408	0.000550	-0.741544	0.4641

R-squared	0.273459	Mean dependent var	0.004563
Adjusted R-squared	0.176587	S.D. dependent var	0.003204
S.E. of regression	0.002907	Akaike info criterion	-8.711740
Sum squared resid	0.000254	Schwarz criterion	-8.489548
Log likelihood	157.4555	Hannan-Quinn criter.	-8.635039
F-statistic	2.822882	Durbin-Watson stat	2.067796
Prob(F-statistic)	0.042329		

Dependent Variable: DLOG(CEST)

Sample (adjusted): 1999Q2 2007Q4

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.028079	0.014164	1.982370	0.0567
DLOG(GDPEST(-1))	0.628865	0.306454	2.052073	0.0490
DLOG(CEST(-1))	-0.275571	0.139944	-1.969160	0.0582
DUMEST	-0.051201	0.014948	-3.425304	0.0018
R(-1)	-0.004422	0.003833	-1.153570	0.2578

R-squared	0.453083	Mean dependent var	0.020115
Adjusted R-squared	0.380160	S.D. dependent var	0.026064
S.E. of regression	0.020520	Akaike info criterion	-4.803257
Sum squared resid	0.012632	Schwarz criterion	-4.581065
Log likelihood	89.05700	Hannan-Quinn criter.	-4.726557
F-statistic	6.213225	Durbin-Watson stat	2.190036
Prob(F-statistic)	0.000914		

Dependent Variable: DLOG(CLT)

Sample (adjusted): 1999Q2 2008Q2

Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.057236	0.016014	3.574057	0.0011
DLOG(GDPLT(-1))	0.208557	0.239220	0.871821	0.3898
DLOG(CLT(-1))	-0.455723	0.167193	-2.725733	0.0103
UNLT(-1)	-0.001390	0.001141	-1.217649	0.2323
R(-1)	-0.005561	0.004202	-1.323539	0.1950

R-squared	0.230567	Mean dependent var	0.021667
Adjusted R-squared	0.134387	S.D. dependent var	0.024184
S.E. of regression	0.022501	Akaike info criterion	-4.625446
Sum squared resid	0.016201	Schwarz criterion	-4.407755
Log likelihood	90.57076	Hannan-Quinn criter.	-4.548700
F-statistic	2.397260	Durbin-Watson stat	2.066192
Prob(F-statistic)	0.070766		

Dependent Variable: DLOG(CLV)

Sample (adjusted): 1999Q2 2007Q4

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.077108	0.053788	1.433567	0.1624
DLOG(CLV(-1))	-0.235982	0.168996	-1.396378	0.1732
UNLV(-1)	-0.004259	0.004748	-0.896947	0.3771
DLOG(GDPLV(-1))	0.243557	0.395984	0.615067	0.5433
DUMLV	-0.076397	0.028066	-2.722086	0.0109
R(-1)	-0.004945	0.005752	-0.859739	0.3970

R-squared	0.312063	Mean dependent var	0.023780
Adjusted R-squared	0.193453	S.D. dependent var	0.029011
S.E. of regression	0.026054	Akaike info criterion	-4.302467
Sum squared resid	0.019686	Schwarz criterion	-4.035835
Log likelihood	81.29316	Hannan-Quinn criter.	-4.210425
F-statistic	2.631004	Durbin-Watson stat	1.585196
Prob(F-statistic)	0.044335		

Dependent Variable: DLOG(INVEURO)

Sample (adjusted): 1999Q2 2007Q4

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010247	0.005058	2.026048	0.0514
DLOG(GDPEURO(-1))	1.356363	0.547350	2.478055	0.0189
DLOG(INVEURO(-1))	-0.069286	0.217861	-0.318029	0.7526
R(-1)	-0.003308	0.001470	-2.249711	0.0317

R-squared	0.341913	Mean dependent var	0.006895
Adjusted R-squared	0.278227	S.D. dependent var	0.008649
S.E. of regression	0.007348	Akaike info criterion	-6.881672
Sum squared resid	0.001674	Schwarz criterion	-6.703918
Log likelihood	124.4293	Hannan-Quinn criter.	-6.820311
F-statistic	5.368741	Durbin-Watson stat	2.184276
Prob(F-statistic)	0.004283		

Dependent Variable: DLOG(INVEST)

Sample (adjusted): 1995Q3 2007Q4

Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007338	0.016178	0.453574	0.6523
DLOG(GDPEST)	1.875057	0.764611	2.452303	0.0180
DLOG(INVEST(-1))	-0.253770	0.133300	-1.903758	0.0632
DUMESTINV	-0.076061	0.045556	-1.669610	0.1018

R-squared	0.257775	Mean dependent var	0.030323
Adjusted R-squared	0.209369	S.D. dependent var	0.062170
S.E. of regression	0.055280	Akaike info criterion	-2.876192
Sum squared resid	0.140571	Schwarz criterion	-2.723230
Log likelihood	75.90480	Hannan-Quinn criter.	-2.817943
F-statistic	5.325260	Durbin-Watson stat	2.257652
Prob(F-statistic)	0.003107		

Dependent Variable: DLOG(INVLT)

Method: Least Squares

Sample (adjusted): 1999Q3 2008Q2

Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.010563	0.015315	-0.689761	0.4953
DLOG(GDPLT)	2.131092	0.684112	3.115123	0.0039
DLOG(INVLT(-1))	-0.160126	0.156750	-1.021537	0.3147
DR(-1)	0.002167	0.034933	0.062039	0.9509

R-squared	0.299526	Mean dependent var	0.021280
Adjusted R-squared	0.233857	S.D. dependent var	0.067359
S.E. of regression	0.058959	Akaike info criterion	-2.719494
Sum squared resid	0.111239	Schwarz criterion	-2.543548
Log likelihood	52.95090	Hannan-Quinn criter.	-2.658084
F-statistic	4.561119	Durbin-Watson stat	2.123108
Prob(F-statistic)	0.009043		

Dependent Variable: DLOG(INVLV)

Sample: 2000Q1 2007Q4

Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.087546	0.029872	2.930689	0.0067
DLOG(INVLV(-1))	-0.255569	0.202867	-1.259786	0.2181
R(-1)	-0.016172	0.006327	-2.555951	0.0163
DLOG(GDPLV(-1))	0.195820	0.504723	0.387976	0.7010

R-squared	0.220917	Mean dependent var	0.031408
Adjusted R-squared	0.137444	S.D. dependent var	0.031598
S.E. of regression	0.029346	Akaike info criterion	-4.102837
Sum squared resid	0.024114	Schwarz criterion	-3.919620
Log likelihood	69.64539	Hannan-Quinn criter.	-4.042105
F-statistic	2.646560	Durbin-Watson stat	2.047282
Prob(F-statistic)	0.068466		

C, GDP, UN, R, INV, respectively, represent real household consumption, real GDP, the EUROSTAT harmonized unemployment rate in percent (or with a D prefix the quarterly change), the three-month euribor nominal interest rate (or with a D prefix the quarterly change), and real fixed capital formation.

EURO, LT, LV, EST designate respectively variables in the eurozone, Lithuania, Latvia and Estonia.

DUMEST and DUMESTINV are dummies picking up the sudden sharp collapse in consumption and investment during the Russian crisis. DUMLV is a similar dummy picking up the erratic decline in 2000:Q3.

All data apart from the interest rate are seasonally adjusted.

Estimations are run up to end 2007 for the eurozone, Estonia and Latvia and up to 2008:Q2 for Lithuania to reflect the somewhat later response to the crisis. Because of the volatile behavior of Latvian investment in the late 1990s, estimations start in 2000.

While goodness of fit varies, the results on the gap between actual and projected variables were robust to different specifications such as changes in the sample period (starting 1999 or 1995) and choice of explanatory variables (interest rates, gross disposable income or operating income, GDP, unemployment rate, level or changes).

REFERENCES

Bank of England, (2006), "*House Prices and Consumer Spending*", Quarterly Economic Bulletin (Summer).

Bakker, Bas, and Anne-Marie Gulde, (2010), "*The Credit Boom in the EU New Member States: Bad Luck or Bad Policies?*", IMF Working Paper 10/130.

Cottarelli, Carlo, Giovanni Dell'Ariccia, and Ivanna Vladkova Hollar, (2003), "*Early Birds, Late Risers, and Sleeping Beauties: Bank Credit Growth to the Private Sector in Central and Eastern Europe and the Balkans*", IMF Working Paper 03/213.

Directorate General for Economic and Financial Affairs (2009), Quarterly Report of the Euro Area, Volume 8, No. 3.

European Central Bank (December 2008 and June 2009), Financial Stability Review.

European Commission, 2010, "*Cross-Country Study: Economic Policy Challenges in the Baltics*", European Economy, Occasional Papers.

Federal Reserve Bank of San Francisco Economic Letter, (May 15, 2009) No. 2009–16, "*Consumption Growth*".

Fisher, Irving (1933), "*The Debt-Deflation Theory of Great Depressions*", Econometrica.

Ghosh, Swati and Atish Ghosh, (1999), "*East Asia in the Aftermath: Was there a Crunch*?", IMF Working Paper, WP/99/38.

Glick, Reuvan and Kevin Lansing, (2009), "*U.S. Household Deleveraging and Future*".

International Monetary Fund (2009), *World Economic Outlook (*October*)*, Chapter 3.

King, Mervyn (1994), "*Debt Deflation: Theory and Evidence*", European Economic Review.

Laeven, Luc and Thomas Laryea, (2009), "*Principles of Household Debt Restructuring*", IMF Staff Position Note.

Lietuvos Bankas, (2009), Financial Stability Review.

Mian, Atif and Amir Sufi, (2010), "*Household Leverage and the Recession of 2007–09*", National Bureau of Economic Research, Working Paper No. 15896.

Mitra, Pradeep, Marcello Selowsky, and Juan Zalduendo, (2009), "*Turmoil and Twenty—Recession, Recovery and Reform in Central and Eastern Europe and the Former Soviet Union*", World Bank.

Myers, Stewart (1977), "*Determinants of Corporate Borrowing*", Journal of Financial Economics, Volume 5, pp. 147–75.