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INTERNATIONAL MONETARY FUND

REPUBLIC OF ESTONIA

Selected Issues

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Approved by the European Department

February 17, 2009

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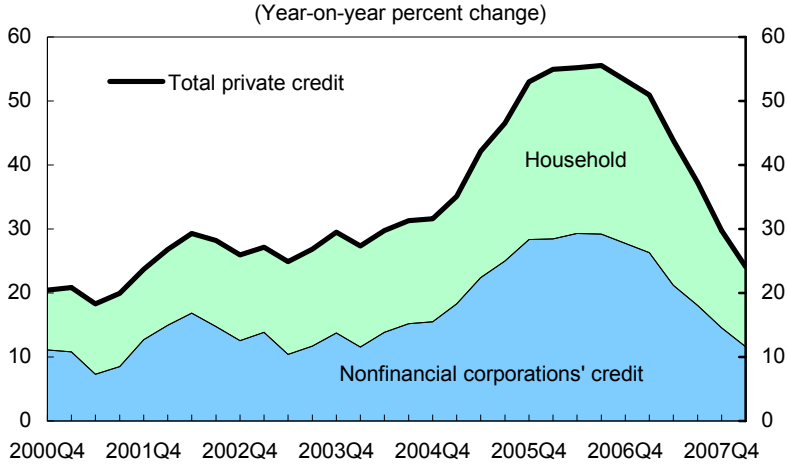
I. Financing Constraints and Productivity in Estonia[1]

A. Introduction

1. **Economic convergence in Estonia has been accompanied by financial deepening and a fast expansion of private sector credit** (Figure 1). Since 2000, real private sector credit has increased by an average of 28½ percent a year. As a result, the private sector credit-to-GDP ratio, at 103 percent in 2007, is only slightly below the average for the euro area. This rapid expansion reflects a variety of factors, including initially low levels of financial development; pent-up demand pressures following decades of socialist management; good macroeconomic policies and accession to the European Union (EU), which have helped lower the risk premium; and improved access to foreign capital through the entry of foreign banks.

Figure 1. Contribution to Private Sector Credit Growth, 2000:Q4-2008:Q1
(Year-on-year percent change)



Source: Eesti Pank.

2. **Yet, there is some evidence that insufficient financing may have limited growth prospects.** First, credit growth has not been evenly distributed across sectors. In particular, financial intermediation and real estate have been the main drivers of credit growth with other sectors playing a much smaller role (Figure 2). Therefore, credit allocation may have resulted in limited access to finance for some firms. Second, more than 60 percent of corporate investment in Estonia is financed with internal funds.[2] Finally, the 2006 progress report on the implementation of the Lisbon Strategy argues that Estonia's adoption of new technologies is hindered by insufficient access to capital.[3] These factors suggest that some

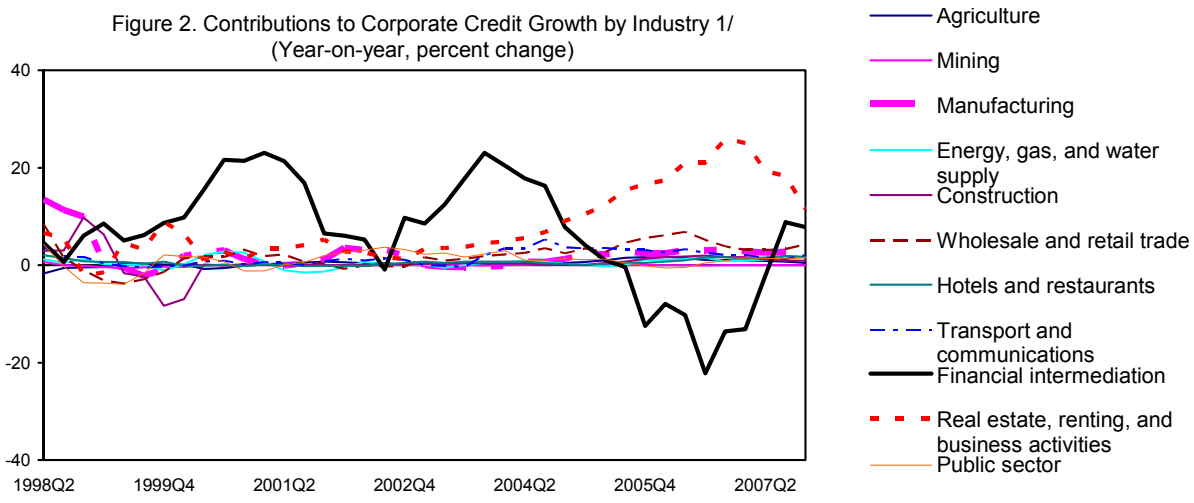
[1] Prepared by Marialuz Moreno-Badia, based on Moreno Badia and Slootmaekers (2008). We thank Larissa Merkulova and Kadri Rohulaid of the Centre of Registers and Infosystems for the data and valuable clarifications on the Registrar Office's database.

[2] By contrast, according to World Bank data, the percentage financed by internal funds in the other Baltic countries is about 50 percent. Estonia's dependence on internal funds could be due to financial frictions but may also be explained by the fact that, since 2000, retained earnings are not taxed.

[3] According to the same report, access to loans is hindered by many factors, including insufficient guarantees or own capital, short financial histories or insufficient business plans, and financial institutions' disproportionally large costs of processing small loans.

firms may be constrained in their investment and input decisions, with a potentially detrimental impact on productivity relative to unconstrained firms.

Figure 2. Contributions to Corporate Credit Growth by Industry 1/
(Year-on-year, percent change)



Source: Eesti Pank.
1/ Excluding leasing.

3. **This paper examines two questions**: (1) is there evidence of financing constraints among Estonian firms? and (2) have financing constraints reduced firm-level total factor productivity (TFP)? These questions are particularly important in the current environment, in which credit growth in Estonia has slowed down considerably and firms may face increasing financing constraints that could dampen growth.

4. **The rest of the paper is organized as follows.** Section B describes the data. Section C provides empirical evidence on the existence of financing constraints among Estonian firms. Section D explores the question of whether financing constraints may have decreased firm-level productivity, and Section E concludes.

B. Data

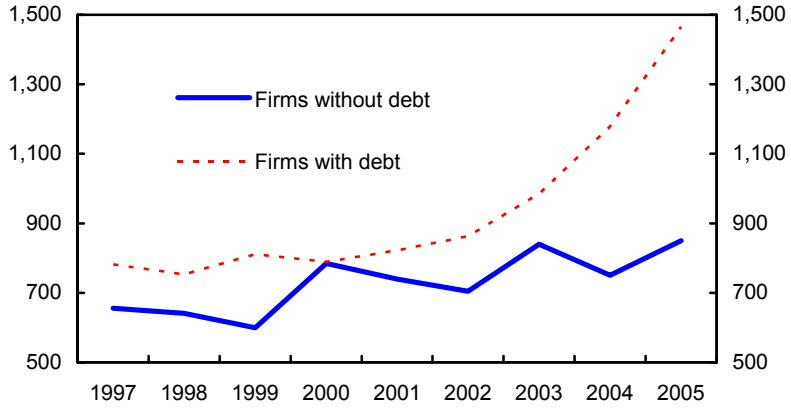
5. **Our data come from the Estonian Business Registry and cover the period 1997–2005**.[4] The data set is an unbalanced panel containing detailed information on balance sheets and income statements of all registered firms in Estonia. However, primarily due to missing information, but also the exclusion of extreme or unrealistic observations, only the data of 45 percent of the firms in the registry (up to 19,000 firms) can be used. One of the unique features of the data set is the absence of any size thresholds: 69 percent of the firms are microenterprises. In addition, more than 90 percent of the firms are privately owned. This makes this data set particularly well-suited to analyze the implications of financial frictions

[4] For a description of the data and definitions, see Appendix I.

since privately owned firms, and small and medium-sized enterprises (SMEs) in particular, usually receive a very small share of credit in many emerging markets, despite accounting for a large share of enterprises, employment, and output. Another salient feature of the data set is the availability of data from all economic sectors in Estonia.

6. **A preliminary analysis suggests there are sharp differences between firms with external financing and those without.** Table 1 shows more than half of the firms in our sample have no long-term liabilities on their balance sheets during their entire life span. These firms are on average much smaller in terms of number of employees, sales, or value added, and they are slightly younger. In addition, their capital intensity and investment rates are considerably lower than those of firms that borrow from banks or private investors. Firms without debt are also on average less productive. This difference is rather small until the year 2003, but no-debt firms' productivity increased only slightly thereafter, whereas firms with debt experienced an exponential growth in their labor productivity (Figure 3).

Figure 3. Labor Productivity
(Sales per worker, thousands of Estonian krooni)



Sources: Estonian Business Registry database; and authors' calculations.

C. Are There Signs of Financing Constraints?

7. **To construct a measure of financing constraints, we build on the literature dealing with the sensitivity of investment to internal finance**. The basic premise is that asymmetric information and incentive problems make external financing more expensive than internal financing.[5] As a result, firms with weak balance sheets may have limited access to external finance, and are obliged to rely on internally generated cash to finance their investment projects. The majority of the empirical literature has interpreted the excess sensitivity of a firm's investment spending to its ability to internally generate cash as evidence of financial constraints.[6] Building on this literature, we estimate the following investment model:[7]

[5] See Stein (2001) for a review of the theoretical literature.

[6] See, for example, Fazzari, Hubbard and Peterson (1988); Bond and others (20003); Love (2003); and Forbes (2007).

[7] For the derivation of this model and estimation issues, see Moreno Badia and Slootmaekers (2008).

$$\left(\frac{I_{it}}{K_{it-1}}\right) = \theta_0 + \theta_1\left(\frac{I_{it-1}}{K_{it-2}}\right) + \theta_2\left(\frac{Sales_{it}}{K_{it-1}}\right) + \left(\frac{Cash_{it}}{K_{it-1}} \times \Omega_{it}\right) + \alpha_i + \delta_t + \varepsilon_{it}, \quad (1)$$

with

$$\Omega_{it} = \delta_1 I_1 + \ldots + \delta_N I_N + \lambda_1 \ln(Size)_{it} + \lambda_2 (Age)_{it} + \lambda_3 (Leverage)_{it} + \lambda_4 Foreign_{it}, \quad (2)$$

and where I_{it} is the investment expenditure of firm i at time t; $Sales_{it}$ is the net revenue received from the sale of products, goods, and services; $Cash_{it}$ represents a firm's internal financial position at the start of period t; α_i represents a firm fixed effect; δ_t denotes a time dummy; $Size_{it}$ is measured as total assets at the beginning of period t; Age_{it} is the age of the firm at the beginning of period t; $Leverage_{it}$ stands for the ratio of long-term liabilities to total assets at the beginning of period t; $Foreign_{it}$ is a dummy equaling 1 if more than 50 percent of the shares is foreign owned at time t; and $(I_1,\ldots,I_N)$ are industry dummies. The estimated coefficients for the δ's and the λ's in equation (2) are then used to calculate a firm-specific score of financing constraints $\hat{F}_{it}^n$, based on the firm's characteristics:

$$\hat{F}_{it}^n = \hat{\delta}_n I_n + \hat{\lambda}_1 Size_{it} + \hat{\lambda}_2 Age_{it} + \hat{\lambda}_3 Leverage_{it} + \hat{\lambda}_4 Foreign_{it}. \quad (3)$$

The bigger the $\hat{F}_{it}^n$, the higher the degree of financing constraint. Although the coefficients are constant over the entire sample period, the characteristics of each firm change over time, and, hence, the degree of its financing constraint does also. [8]

8. **Our results indicate that financing constraints vary across firms and sectors.** In particular, young and highly indebted firms tend to be more financially constrained (Table 2). However, contrary to expectation, there are no significant differences in financing constraints based on firm size. Foreign firms, however, seem to have easier access to external capital. Overall, a large number of firms display some degree of financing constraint, and, at the sectoral level, the primary sector ("agriculture," "mining and quarrying," and "energy, gas, and water supply") is the one with the highest constraint (Table 3). In particular, the score of financing constraint implies that, on average, a 1 unit increase in the ratio of cash to capital results in a 0.6 increase in the investment rate in the primary sector. By contrast, such an increase raises the investment rate by only 0.1 for most other sectors, except for wholesale and retail trade, where it increases the investment rate by a mere 0.03. However this does not imply that firms in these sectors are not financially constrained, particularly given the variation of the score across firms within a sector. [9]

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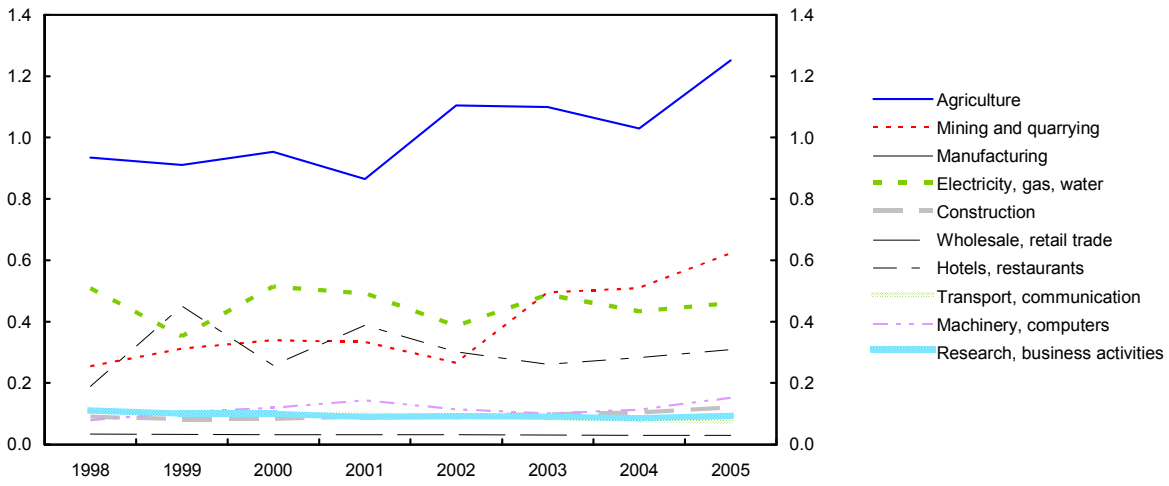
[8] The estimated coefficients for the δ's represents the excess sensitivity of investment in a particular industry to cash flows while the estimated λ's represents how that excess sensitivity varies with firm characteristics.

[9] For example, as can be seen in the last column of Table 3, variation across firms is relatively larger in the "hotels and restaurants" sector.

9. **For most sectors, financing constraints have remained roughly constant over time**. In principle, we would have expected financing constraints to ease over time, as the degree of financial intermediation increased in Estonia during this period. However, the average of the score ($\hat{F}_{it}^{n}$) for most sectors has remained relatively constant for the entire sample period. The only exceptions are "agriculture" and "mining and quarrying" where the average score has actually increased (Figure 4). The relatively flat trend of the degree of financing constraint for most sectors could suggest that the demand for credit during this period increased more than the available funds because of the emergence of new financing needs with the growth of the economy and the entry of new firms. On the other hand, it could also be indicative of credit misallocation since some firms within particular sectors may have received the bulk of the credit.

Figure 4. Mean Financing Constraints by Industry, 1998-2005 1/



Sources: Estonian Business Registry database; and staff calculations.
1/ Financing constraints are calculated based on equation (3). The average financing constraints for the "manufacturing" and "research and business activities" sectors are very close and, therefore, they overlap in the graph.

D. Have Financing Constraints Reduced Firm-Level TFP?

10. **To analyze the relationship between financing constraints and productivity at the firm level, we develop a structural approach**.[10] In particular, we incorporate the score of financing constraints directly as a regressor in a production function equation while allowing productivity to evolve as a first-order autoregressive process:

$$y_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \beta_a \ln(Age)_{it} + \beta_f \hat{F}_{it-1} + \delta_j + \delta_t + \omega_{it} + \varepsilon_{it}, \qquad (4)$$

[10] Throughout this section, productivity refers to TFP.

where i and t indicate firm and time respectively, and all variables are presented in natural logarithms; y_{it} is value added; l_{it} is the labor input; and k_{it} is the capital stock. The error term has two components: a productivity term, ω_{it}, known to the firm and correlated with the inputs, and a random productivity shock, ε_{it}, with zero mean and uncorrelated with inputs, financing constraints, and firm characteristics. To estimate equation (4), we modify the Levinsohn-Petrin algorithm (see Levinsohn and Petrin (2003)) and treat financial constraints as an additional state variable.[11]

11. **Surprisingly, financing constraints do not appear to affect productivity in most sectors**. The estimated coefficient of financing constraints in equation (4) is not significantly different from zero in eight out of ten sectors (Table 4). Only in the sectors "construction" and "R&D and other business activities" is the coefficient negative and significant. However, this result is only robust to changes in the model specification for the "R&D and other business activities" sector, where the dampening effect of financing constraints on productivity is remarkably large.[12] A possible explanation for this last result is that firms in "R&D and other business activities" need a continuous inflow of fresh capital to keep up with the latest technology and invest in frontier research. In general, this involves risky investment, and few banks and investors are willing to take that risk. Our results seem to suggest that even the smallest constraint in obtaining adequate funding has a large impact on the productivity of firms within this sector.[13]

E. Conclusions

12. **Although many Estonian firms appear to have faced financing constraints in recent years, this has not resulted in lower productivity**. We find that the investment of both young and highly indebted firms is more sensitive to internal funds and, as expected, foreign firms tend to be less financially constrained than the average Estonian firm. Overall, a large number of firms display some degree of financing constraint, with firms in the primary sector the most constrained. However, financing constraints did not have an impact on productivity for most sectors, with the exception of "R&D and other business activities," where the negative effect on productivity was large.

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[11] A similar approach is used in Fernandes (2007). For details of the estimation procedure and caveats, see Moreno Badia and Slootmaekers (2008).

[12] In the interest of brevity, robustness checks are omitted from this paper but can be found in Moreno Badia and Slootmaekers (2008).

[13] To a certain extent our results may be driven by firms included in the "other business activities" sector rather than "R&D." Unfortunately, data availability does not allow us to estimate a separate model for the R&D sector.

13. **What can explain these findings?** We would expect access to finance to improve productivity by allowing firms to adopt the latest technologies. Therefore, firms facing financing constraints should be less productive since they can not invest in the latest vintages of capital. However, there are a number of reasons why access to finance may not necessarily improve productivity for most sectors. First, in the face of rapid credit growth it is difficult for credit officers to screen clients and ensure that capital is allocated to the most productive activities (see, for example, Ghani and Suri (1999)). The rapid buildup in credit thus lowers the quality of investment and reduces the expected productivity gain. Second, higher liquidity may reduce the incentive of shareholders to undertake costly monitoring of managers, which impedes efficient resource allocation and slows productivity growth (Shleifer and Vishny, 1986; and Bhide, 1993). Third, overinvestment and low productivity may also result when managers maximize their own utility rather than firm profits (Grabowsky and Mueller, 1972). Finally, access to finance may increase firms' production capacity—for example, by expanding plant size—without necessarily increasing productivity (Power, 1998). In fact, macro data indicate that about 50 percent of gross fixed investment during the sample period was on building construction and dwellings, which would not necessarily lead to higher productivity. Overall, these arguments indicate that financially unconstrained firms may not necessarily have higher productivity levels than constrained firms. In the absence of a more explicit estimation model, we cannot distinguish which of these channels is at play in Estonia.

14. **Going forward, there is scope for productivity improvements.** Estonia's large TFP gap with respect to the EU-15 underscores its substantial growth potential.[14] However, in the face of slowing credit growth, we can expect some firms will confront financing constraints, resulting in lower levels of investment. Nevertheless, productivity levels might not be necessarily lower than in the absence of these constraints. Moreover, these levels could even increase if, in this new environment, banks allocate credit more efficiently—toward more productive firms—or if credit is redirected toward productivity-enhancing projects rather than projects increasing production capacity. However, this may not be enough to offset the other negative factors dampening growth.

[14] For a discussion on Estonia's TFP gap relative to EU-15, see Moreno Badia (2007).

Table 1. Summary Statistics

	Debt	No debt
Percentage of firms	46	54
Number of employees	23	7
Age	6	5
Sales	17,200	4,664
Value added	5,247	1,339
Capital intensity	198	59
Labor productivity	980	750
Labor productivity growth	0.06	0.04
Investment ratio	0.12	0.05

Sources: Estonian Business Registry database; and authors' calculations.
Notes: Firms are divided in two groups: firms with long-term liabilities (Debt) and firms with no long-term liabilities on their balance sheets during their entire lifespan (No debt). All variables are measured in thousand of Estonian Krooni and deflated by two-digit sector deflators; all variable definitions can be found in Appendix I. Capital intensity is defined as (net real tangible + net real intangible assets-goodwill)/labor; labor productivity= real sales per worker; investment ratio=real investment/real total assets lagged one year.

Table 2. Determinants of Financing Constraints 1/

	Age	Size	Leverage	Foreign
Agriculture, fishing, and forestry	...	...	5.374***	-0.622**
Mining and quarrying	0.197*	...	5.401***	..
Manufacturing	-0.075**	...	0.169***	...
Electricity, gas, and water	...	...	3.745***	-1.247**
Construction	-0.068**	...	...	...
Wholesale and retail trade	...	...	...	...
Hotels and restaurants	...	...	1.601***	...
Transport	-0.090***	...	...	-0.111***
Renting of machinery and computer activities	-0.079*	...	...	...
R&D and other business activities	-0.079***	...	0.394***	...

Sources: Estonian Business Registry database; and staff calculations.

1/ The numbers reported are the estimated coefficients for the λ's in equation (2). Three dots indicate that the coefficient was not significant. For details on the estimation procedure, see Moreno Badia and Slootmaekers (2008). Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Magnitude and Distribution of Financing Constraints by Sector 1/

	Number of Observations		Financing Constraints		
	Total	Zero constraints	Mean	Median	Standard deviation
Agriculture	5,369	286	1.04	0.48	1.44
Mining and quarrying	342	110	0.41	0.04	0.84
Manufacturing	19,346	3,046	0.09	0.07	0.11
Electricity, gas, and water supply	550	67	0.46	0.08	0.71
Construction	11,001	1,034	0.10	0.06	0.14
Wholesale and retail trade	36,836	76	0.03	0.03	0.01
Hotels and restaurants	5,296	831	0.30	0.05	1.12
Transport and communication	9,547	649	0.09	0.07	0.08
Renting of machinery and computer activities	2,413	290	0.12	0.05	0.27
R&D and other business activities	9,819	733	0.09	0.06	0.11

Sources: Estonian Business Registry database; and staff calculations.

1/ Financing constraints are calculated based on equation (3).

Table 4. Results for the Structural Approach, by Industry

	Number of observations	Labor	Capital	Age	Score
Agriculture	1,825	0.505***	0.335***	-0.019***	0.008
		[0.042]	0.070]	[0.010]	[0.018]
Mining and quarrying	189	0.340***	0.322***	0.031	0.059
		[0.135]	0.127]	[0.050]	[0.068]
Manufacturing	7,798	0.586***	0.051***	-0.014***	0.018
		[0.017]	0.026]	[0.005]	[0.124]
Electricity, gas, and water supply	196	0.481***	0.203	-0.003	-0.001
		[0.110]	0.188]	[0.027]	[0.135]
Construction	3,756	0.643***	0.190***	-0.024***	-0.299*
		[0.030]	0.035]	[0.006]	[0.156]
Wholesale and retail trade	12,714	0.520***	-0.022***	-0.012***	0.05
		[0.017]	0.011]	[0.003]	[0.120]
Hotels and restaurants	1,782	0.720***	0.039	-0.035***	-0.009
		[0.043]	0.090]	V0.007]	[0.023]
Transport and communication	3,201	0.567***	0.214***	-0.061***	0.336
		[0.035]	0.053]	[0.013]	[0.410]
Renting of machinery and computer activities	758	0.746***	0.138	-0.040***	-0.208
		[0.054]	0.129]	[0.015]	[0.472]
R&D and other business activities	3,210	0.726***	0.106***	-0.036***	-0.965***
		[0.027]	0.035]	[0.012]	[0.308]

Sources: Estonian Business Registry database; and staff calculations.

Notes: Financing constraints are directly included in the TFP estimation as an additional state variable. The dependent variable of equation (4) is the log form of real value added, and we use bootstrapping methods (1,000 replications) to obtain correct standard errors (reported in brackets). The structural approach is estimated for each one-digit industry separately. *R*-squared statistics are not available for the modified Levinsohn-Petrin estimation. Though not reported, all regressions include two-digit industry dummies and time dummies. Significance level: *** p<0.01, ** p<0.05, * p<0.1. Variable definitions are in Appendix I.

DATA SOURCES AND DEFINITIONS

The data used in this paper come from the Estonian Business Registry, which covers the period 1995–2005. Due to missing information on employment for the years 1995–96, we use data only from 1997. We exclude all financial, insurance, and real estate firms, plus public services companies since they are not or less subject to financial constraints, or their investment behavior depends more on political decisions or broader economic policy than on access to (external) finance.[15] In addition, we exclude state-owned firms since they are more likely to face soft budget constraints, and are not necessarily profit-maximizing agents. For a detailed description of the construction of the sample, see Moreno Badia and Slootmaekers (2008).

All variables used in this paper are in real terms. Sales, value added, and cash are deflated by output deflator; intermediate inputs are deflated by the intermediate inputs deflator; assets, debt, and investment are deflated with the gross capital formation price index. All deflators come from the system of national accounts provided by the Statistical Office of Estonia, and are available for 16 sectors (corresponding to the one-digit ISIC Rev. 3.1). The following variables are used:

- Sales ($Sales_{it}$): net revenue received from the sale of products, goods and services.
- Labor (L_{it}): number of employees.
- Intermediate inputs (M_{it}): cost of goods, raw materials, and services purchased for core activities.
- Value added (Y_{it}): net sales minus intermediate inputs.
- Capital (K_{it}): tangible and intangible fixed assets minus the goodwill, net of accumulated depreciation.
- Investment (I_{it}): calculated based on data on capital and depreciation, $I_{it} = K_{it} - K_{it-1} + D_{it}$, where D_{it} stands for reported annual depreciation. Due to this calculation, we have no data on investment for the first year of a firm's observation series.
- Cash stock ($Cash_{it}$): sum of the cash stock and short-term financial securities, such as shares at the beginning of period t.
- Leverage ($Leverage_{it}$): ratio of long-term liabilities to total assets (net of accumulated depreciation) at the beginning of period t.

[15] More specifically, we exclude the sectors with EMTAK 65 to 70 (financial intermediation and real estate activities) and EMTAK 75 to 99 (public services). See Table A1 for a complete list of the sectors.

- Age (Age_{it}): age of the firm at the beginning of period t, based on the entry date in the registry.

- Size ($Size_{it}$): continuous measure of firm size, measured by total assets (net of accumulated depreciation) at the beginning of period t.

- Owner ($Owner_{it}$): either private, state, foreign, or other. Shareholders with more than 10 percent of share capital of the firm shall be disclosed, and upon this information the Statistical Office of Estonia has classified the ownership type. For example, a firm is labeled foreign if the sum of the foreign-owned shares surpasses 50 percent.

- Industry classification: Estonian EMTAK code (Classification of Economic Activities of Estonia).

Table A1 provides an overview of the classification of industries used in Estonia.

Table A1. Industry Classification

Code	Sector Name	Number of Observations	Number of Firms
1	Agriculture, hunting, and related service activities	3,138	880
2	Forestry, logging, and related service activities	1,722	595
5	Fishing, fish farming, and related service activities	509	140
10-14	Mining and quarrying	342	59
15-16	Manufacture of food products and beverages, and tobacco products	1,965	494
17	Manufacture of textiles	812	187
18-19	Manufacture of wearing apparel, tanning, dressing, and dyeing	1,969	469
20	Manufacture of wood and straw products, except furniture	3,687	1,014
21-22	Manufacture of pulp, paper, and publishing and printing	1,896	472
23-24	Manufacture of coke, refined petroleum products, nuclear fuel, and chemicals	379	105
25	Manufacture of rubber and plastic products	662	165
26	Manufacture of other nonmetallic mineral products	613	165
27-28	Manufacture of basic metals and fabricated metal products	2,707	732
29	Manufacture of machinery and equipment not elsewhere classified	909	231
30-32	Manufacture of office and electrical machinery, computers, televisions, and radio transmitters	732	175
33	Manufacture of medical, precision and optical instruments, watches, and clocks	526	114
35	Manufacture of transport equipment	442	131
36-37	Manufacture not elsewhere classified	2,047	556
40-41	Electricity, gas, steam and hot water supply, and collection, purification, and distribution of water	550	147
45	Construction	11,001	3,428
50	Sale, maintenance, and repair of motor vehicles and motorcycles, and retail sale of automotive fuel	5,856	1,631
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	14,720	4,561
52	Retail trade, except of motor vehicles and motorcycles, and repair of personal and household goods	16,260	4,449
55	Hotels and restaurants	5,296	1,560
60-62	Land, water, and air transport	6,680	1,917
63	Supporting and auxiliary transport activities, and activities of travel agencies	2,499	820
64	Post and telecommunications	368	125
65-67	Financial intermediation	416	197
70	Real estate activities	3,902	1,428
71	Renting of machinery and equipment without operator and of personal and household goods	821	307
72	Computer and related activities	1,592	530
73-74	Research and development, and other business activities	9,819	3,192
80	Public administration and defense, compulsory social security, and education	926	281
85	Health and social work	2,728	714
90	Sewage and refuse disposal, sanitation, and similar activities	395	115
92	Recreational, cultural, and sporting activities	1,264	425
91-93	Other service activities	1,630	516
	Total	111,780	33,027

Source: Estonian Business Registry database.

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II. Assessment of Current Account Stability[1]

A. Overview and Key Conclusions

1. This chapter assesses current account stability in Estonia. It focuses on measuring current account disequilibrium, defined as the gap between the underlying current account (the current account stripped of temporary factors) and the equilibrium current account (a balance that leads net foreign assets to evolve in a manner consistent with the economy's fundamentals). It also draws implications for real exchange rate misalignment.

2. Econometric estimates based on CGER methodologies, suggest that as of October 2008 there was a current account gap of 1½ -4¼ percent of GDP, which corresponds to a real exchange rate overvaluation of 3-9 percent. Direct estimates of overvaluation point to a somewhat higher overvaluation, in the order of 16-19 percent.

B. Equilibrium and Underlying Current Account Measures

3. Since estimates of the equilibrium and underlying current accounts are subject to significant uncertainty, we use several complementary approaches to establish a range of values.

Equilibrium Current Account

Macrobalance Approach

4. The macrobalance approach uses coefficients from cross-country panel regressions to calculate the current account balance that is consistent with medium-term fundamentals—captured by the independent variables in the regression. These variables include demographic features, growth, fiscal positions and net foreign liabilities—all chosen for their likely influence on the savings-investment balance.[2] Table 1 shows four alternative estimates of Estonia's equilibrium current account deficit based on this approach. These estimates cover a wide range—from 2.3 to 11.6 percent of GDP.[3]

5. In the rest of this note, we focus on the results obtained in the hybrid pooled estimation and in Rahman (2008), which give us an average equilibrium current account deficit of approximately 6.2 percent of GDP. The other two approaches have features that are

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[1] Prepared by Pedro Rodriguez.

[2] Lee et al. (2008) and Rahman (2008) describe the methodology and coefficients.

[3] The results associated with Rahman's (2008) differ somewhat from those reported in her paper because of differences in the value of the regressors, particularly of the NFA position (which is lower in the paper).

problematic. The pooled estimation in Lee et al (2008) omits factors specific to Eastern European countries, such as investment climate (as captured by Rahman, 2008) or the initially low capital stock (which creates persistence in the current account deficit and may be captured by the lagged current account deficit). And the fixed effects estimation is dominated by the fixed-effect term, making it difficult to interpret.[4]

External Sustainability Approach

6. The external sustainability approach calculates the current account balance that would be consistent with a specified evolution of the net foreign assets position. A natural benchmark is the deficit that stabilizes net foreign assets (NFA) as a share of GDP.[5]

7. The NFA-stabilizing balance (cab^S) can be calculated from equation (1), where g is real GDP growth, π is the inflation rate (GDP deflator), and *nfa* is NFA as a share of GDP.

$$cab^S = \frac{(g+\pi)}{(1+g)(1+\pi)} nfa \qquad (1)$$

8. Assuming real GDP growth of 5 percent (staff's medium-term growth projection), and a rate of change in prices of 2.25 percent (in line with projected medium-term increase in the rate of change of Euro-denominated foreign prices), implies that sustaining Estonia's net foreign assets position (-77 percent of GDP, as of end-September 2008) requires running a current account deficit of approximately 5.2 percent of GDP.[6]

Underlying Current Account

9. We use two alternative methodologies to estimate the underlying current account, the *projections-based method* and the *elasticities-based method*. The first method equates the underlying current account with staff's medium-term current account projections (which are part of staff's macroframework). The second method uses elasticities estimated in earlier CGER empirical work (Isard and Faruqee, 1998, Chapter V) to calculate the underlying

[4] In short samples (such as those available for Estonia), the fixed effect tends to be significantly influenced by the historical realizations of the dependent variable (see Lee et al [2008], page 5).

[5] While this could have been a poor benchmark for Estonia fifteen years ago when the country was initiating its convergence, it is a more useful benchmark now given the large and negative NFA position.

[6] The assumption on the rate of change in prices could be seen as conservative given Estonia's currently high inflation. However, assuming a higher inflation rate (e.g. 2.7 percent as in staff's baseline scenario), would barely change the result.

current account by stripping out cyclical influences on the actual current account and adding in the lagged impact of the past appreciation of the real exchange rate.

10. The projections-based method suggests an underlying current account balance of minus 9.1 percent of GDP while the elasticities-based method suggests a lower underlying balance (-10.9 percent of GDP). We will come back to the differences in the estimates in section D. At this point, however, it is convenient to highlight that the figure obtained in the elasticities-based method is the results of two large and opposite effects (Table 2): On the one hand, the closing of the output gap is estimated to reduce the current account deficit by around 4 percentage points. [7] On the other hand, the impact of past real exchange rate appreciation is estimated to increase the deficit by approximately the same magnitude.[8]

Current Account Gap and the Assessment of the Real Exchange Rate

11. Table 3 derives the estimated current account gap for each of the approaches described above and shows the corresponding real exchange rate misalignment, based on a real exchange rate elasticity of the current account calculated using the coefficients in Isard and Faruquee (1998). The calculation of the current account gap takes into account the projected medium-term capital transfers from the European Union, which are a mitigating factor of the current account imbalance.

C. Direct Estimates of the Misalignment of the Real Exchange Rate

12. The results described in the previous section can be complemented with a direct estimate of the equilibrium real exchange rate (ERER). We follow two complementary methods:

- The first method estimates the ERER using coefficients estimated in cross-country regressions. The application of this approach was problematic since the time series is short (see footnote 19) and since Estonia is out of the sample—thus it was necessary to infer the key country "fixed effect" from the data and the other estimated coefficients. The coefficients are discussed in Lee et al (2008), where

[7] This would be achieved through lower imports associated with lower consumption and investment, and possibly also a shift of resources from the nontradable sector (e.g., construction) to the tradable sector.

[8] Isard and Faruquee (1998) obtain that changes in the real exchange rate tend to be passed to the current account over a three year period.

corrections have been made to account for effects specific to countries in Central and Eastern Europe.[9]

- The second method estimates the ERER as an average of historical observations of the real exchange rate. Observations from the early years of Estonia's transition may not very relevant given the substantive transformations the economy has undergone. Therefore, we use the average of the last five years to estimate the ERER (we look both at the CPI-based real exchange rate and at the unit labor costs-based real exchange rate).

13. The results (Table 4) show an overvaluation of Estonia's real exchange rate of approximately 16-19 percent. The first method suggests that the main drivers of the ERER are: the fixed-effects coefficient, the terms of trade index, and the productivity gap (the latter does not have a large contribution in the result shown in the table, but has an important role in explaining the appreciation during 1996–2003).

D. Assessment of the Results

14. The results reported above provide a benchmark for assessing Estonia's current account stability. However, it is important to highlight some caveats that suggest that some methods could be overstating the size of the current account gaps and the degree of overvaluation in a rapidly converging economy with overheated demand.

15. The degree of overvaluation calculated using the *equilibrium exchange rate approach* could be overestimated. First, the terms of trade series does not capture the improvements in terms of trade that Estonia has had in the last two years. If a terms of trade series calculated from export and import price deflators is used instead, the estimated overvaluation using the first method falls from 18.6 percent to 15 percent. Second, firms' profitability remains high, suggesting that increases in labor productivity and the capacity to charge higher prices on account of quality improvements have sustained firms' competitiveness in spite of higher wages (Figure 8 of the staff report).

16. The *underlying current account deficit* estimated using the elasticities-based approach could be overestimated. This is illustrated by a comparison between the actual current account and the current account forecasted by the elasticities-based approach.

- Figure 1 illustrates that the elasticities-based approach tends to overestimate the size of the current account deficit and the overestimation seems to be

[9] The adjustments made in Lee et al (2008, chapter 3) imply a higher coefficient for the productivity differential and a lower (actually zero) coefficient for the impact of government consumption.

related to the contribution of the component capturing the impact of past exchange rate changes. This is perhaps due to the coefficients used for the adjustment for past changes of the real exchange rate being estimated in a sample of countries whose real exchange rate was stationary (so past changes in the real exchange rate were likely measuring deviations from equilibrium). Estonia, however, has had a secular appreciation of the real exchange rate, as expected along an equilibrium path of a converging economy. Therefore, past changes of the real exchange rate also reflect changes in productivity and were not likely to lead to a future deterioration of the current account.[10]

- Figure 2 illustrates that the elasticities-based approach performs better (i.e., with no bias) in Estonia when we restrict our attention to the cyclical component (i.e., we exclude the impact of the past changes of the REER).

E. Conclusions

17. Econometric estimates based on CGER methodologies, suggest that as of October 2008 there was a current account gap of 1½ -4¼ percent of GDP, which corresponds to a real exchange rate overvaluation of 3–9 percent. Direct estimates of overvaluation point to a somewhat higher overvaluation, in the order of 16–19 percent.

18. The range estimated for the current account gap is primarily driven by the range of estimations of the underlying current account. Estimations of the latter variable using elasticities obtained from previous CGER work seem to overestimate the magnitude of the underlying current account deficit.

[10] This analytical issue was pointed out by the Estonian authorities in the technical discussions.

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Table 1. Equilibrium Medium-Term Current Account Balance
Macrobalance Approach

Variables	Regressors	Coefficients				Contributions to equilibrium current account			
		Pooled estimation		Hybrid pooled estimation	Fixed effects estimation	Pooled estimation		Hybrid pooled estimation	Fixed effects estimation
		(IMF, 2008)	(Rahman, 2008)			(IMF, 2008)	(Rahman, 2008)		
Fiscal balance (% of GDP) 1/	-3.9	0.20	0.22	0.19	0.32	-0.8	-0.8	-0.7	-1.2
Old-age dependency (ratio) 1/	-0.3	-0.14	0.04	-0.12	-0.23	0.0	0.0	0.0	0.1
Population growth 2/	-0.5	-1.21	-0.63	-1.03	-0.47	0.6	0.3	0.5	0.2
Initial net foreign assets (% of GDP) 3/	-77.0	0.02	0.03			-1.5	-2.2		
Lagged CA balance to GDP (%GDP) 4/	-12.4			0.37				-4.5	
Oil Balance (%GDP)	-3.8	0.23	0.44	0.17	0.31	-0.9	-1.7	-0.6	-1.2
Output growth 2/	2.8	-0.21	-0.18	-0.16	-0.27	-0.6	-0.5	-0.4	-0.7
Relative Income 5/	45.9	0.02	-0.01	0.02		0.9	-0.3	0.9	0.0
Investment climate	400.0		-0.01				-4.0		
Fixed effect 6/	100.0				-0.09				-8.8
Constant	100.0	0.00	0.02	0.00		0.0	2.0	-0.3	0.0
Equilibrium Current Account Balance (percent of GDP)						**-2.3**	**-7.2**	**-5.2**	**-11.6**

Source: IMF staff calculations. Coefficients taken from IMF (2008) and Rahman (2008).

1/ End-term projections (i.e., for 2014) of all variables are used as regressors with the exception of those flow variables that enter as lagged variables (for which the projected average for the period 2006-09 is used) and those variables that enter in the form of initial stocks (for which the end -September 2008 value is used)
2/ Relative to trading partners
3/ End-September 2008 ratio.
4/ Average for the period 2006-09.
5/ Relative to the US (end-2007)
6/ Calculated such that the average prediction error for the period 1996-2007 is zero.

Table 2. Deriving the Underlying Current Account Balance Under the Elasticities-Based Method

	Elasticity	Data	Adjustment (in percent of GDP)
Current account balance (12 months ending in October 2008) (A)	...	...	-9.9
Temporary factors (B)			-1.0
One-off factors	...		0.0
Estonian business cycle (output gap) 1/	1.5	3.0	3.7
Export partners' business cycle	1.5	0.6	-0.7
Real exchange rate movements	...	...	-4.1
2008	0.60	-0.5	0.2
2007	0.25	6.7	-3.4
2006	0.15	4.6	-0.9
Underlying current account balance (A+B)			**-10.9**
Memorandum items:			
Exports elasticity to the real exchange rate	0.71		
Imports elasticity to the real exchangerate	0.92		
Exports to GDP		72.8	...
Imports to GDP		82.4	...

Methodology: Isard and Faruqee (1998), OP167, Chapter V
Source: IMF staff calculations.

1/ Output gap measured as the average gap obtained from the Hodrick-Prescott filter and the production function approach.

Table 3. Current Account Stability. Summary Table
(percent of GDP unless otherwise indicated)

	MB 1/	ES 2/
Equilibrium CA (A)	-6.2	-5.2
Underlying current account (B)		
Projections-based method	-9.1	-9.1
Elasticities-based method 3/	-10.9	-10.9
CA gap (C=A-B)		
Projections-based method	2.9	3.9
Elasticities-based method 3/	4.7	5.7
Mitigating factor: Capital Transfers (I) 4/	1.5	1.5
CA gap net of mitigating factor (J=H-I)		
Projections-based method	1.4	2.4
Elasticities-based method 3/	3.2	4.2
Overvaluation of the real exchange rate 5/		
Projections-based method	3.1	5.3
Elasticities-based method 3/	7.2	9.4

Source: IMF staff calculations.

1/ Average of the results obtained in the hybrid pooled estimation
and in Rahman (2008)
2/ Stabilizes net foreign assets at the September-2008 ratio (-77 percent of GDP)
3/ Calculated using coefficients from Isard and Faruquee (1998, chapter V)
4/ Medium-term projected transfers.
5/ In percent. The elasticity of net exports to the real exchange rate is set at -0.45
based on the coefficients in Isard and Faruquee (1998, chapter V)

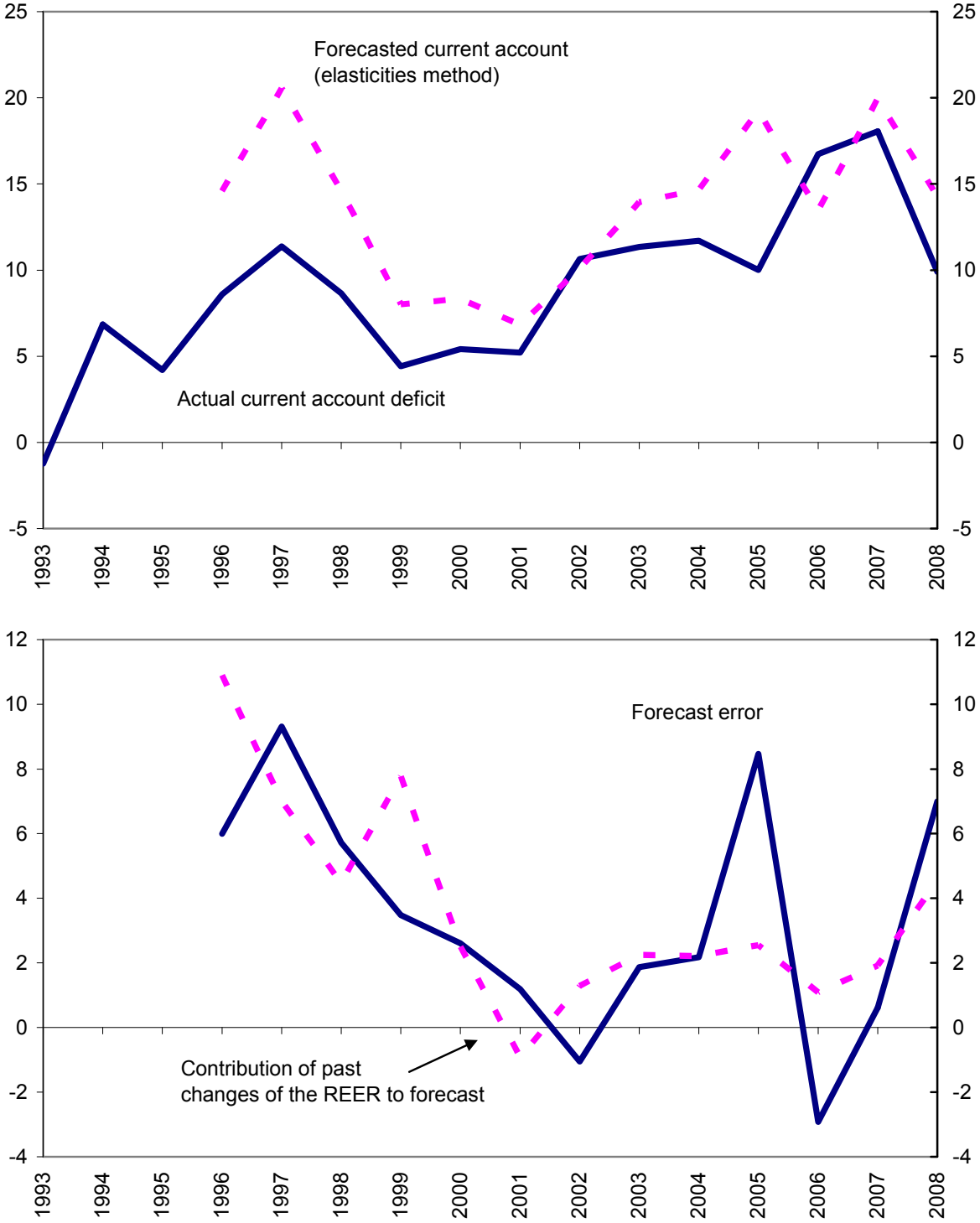
Table 4. Equilibrium Real Exchange Rate Approach

	First Method (estimation method) 1/			Second Method (averages method) 2/
	Regressors	CEE coefficients 3/	Contribution to equilibrium real exchange rate	
Productivity gap 4/	0.01	1.42	0.01	
NFA (as share of average exports and imports)	-1.34	0.04	-0.05	
Government consumption (as share of GDP)	0.17	0.00	0.00	
Trade restrictions index (Sachs and Warner, 1995)	0.00	0.14	0.00	
Share of administered prices 5/	2.00	-0.02	-0.04	
Commodity terms of trade index (logarithm) 6/	4.61	0.39	1.80	
Country-specific constant parameter (fixed effect) 7/	1.00	2.95	2.95	
Logarithm of equilibrium real exchange rate (A)			4.67	
Logarithm of actual real exchange rate (B)			4.86	
Estimated overvaluation (B-A) (in percent)			**18.6**	**15.5**

Source: IMF staff calculations. CPI-based REER series is from IMF REER database. ULC-based REER series is from the European Commission (Economic and Financial Affairs).

1/ End-term projections (i.e., for 2014) of all variables are used as regressors. Projections of the productivity gap equal to the value observed in 2006.
2/ Average deviation (of CPI-based REER and ULC-based REER) from their past five-year historical averages.
3/ CEE countries are Poland, Slovak Republic, Czech Republic, Hungary, and Slovenia
4/ Logarithm of productivity of tradables minus logarithm of productivity of nontradables
5/ Measure of regulated prices, EBRD
6/ Base year is 2005 (value in 2005 is 4.60)
7/ Calculated such that the average prediction error (i.e., the average misalignment) for the period 1996-2007 is zero

Figure 1. Estonia: Forecasting the Current Account Deficit Using the Elasticities Method
(percent of GDP) 1/



Source: Bank of Estonia (actual data) and IMF staff estimates (forecast)

1/ Data for 2008 corresponds to the 12 months ending in October 2008.

Figure 2. Estonia: Actual and Estimated Current Account Deficit (percent of GDP) 1/

1/ Data for 2008 corresponds to the 12 months ending in October 2008.
Source: Bank of Estonia (actual data) and IMF staff estimates.

III. Balance-Sheet Analysis[1]

1. This chapter reports on an analysis of Estonia's sectoral balance sheets as of September 2008 (Table 1).

2. **The public sector's balance sheets are robust, providing strong support to the currency board arrangement.** Repeated budget surpluses in recent years have helped build a net asset position to the government (30 percent of GDP in September 2008, of which nearly 8 percent of GDP are in liquid financial instruments). Eesti Pank's liquid foreign exchange assets exceed its domestic currency liabilities by a small margin, implying a full backing of the monetary base as required by the currency board.

Public Sector Balance Sheet Positions, September 2008
In percent of GDP

	Net Financial Asset Positions by Currency				Liquidity Position by Currency					
					Kroon			Foreign exchange		
	Kroon	Foreign exchange	Equity	Total	*Assets*	*Liabilities*	*Net Position*	*Assets*	*Liabilities*	*Net Position*
Government	4.3	8.3	17.2	30	4.7	0.0	4.7	4.7	1.6	3.1
Eesti Pank	-13.5	15.0	-1.5	0	0.0	13.5	-13.5	15.4	0.4	15.0

Source: Estonian authorities and IMF staff estimates.

3. **These cushions are, however, dwarfed by Estonia's private sector indebtedness.** ***Banks*** are net creditors vis-à-vis the central bank reflecting high reserve requirements and the absence of a central bank lending facility, consistently with the currency board arrangement. Banks are also net creditors vis-à-vis the nonbank private sector since domestic lending exceeds domestic deposits. But precisely because of this gap, which is filled through funding from abroad, and because of the foreign ownership of the banking sector, banks have a large debtor position vis-à-vis nonresidents—61 percent of GDP in September 2008. The ***corporate sector*** is a net debtor vis-à-vis all other sectors—particularly

Net asset position by counterpart and currency, September 2008
In percent of GDP

	Kroon	FX	Equity	Total
		Banks' position		
Government	-4	1	0	-4
Eesti Pank	10	0	0	10
Households	-8	36	0	28
Other private sector	-3	42	-9	30
Nonresidents	0	-47	-14	-61
		Corporates' position		
Government	0	-3	-15	-18
Eesti Pank	0	0	0	0
Households	0	0	-8	-8
Banks	3	-42	9	-30
Nonresidents	0	-18	-38	-56
		Households' position		
Government	0	0	0	0
Eesti Pank	3	0	0	3
Other private sector	0	0	8	8
Banks	8	-36	0	-28
Nonresidents	0	9	8	18

Source: Estonian authorities and IMF staff estimates.

[1] Prepared by Nada Choueiri.

nonresidents, another manifestation of the importance of foreign ownership in the Estonian economy. As for ***households***, their negligible net asset position (1 percent of GDP) masks a sizable indebtedness to the banking sector, driven by foreign currency mortgage borrowing (which represents 80 percent of household borrowings).

4. **Banks are vulnerable to a sudden stop in foreign funding–all of which comes from parent institutions.** The bulk of their exposure to nonresidents is debt (47 percent of GDP), while only a small share is equity (14 percent of GDP). Although all of it is held by parent banks, there is a vulnerability to a sudden stop because the parents rely on funds from the wholesale market. Besides, a large part of the debt is short term,[2] while banks' assets have very long average maturities—mortgages for example can have maturities extending up to 40 years. While the exposure of corporates to nonresidents is almost as large as that of banks, it is mostly in the form of equity, and is therefore much more sheltered against direct cuts in credit lines.[3] However, to the extent that corporates rely on bank borrowing for their financing—indeed their net liability position to the banking sector is 39 percent of GDP—they would also be affected by a disruption to bank financing.

5. **While banks are long in foreign currency, the large exposure of corporates and households to currency risk represents indirect exposure of banks themselves to such risk.** At over 30 percent of GDP, the net (positive) foreign exchange position of banks, reflects large net foreign currency claims on the nonbank private sector (78 percent of GDP) and funding liabilities to nonresidents (47 percent of GDP). Banks' ability to service their external debt hinges on the ability of households and corporates to generate the foreign exchange needed to service their foreign currency bank loans—much of which may not be hedged, particularly as far as households are concerned.

6. **Several factors likely contributed to these foreign currency positions.** The credibility and robustness of the currency board arrangement and a continuously positive—albeit, until recently, small—differential between kroon and euro deposit rates encouraged Estonians to hold deposits in kroon but borrow in euros. Banks likely priced their deposit and lending instruments in this way in order to avoid large open euro positions—which meant

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[2] The data overstate the amount of short-term debt because all bank borrowing from parent banks is recorded under currency and deposits, so as short-term, following the new methodology adopted by the central bank in 2008. However, as of September 2008, nearly 60 percent of bank borrowing from abroad was long-term (over 1 year maturity) at original maturities, and about 40 percent of that borrowing was long-term at remaining maturities.

[3] The larger part of the external debt of corporates seems to be loans from international institutions such as the EIB, including with government guarantees for public enterprises—and these should be relatively sheltered against sudden stops.

expressing a preference for lending in foreign exchange since their funds were predominantly denominated in hard currency.

7. **Since a large share of bank loans are tied to real estate, banks are vulnerable to a deterioration in the real estate market.** At least half of bank credit finances real estate activities and about 74 percent of all bank loans are backed by real estate collateral. A downturn in the real estate market would not have a major impact on the performance of these loans so long as borrowers remained able to service them. However, to the extent that borrowers rely on real estate capital gains to meet their financial obligations, a real estate downturn could lead to loan losses. Also, should a change in the global environment lead to rising EURIBOR rates, to which mortgages are linked, borrowers could increasingly find it difficult to service their mortgage debt. A more pressing risk currently is that the severe economic downturn hits households' incomes and thus their ability to service mortgage debt, in which case the rapid growth of NPLs could adversely affect banks' balance sheets and profitability. So far, real estate prices have declined by about 20–30 percent on average from their 2006 peak, but banks have held up relatively well—although 60-days overdues in housing loans have quadrupled in the last year alone, they remained very low, at 1½ percent of total housing loans in September 2008.

8. **The banking sector is also exposed to significant maturity mismatches.** As is normal for banks, maturity transformation creates an exposure to both roll-over and interest rate risks. Banks' exposure to interest rate risk is overstated in the data for two reasons. First, borrowing from parent banks is recorded as short-term deposits from abroad regardless of actual maturity.[4] Second, mortgages generally have floating rates—tied to 6-month EURIBOR—and are therefore more akin to short-term instruments in terms of frequency of repricing. Interest rate risk is thus transferred to households. Keeping these caveats in mind, banks' exposure to roll-over risk appears pressing since their short term foreign exchange assets only cover 25 percent of their short term foreign exchange liabilities—the ratio is just slightly beefed up to 27 percent if one

Balance Sheet Positions in Liquid Assets by Currency, September 2008
In percent of GDP

	Kroon			Foreign exchange		
	Assets	*Liabilities*	*Net Position*	*Assets*	*Liabilities*	*Net Position*
Government	4.7	0.0	4.7	4.7	1.6	3.1
Eesti Pank	0.0	13.5	-13.5	15.4	0.4	15.0
Banks	11.5	31.7	-20.1	18.4	73.7	-55.3
Households	19.1	0.4	18.6	4.3	0.2	4.2
Other private sector	9.6	1.1	8.5	18.3	15.0	3.3

Source: Estonian authorities and IMF staff estimates.

[4] But IIP data prior to 2008, available on the central bank's website, recorded such borrowing under short-term or long-term loans depending on the maturity.

takes into consideration the unencumbered foreign exchange reserves of the central bank (1½ percent of GDP).

9. **In sum, the salient vulnerabilities are banks' exposure to funding and credit risk, and nonbank private sector's exposure to currency risk, while strong public sector balance sheets provide support to the currency board arrangement.**

Table 1. Estonia: Intersectoral Asset and Liability Positions, September 2008 (In percent of GDP)

Counterpart / Intrument / Holder	Eesti Pank			General Government			Banks (Including Leasing)			Other private sector			Of which: Households			Nonresidents			Sector's Overall Position		
	Assets	Liabilities	Net position	Assets	Liabilities	Net position	Assets	Liabilities	Net position	Assets	Liabilities	Net position	Assets	Liabilities	Net position	Assets	Liabilities	Net position	Total Assets	Total Liabilities	Total net Position
Central bank																					
In domestic currency				0.0	0.0	0.0	0.0	9.7	-9.7	0.4	3.8	-3.4	0.0	3.2	-3.2	0.0	0.4	-0.4	0.4	14.0	-13.5
Short term				0.0	0.0	0.0	0.0	9.7	-9.7	0.0	3.8	-3.8	0.0	3.2	-3.2	0.0	0.0	0.0	0.0	13.5	-13.5
Medium & Long term				0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.4	-0.4	0.4	0.4	0.0
In foreign currency				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.4	15.0	15.4	0.4	15.0
Short term				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.4	15.0	15.4	0.4	15.0
Medium & Long term				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity				0.0	2.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.6	2.0	-1.5
General government																					
In domestic currency	0.0	0.0	0.0				4.8	0.4	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.4	4.3
Short term	0.0	0.0	0.0				4.7	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	4.7
Medium & Long term	0.0	0.0	0.0				0.1	0.4	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	-0.4
In foreign currency	0.0	0.0	0.0				1.5	2.3	-0.8	2.6	0.0	2.6	0.0	0.0	0.0	9.4	2.9	6.6	13.5	5.1	8.3
Short term	0.0	0.0	0.0				1.5	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	3.2	1.5	1.7	4.7	1.6	3.1
Medium & Long term	0.0	0.0	0.0				0.1	2.3	-2.2	2.6	0.0	2.6	0.0	0.0	0.0	6.2	1.3	4.9	8.8	3.6	5.2
Equity	2.0	0.0	2.0				0.0	0.0	0.0	15.2	0.0	15.2	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0	17.2
Banks 1/																					
In domestic currency	9.7	0.0	9.7	0.4	4.8	-4.3				15.9	26.3	-10.4	8.9	16.5	-7.6	2.4	2.4	0.0	28.4	33.4	-5.1
Short term	9.7	0.0	9.7	0.0	4.7	-4.7				1.5	24.8	-23.3	0.4	15.8	-15.4	0.3	2.2	-1.9	11.5	31.7	-20.1
Medium & Long term	0.0	0.0	0.0	0.4	0.1	0.4				14.3	1.5	12.9	8.5	0.7	7.8	2.1	0.2	1.9	16.9	1.8	15.1
In foreign currency	0.0	0.0	0.0	2.3	1.5	0.8				93.9	16.4	77.6	42.2	6.2	36.0	14.9	62.2	-47.3	111.2	80.1	31.1
Short term	0.0	0.0	0.0	0.0	1.5	-1.4				3.6	13.3	-9.8	0.2	4.3	-4.2	14.8	58.9	-44.1	18.4	73.7	-55.3
Medium & Long term	0.0	0.0	0.0	2.3	0.1	2.2				90.4	3.0	87.3	42.0	1.9	40.2	0.1	3.3	-3.1	92.8	6.4	86.4
Equity	0.0	0.0	0.0	0.0	0.0	0.0				-7.7	1.1	-8.8	0.0	0.0	0.0	11.2	25.1	-13.9	4.0	26.2	-22.2
Other private sector																					
In domestic currency	3.8	0.4	3.4	0.0	0.0	0.0	26.3	15.9	10.4							0.0	0.0	0.0	30.1	16.3	13.8
Short term	3.8	0.0	3.8	0.0	0.0	0.0	24.8	1.5	23.3							0.0	0.0	0.0	28.7	1.5	27.1
Medium & Long term	0.0	0.4	-0.4	0.0	0.0	0.0	1.5	14.3	-12.9							0.0	0.0	0.0	1.5	14.8	-13.3
In foreign currency	0.0	0.0	0.0	0.0	2.6	-2.6	16.4	93.9	-77.6							18.9	27.6	-8.6	35.3	124.1	-88.7
Short term	0.0	0.0	0.0	0.0	0.0	0.0	13.3	3.6	9.8							9.3	11.6	-2.3	22.6	15.2	7.4
Medium & Long term	0.0	0.0	0.0	0.0	2.6	-2.6	3.0	90.4	-87.3							9.6	16.0	-6.3	12.7	108.9	-96.2
Equity	0.0	0.0	0.0	0.0	15.2	-15.2	1.1	-7.7	8.8							25.7	55.0	-29.3	26.8	62.6	-35.8
Of which: Households																					
In domestic currency	3.2	0.0	3.2	0	0	0	16.5	8.9	7.6							0.0	0.0	0.0	19.7	8.9	10.8
Short term	3.2	0.0	3.2	0	0	0	15.8	0.4	15.4							0.0	0.0	0.0	19.1	0.4	18.6
Medium & Long term	0.0	0.0	0.0	0	0	0	0.7	8.5	-7.8							0.0	0.0	0.0	0.7	8.5	-7.8
In foreign currency	0.0	0.0	0.0	0	0	0	6.2	42.2	-36.0							9.3	0.0	9.3	15.5	42.2	-26.7
Short term	0.0	0.0	0.0	0	0	0	4.3	0.2	4.2							0.0	0.0	0.0	4.3	0.2	4.2
Long term	0.0	0.0	0.0	0	0	0	1.9	42.0	-40.2							9.3	0.0	9.3	11.2	42.0	-30.8
Direct Investment	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0							8.2	0.0	8.2	16.5	0.0	16.5
Nonresidents																					
In domestic currency	0.4	0.0	0.4	0.0	0.0	0.0	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0				2.8	2.4	0.5
Short term	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.3	1.9	0.0	0.0	0.0	0.0	0.0	0.0				2.2	0.3	1.9
Medium & Long term	0.4	0.0	0.4	0.0	0.0	0.0	0.2	2.1	-1.9	0.0	0.0	0.0	0.0	0.0	0.0				0.7	2.1	-1.4
In foreign currency	0.4	15.4	-15.0	2.9	9.4	-6.6	62.2	14.9	47.3	27.6	18.9	8.6	0.0	9.3	-9.3				93.0	58.7	34.3
Short term	0.4	15.4	-15.0	1.5	3.2	-1.7	58.9	14.8	44.1	11.6	9.3	2.3	0.0	0.0	0.0				72.4	42.7	29.7
Medium & Long term	0.0	0.0	0.0	1.3	6.2	-4.9	3.3	0.1	3.1	16.0	9.6	6.3	0.0	9.3	-9.3				20.6	16.0	4.6
Equity	0.0	0.4	-0.4	0.0	0.0	0.0	25.1	11.2	13.9	55.0	25.7	29.3	0.0	8.2	-8.2				80.1	37.3	42.8

Source: Estonian authorities and IMF staff estimates.

1/ Includes leasing companies.

REFERENCES

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