Marianna Endrész, Győző Gyöngyösi and Péter Harasztosi: Corporate sector currency mismatch in Hungary*, [1]

Our analysis of micro data shows that the size of unhedged foreign currency lending has become significant not just in the household sector, but in the corporate sector as well. The weight of foreign currency debtors without net foreign currency income was significant prior to the crisis. During the crisis – as a result of the exchange rate depreciation – the performance of foreign currency debtors was worse in relative terms. There was a greater increase in their probability of default and a stronger fall in their investment, while their access to the loan market also deteriorated more.

INTRODUCTION

The financial crises of the 1990s, coupled with deep recession, drew attention to a specific mechanism of exchange rate depreciation, the so-called balance sheet effects. According to third-generation crisis models, foreign currency exposures in the private sector add to the costs of an exchange rate crisis and narrow the room for manoeuvre of monetary policy. If, for example, a significant portion of companies become indebted in foreign currency, exchange rate depreciation results in a significant increase in the debt burden of the companies concerned, thus impairing their profitability and balance sheet, which may lead to a decline in investment. If banks take into account the value of the company as well upon the evaluation of loan applications, companies with worse balance sheet receive loans only with less favourable conditions or do not receive loans at all. Therefore, investment will be lower, and output may decline as a result of depreciation.[2]

However, indebtedness in foreign currency in itself does not necessarily lead to lower output. Namely, a certain proportion of companies export, and the weaker exchange rate raises their export income as well. Therefore, the key issue is not the amount of foreign currency loans outstanding in itself, but rather its unhedged portion. Unhedged foreign currency exposure – or currency mismatch – means that there is a mismatch between the given company's net

foreign currency assets and the net present value of the expected foreign currency incomes.

Perhaps the difference between foreign currency lending and currency mismatch can serve as an explanation for the fact that lending in foreign currency to households has been given much greater attention recently than foreign currency lending to companies. Households have low foreign exchange incomes or none at all. The corporate sector, however, has significant export revenues serving as natural hedge for foreign currency loans. Consequently, depreciation is expected to have a less negative impact on the corporate sector than on households. While in the case of households aggregate statistics reflect the weight of the problem, in the case of companies they provide less information, as the weight of currency mismatch and balance sheet effects depends on the proportion of foreign currency debtors that do not have a natural hedge (i.e. net export income) and on the importance of their role in the macroeconomy. This, however, can be examined only on the basis of firm-level data.

Combining several administrative databases allowed us to carry out an analysis of this kind. The combined database contains companies that are subject to double-entry book-keeping from 2004 to 2010. Companies' balance sheet data, the currency composition of their loans, their export revenues as well as import expenditures are known. This

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Table 1
Definition of the groups with currency mismatch

	FX loan		HUF loan	No loan
Net exporter				
Net importer	unhedged	↔		
Not engaged in foreign trade	unhedged			

allows us to identify the companies with currency mismatch with a relatively high degree of accuracy.[3]

Currency mismatch is an important subject in terms of monetary policy as well. Firstly, in normal times it weakens the exchange rate channel of monetary transmission: currency mismatch reduces the stimulating effect of a looser monetary policy. Secondly, when the economy is exposed to a major exchange rate shock, balance sheet effects may significantly limit the room for manoeuvre of monetary policy. Depending on the size of corporate exposure, the position of the banking sector, the size of the exchange rate shock and a number of other factors, monetary easing may even become contractionary, especially if the banking sector is also affected, resulting in a significant deterioration in its lending capacity.

In the first part of the article, we define the companies that are considered to be unhedged foreign currency debtors. We examine the characteristics and macroeconomic weights of these companies. Finally, using descriptive statistics, we show the changes in the performance of these firms during the crisis.

DEFINITION OF CURRENCY MISMATCH AND THE CHARACTERISTICS OF THE COMPANIES CONCERNED

The foreign currency exposure of a company may appear in the form of assets, liabilities, revenues and expenditures. If they do not hedge one another, the firm is exposed to the exchange rate risk, i.e. exchange rate changes influence its balance sheet, profitability and market value. Typically, there are export revenues and import expenditures contrasted with FX loans. If the value of FX loans exceeds the present value of the expected (net) FX revenues, the company has an unhedged exposure, which results in a loss in the case of a depreciation.

In practice, it is difficult to determine the size of the net exposure, because stock- and flow-type data have to be compared. Moreover, one may only assume the future FX revenues.[4] Therefore, we are applying a somewhat different definition; instead of precisely measuring the exposure, we create categories. We speak about unhedged exposure when a company has an FX loan but does not have net FX revenue, i.e. it is a net importer, or does not participate in international trade at all (Table 1).[5]

Depreciation has a clearly negative impact on these two groups. A weaker exchange rate adds to their loan burden (balance sheet effect), and the depreciation does not increase the competitiveness of these groups either. Moreover, it even increases the forint value of net importers' import expenditures.

A weakening exchange rate afflicts net exporters as well, if they have FX loans. In their case, however, this is offset by competitiveness effects. The result of these two factors is presumably positive, but the balance sheet effect exists in their case as well.

Making distinctions between companies with currency mismatch is also important because it is well documented in the literature of international trade that companies participating in international trade are more efficient, i.e. the average characteristics of importers and non-trading companies are significantly different.[6] In addition, developments in external and domestic demands have been different in recent years; therefore, it is worthwhile to compare companies with FX loans with their peers within foreign trade categories. As companies with loans are also significantly better than the ones without loans, we also distinguish companies with forint loans. This categorisation (groups according to international trade and loan status) allows identifying appropriate control groups for the evaluation of the performance of foreign currency debtors.

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[3] For a description of the databases, and the cleaning and merging process, see the relevant chapter and appendix of the study by Endrész et al. (2012).

[4] In addition, companies' foreign currency exposure is also affected by the stock of FX derivative positions, e.g. forward deals. On the one hand, the stock of forward positions is a fraction of that of FX loans, on the other hand, it is not available at company level.

[5] It is to be noted that according to the definition the group of net importers also includes companies that are otherwise stable exporters, but their exports in the given year were below their imports.

[6] See Békés et al. (2011) on Hungarian companies.

Chart 1
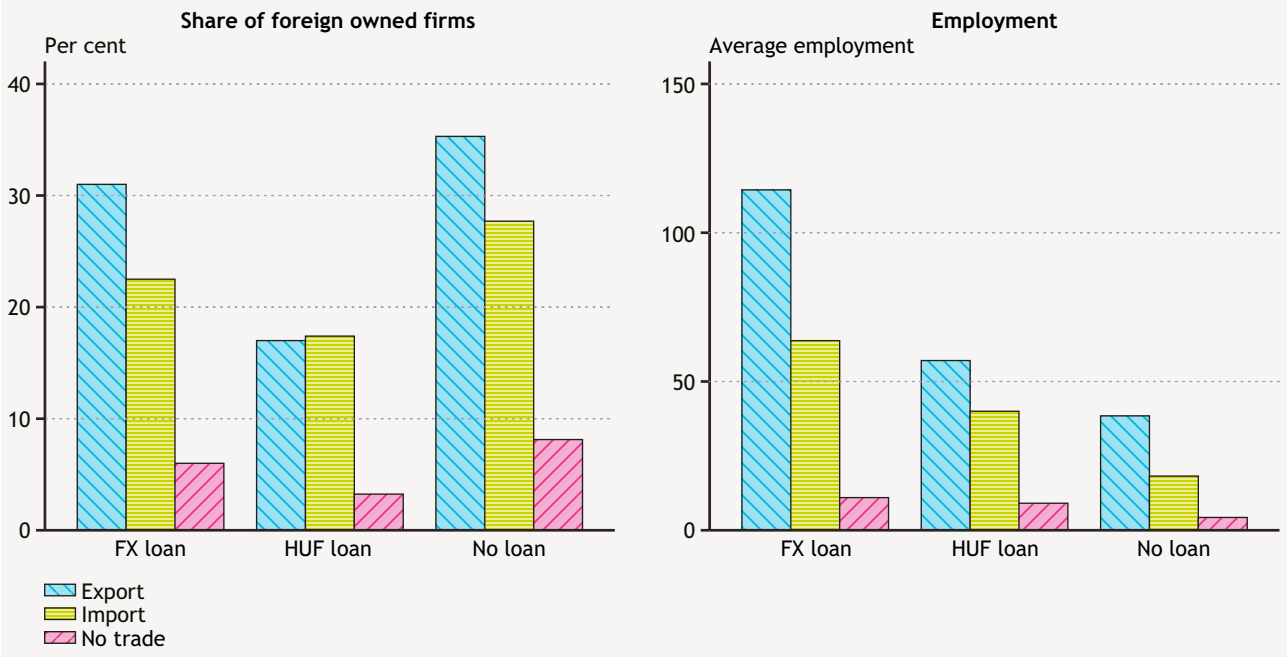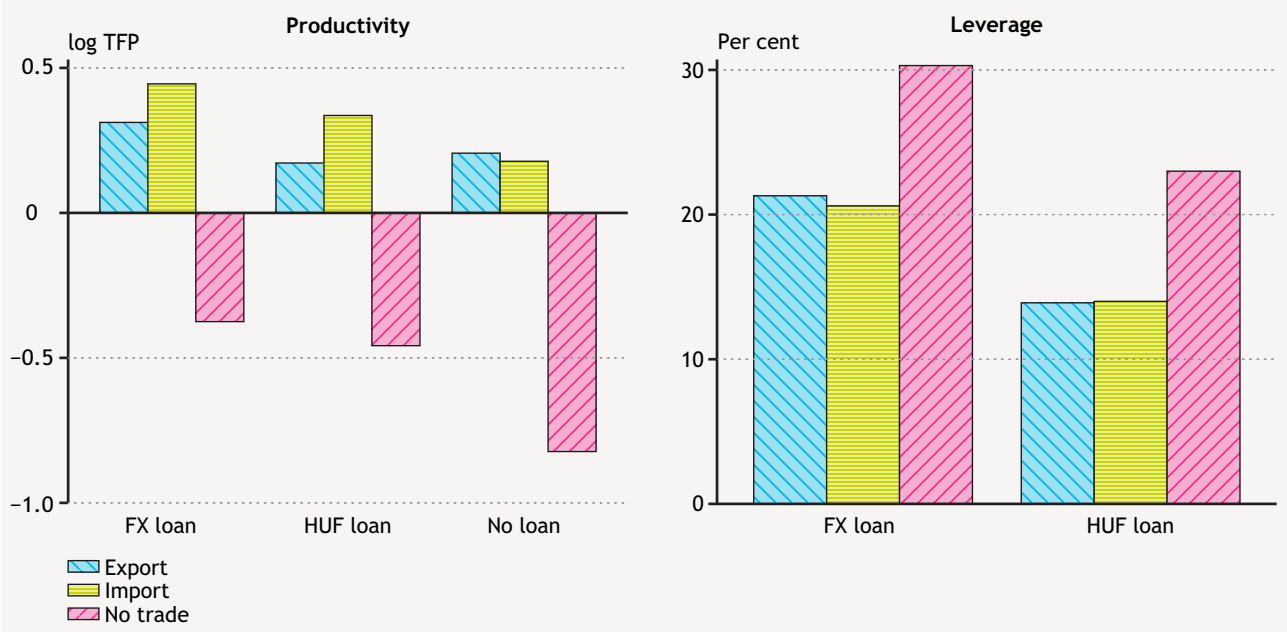**Average characteristics: foreign ownership and employment**

Share of foreign owned firms

Per cent

Employment

Average employment

Legend:
- Export
- Import
- No trade

Chart 2
Average characteristics: productivity and indebtedness

Productivity

log TFP

Leverage

Per cent

Legend:
- Export
- Import
- No trade

The following is a review of the average characteristics of companies with currency mismatch. We examine the size and average indebtedness of companies, the proportion of foreign ownership and total factor productivity (TFP). Based on Charts 1 and 2, companies with FX loans are usually larger, somewhat more productive and more indebted than the control group (firms with forint loans within the given trading group). However, the comparison also reveals that there are considerable differences between groups by foreign trade and loan status as well. If a firm is engaged in foreign trade and/or has a loan, it is much larger and much more productive than those producing only for the domestic market or those that run their business without borrowing. In addition, foreign ownership is more typical of those participating in foreign trade.

The proportion of foreign ownership is much higher among exporters and importers. The analysis according to loan status reveals the specific financing preferences of foreign-owned companies. The proportion of foreigners is the highest among companies working without loans, their proportion is the second highest within those with FX loans, and foreign ownership is the least typical among companies with forint loans.

In terms of employment, the companies with FX loans and exporters are the largest. They are followed by importers and companies with forint loans.

As for productivity, the foreign trading status is more determining, as the significant differences are between companies that participate in international trade and those that do not, although the average TFP of companies with loans is also higher than the TFP of firms functioning without loans.

Average indebtedness is typically higher among companies with FX loans. This is not surprising, as due to the interest rate spread between forint- and FX-denominated loans the latter allowed higher indebtedness.[7]

MACROECONOMIC WEIGHT OF COMPANIES WITH CURRENCY MISMATCH

The real economy effect of exchange rate depreciation depends on the weight of unhedged foreign currency borrowers in the macroeconomy. Therefore, this chapter examines how high the proportion of these companies is in the main macroeconomic aggregates. Four indicators are examined: value added, employment, investment and loans. The selected year is 2007, i.e. the last one before the crisis.

Chart 3 depicts the share of individual groups of companies (including debtors with unhedged and hedged foreign currency debt) in the macro aggregates. The proportion of companies with unhedged foreign currency debt is the lowest in terms of the number of employees: around 17 per cent in 2007. More than 20 per cent of value added was produced by such companies, and their share in investment was 30 per cent. Exporters with FX loans do not have unhedged exposure, but are also exposed to balance sheet effects. Their proportion is also significant within certain aggregates. Including this set of companies, the proportion

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Chart 3

Macroeconomic weight of firms with unhedged FX loans and their weight in banks' loan portfolio

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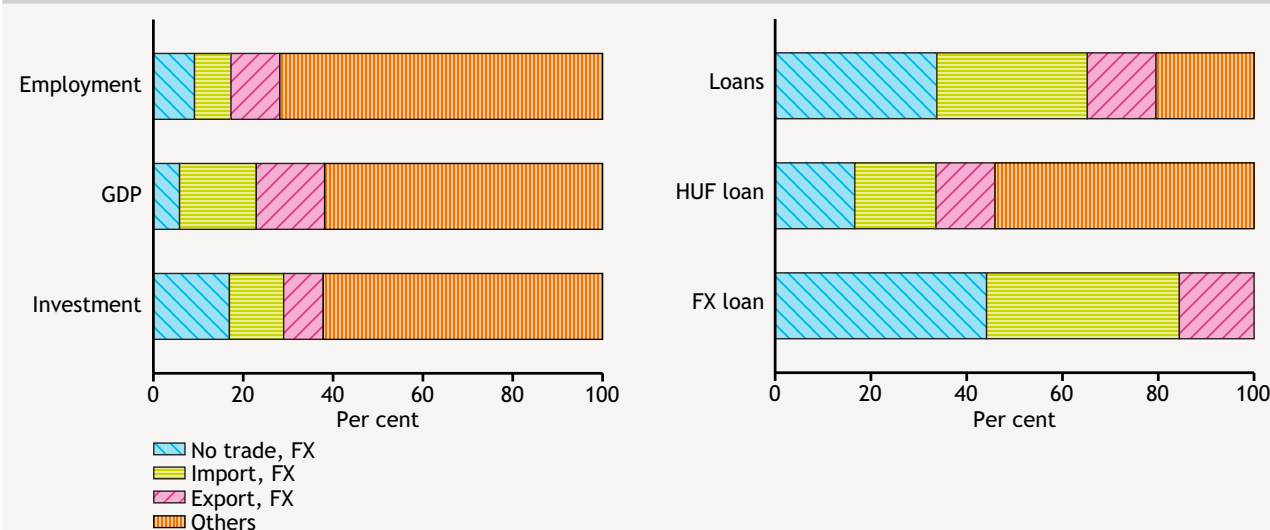
[7] Not only the interest rate spread remained large prior to the crisis, but the uncovered interest parity condition failed as well. This means that the exchange rate movements did not offset the effect of the difference in interest rates.

of the whole group exposed to the balance sheet effect is close to 40 per cent in both output and investment.

The weight of firms with unhedged FX loans is even higher in the loan portfolio of domestic banks.[8] In 2007, these firms accounted for 2/3 of all corporate loans, most of which were FX loans. In terms of its size, banks' indirect exchange rate exposure due to unhedged FX lending to companies compares with the stock of households' FX loans. Just before the outbreak of the crisis, households' FX loans amounted to HUF 3.9 billion. In the same period, companies with currency mismatch[9] had FX-denominated and HUF-denominated loans amounting to HUF 3.5 billion and HUF 1 billion, respectively.[10] Thus, the Hungarian banking sector is exposed to significant indirect exchange rate risk not only through household FX lending, but also through corporate FX lending.

The conclusion that can be drawn from these statistics is that depreciation may have serious real economy effects, as a significant portion of the economy is affected by currency mismatch. It is worth emphasising that the share of companies exposed to depreciation is especially high in banks' loan portfolio. Consequently, the banking sector's lending capacity may also become significantly impaired as a result of depreciation, whereas the subsequent restraining of lending may considerably amplify the direct impact of the depreciation on the real economy (Endrész and Krekó, 2010).

THE IMPACT OF THE CRISIS

During the crisis the forint depreciated significantly, in several waves, weakening by some 20 per cent. The first wave took place in 2008 Q4 and 2009 Q1. If the balance sheet effects worked, we expect that the performance of the firms with currency mismatch worsened because of the depreciation. The data did show this. The probability of default was higher in the case of companies with currency mismatch (and in general with FX loans), and their investment rate and probability of having access to loans deteriorated more strongly.

Methodology

The differences observed in the performance of the groups of companies were examined with various methods. Firstly, we analysed the changes in performance indicators over

time. Here we allowed for changes in the sample of companies within individual groups over time. In the second approach, we worked with a fixed sample over time. We examined how the performance of firms belonging to a given group in 2007 and remaining therein changed after 2-3 years. For the latter approach, for each issue investigated we applied the same methodology, the so-called diff-in-diff estimation, where the following regression is estimated:

$$Y_{i,t+j} = \beta' X_{it} + \sum_{j=1}^{9} \delta_j TLD_{ijt} + \gamma Y_{it} + \mu_s + \varepsilon_{it}$$

The variable on the left is the outcome variable of company i at time t – investment rate, probability of default, probability of obtaining a loan. Variable TLD_{ijt} shows the "foreign trade–loan group" of company i at time t; its value is 1 if the company belongs to group j, and it is 0 otherwise.[11] For a more detailed description of the method, see Endrész (2012).

We are interested in how the performance of the groups changed from 2007 to 2009 and 2010. For this, it is sufficient to examine parameters δ_j. If, for example, j indicates the group of non-trading firms with FX loans δ_j, tells us to what extent the given group's average investment rate or probability of taking on a loan declined or increased relative to 2007. A comparison of the δ_j parameters of the different groups may also answer the question of whether there was any significant difference between firms with FX loans and companies in the control group. Although we control for a number of firm-specific factors, the results do not necessarily imply causality.

Investment

As a result of the crisis, investment in the whole economy declined considerably. Only two groups of companies reached the pre-crisis level by 2010.

Significant differences are observed, depending on whether the given company had FX loans. In each foreign trade category, there was a stronger decline in the investment of foreign currency debtors than in the investment of those indebted in forints or those running their businesses without loans. This applies to net exporters as well, i.e. even in their case it can be assumed that the balance sheet

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[8] Upon the assessment of the macro weights, it is worth remembering that the group of net importers comprises exporting companies as well.

[9] The two figures originate from different sources; one from the credit register, the other from supervisory bank reports. Therefore, the two may be compared only with reservations, but this does not modify the qualitative conclusion.

[10] With regard to households, we do not have information about the forint loans held by households, who have foreign currency exposure as well

[11] Vector X contains the control variables, such as productivity, size, indebtedness and foreign ownership. μ_s sector-specific fixed impact, ε_{ijt} is the error term, β, γ and δ_j are parameters.

Chart 4

Investment by groups of companies and the result of the diff-in-diff estimation
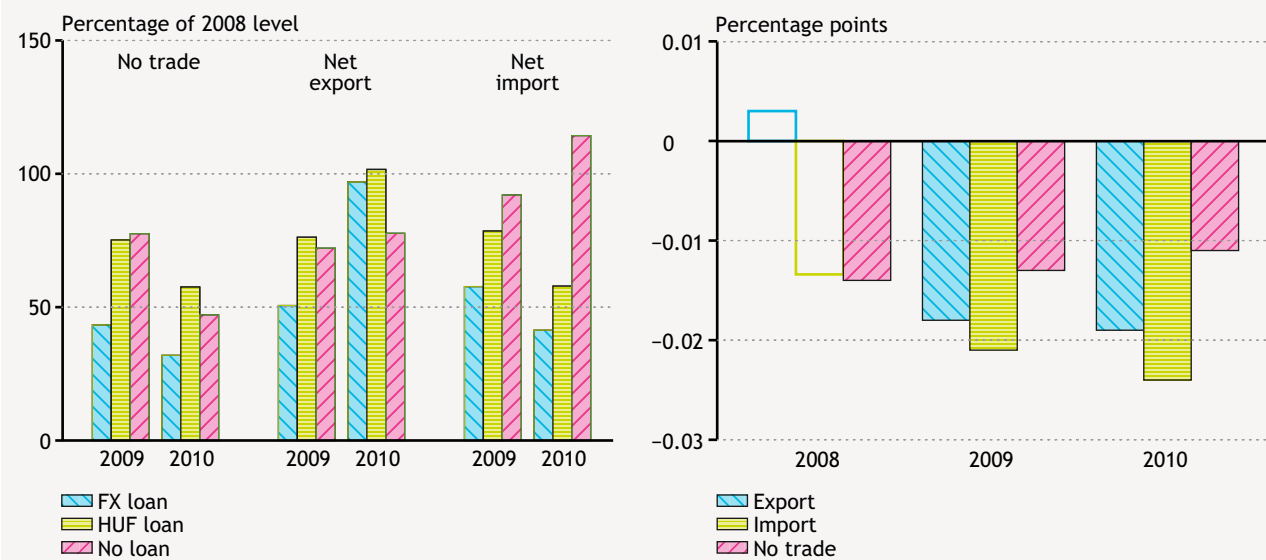
channel played a role. The lag of the two groups with currency mismatch was significant even in 2010.

The diff-in-diff estimations also confirm the above picture. The chart shows the difference of the δ_j parameters of foreign currency debtors and forint debtors by trade status. If it is negative, it means that the decline in the investment rate of foreign currency debtors was greater than that of forint debtors. The full columns indicate significant results. The impact was strong and significant even in 2010 in all the three groups according to foreign

trade status, meaning that there was a major deterioration in foreign currency debtors' performance even in the case of net exporters.

Probability of default

Prior to the crisis, the one-year probability of default was around 1 per cent, and there was no major difference between groups by foreign trade and loan status. Probabilities of default surged after the outbreak of the crisis. Differences between groups also became spectacular: in 2009, the

Chart 5

Probabilities of default within one year and changes in the probabilities of default within one year and two years – result of diff-in-diff estimation
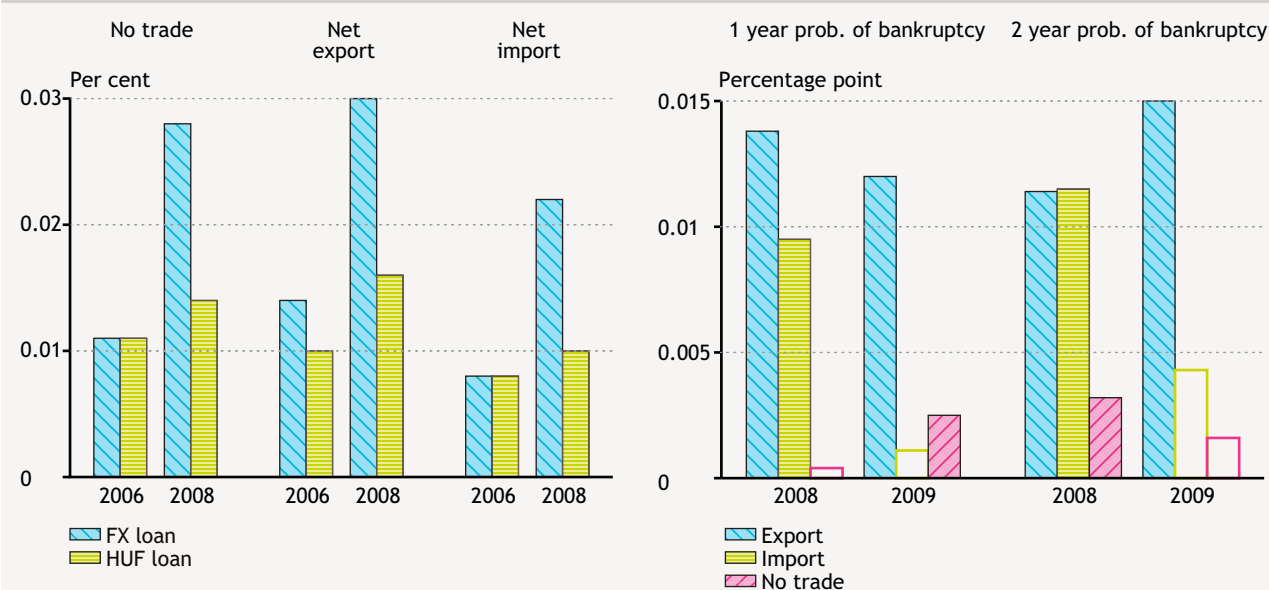
probability of default of foreign currency debtors was twice as high as that of companies with forint loans.

The variable sample and the diff-in-diff estimation yield very similar findings. Controlling for a number of firm-specific characteristics, the probability of default of foreign currency debtors is higher than that of forint debtors, although the significance of the results varies according to foreign trade status and horizon. At the same time, the result of the diff-in-diff estimation also reveals that the disadvantage of foreign currency debtors is the greatest in the case of exporters. This is explained by various factors: firstly, the different dynamics of the export and the domestic market, and secondly, the faster bankruptcy process observed in the case of exporting companies.

Changes in the loan market

Strong adjustment was observed in the loan market. Firstly, companies reconsidered their financing decisions. While the high pre-crisis interest rate spread and low exchange rate volatility had made borrowing in foreign currency attractive, this changed as a result of the crisis. Although the interest rate differential declined only slightly, the exchange rate depreciated, and its volatility also increased significantly. Therefore, demand for FX loans presumably fell. Secondly, loan supply also changed, for several reasons. The balance sheet as well as the creditworthiness of foreign currency debtors deteriorated to a relatively greater extent, which was reflected in banks' losses and
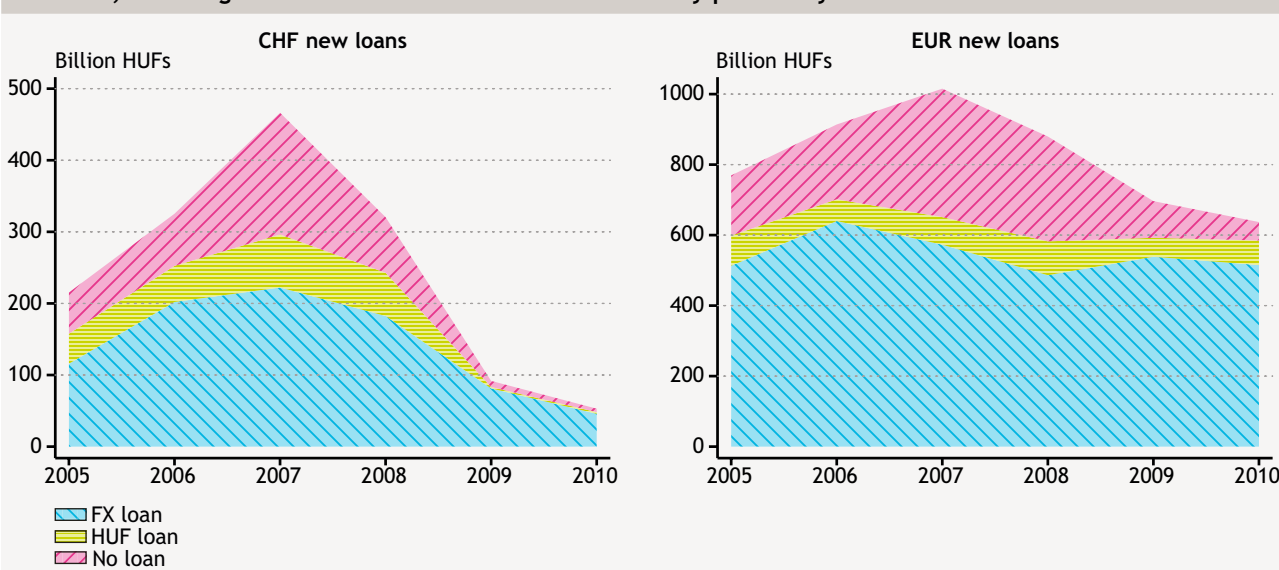
Chart 6
Corporate loans outstanding by source of loans
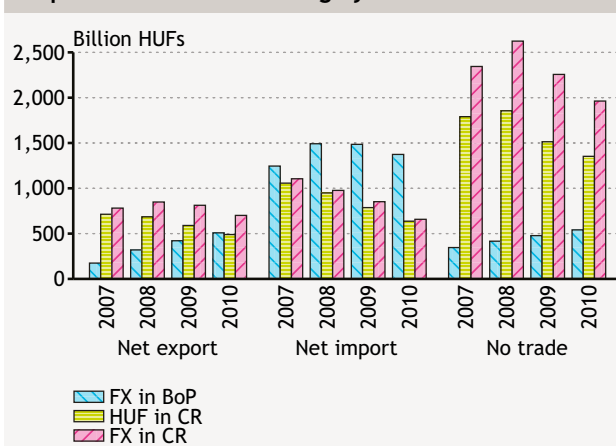
provisioning costs. In addition, banks were exposed to the exchange rate risk through other channels as well – they faced serious FX liquidity shortages. Consequently, banks strived to reduce the indirect and direct exchange rate exposures of their own balance sheets. Accordingly, both demand and supply factors may have contributed to the dispreferential treatment of both FX loans and foreign currency debtors. However, the demand and supply effects cannot be separated.[12]

One of the interesting features of loan market developments is that while lending by domestic banks declined considerably, both the amount and number of loans taken from abroad increased.[13] This can be observed not only in the case of

Chart 7
Domestic, new long-term CHF and EUR loans broken down by previous year's loan status


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[12] This is attempted by Sóvágó (2011), using bank data.

[13] It is to be noted that because our charts show outstanding debts in forints and at the current exchange rate, their increase partly reflects the effect of the exchange rate. Therefore, we consider it important to mention that the number of loans from abroad also increased.

Chart 8

Domestic, new long-term CHF and EUR loans broken down by foreign trade status
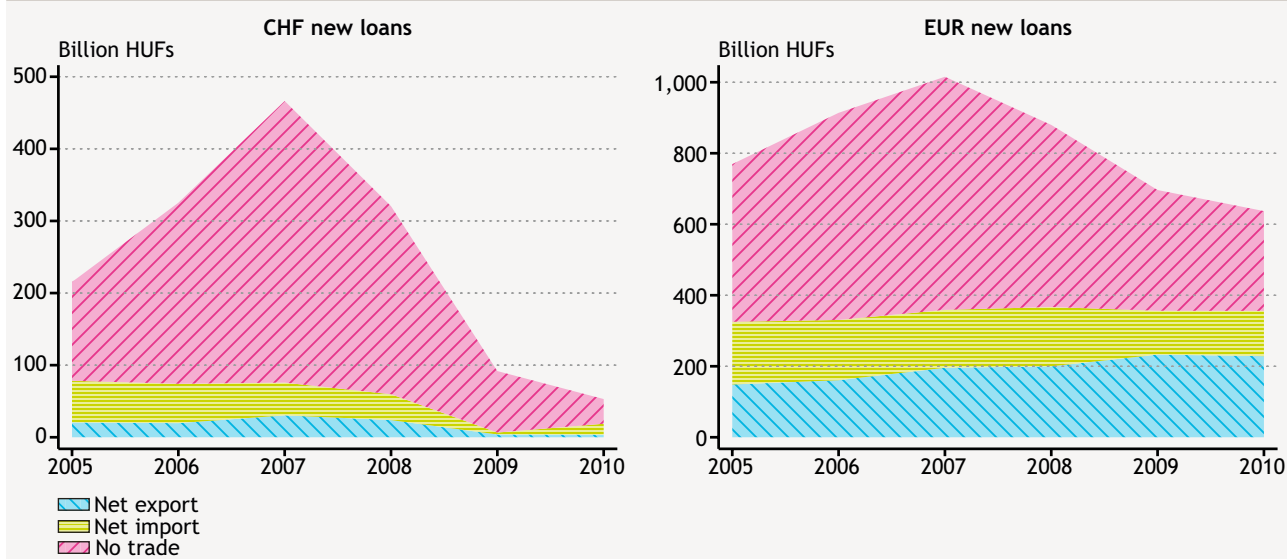
exporters, but also in the case of unhedged FX borrowers. This obvious substitution between the two sources suggests the presence of domestic bank supply factors.

The crisis also entailed a tightening of liquidity constraints. While before the crisis the probability of obtaining access to loans (especially in Swiss francs and euro) was increasing for companies that had not previously had loans, following the crisis these companies almost disappeared from the loan market. Chart 7 shows the long-term domestic FX loan flows, indicating whether the given company had any loans in the previous year, and if yes, what kind of loan.

An examination of FX loan flows according to the foreign trade status reveals that exporters mostly borrowed in euros, i.e. in their case the motive of hedging was stronger. Firms not engaged in foreign trade became indebted in both euros and Swiss francs. However, as a result of the crisis, Swiss franc loans practically disappeared from the loan market, and the proportion of debtors with currency mismatch also declined markedly.

The results of the diff-in-diff estimation also confirm that foreign currency debtors' probability of taking out a loan declined considerably, dropping by some 10-15 per cent in

Chart 9

Change in the probability of borrowing by groups of companies – result of diff-in-diff estimation
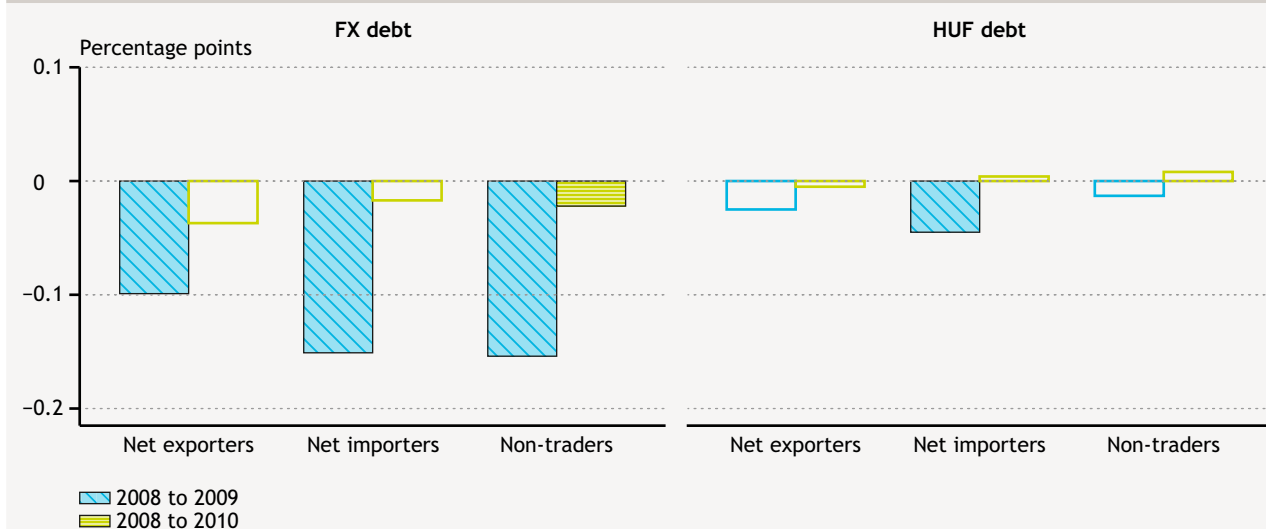
Note: Hollow columns show non–significant results.

Table 2
Change in the macroeconomic weight of firms with currency mismatch

	2007	2011
Domestic loan (CR – Credit register)	59.6%	58.2%
Total loans (CR and BoP)	65.1%	64.6%
Value added	22.8%	19.8%
Investment	28.6%	20.3%

2009. For 2010, the result is significant only in the case of non-trader FX debtors.

CHANGE IN THE WEIGHT OF DEBTORS WITH CURRENCY MISMATCH

As a result of the balance sheet effects and the adjustment, there may even have been a material change in the weight of debtors with currency mismatch following the crisis. The decline is the greatest in the case of investment: their proportion fell from 29 per cent to 20 per cent. At the same time, the changes observed in output and loans outstanding are much smaller. This also means that – depending on the position and resistance of the banking sector – the bank balance sheet channel may continue to play a potentially important role in the case of depreciation.

CONCLUSION

Analyses of micro data show that unhedged foreign currency lending has become significant in the corporate sector as well. The weight of foreign currency debtors that did not have net foreign currency income was significant prior to the crisis: they accounted for almost 30 per cent of investment, whereas their weight in the loan portfolio was even higher (2/3). While prior to the crisis FX lending most probably mitigated liquidity constraints, during the crisis – as a result of the exchange rate depreciation – the performance of foreign currency debtors was worse in relative terms. There was a greater increase in their probability of default and a stronger fall in their investment, while their access to the loan market also deteriorated. These stylised facts suggest that strong balance sheet effects were felt in the corporate sector as well during the crisis. As a result of the balance sheet effects and the adjustment, their weight somewhat declined by 2011, but it can still be considered significant.

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