EXCHANGE RATE EXPOSURE OF HUNGARIAN ENTERPRISES – RESULTS OF A SURVEY

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Abstract

In this paper I examine the exchange rate exposure of Hungarian enterprises from a financial stability perspective. In connection with the recent growth of FX loans to enterprises, the central bank assesses the vulnerability of the banks' loan portfolio to changes of the exchange rate. To collect firm-level data, two surveys were carried out on exchange rate exposure and exchange rate risk management practices. A 2005 survey showed that the majority of small and medium sized enterprises are exposed to exchange rate devaluation but exchange rate risk management techniques are almost unknown for them. In the 2007 survey, summarized here, large enterprises were also examined, as well as motives for borrowing in foreign currency and the lack of FX risk management tools. Based on the results, the main motive of raising FX debt is smaller interest rates, while at large enterprises natural hedging appears also. Risks of FX debt are ignored by several enterprises, explained by the phenomena that FX risk management tools are thought to be expensive, complicated or ineffective. Majority of enterprises think there are no possible tools to manage FX risks or they expect external solutions, like the introduction of euro to decrease their risks. Based on calculations, exchange rate devaluations would have a larger negative effect on Hungarian enterprises than appreciations.

Keywords: exchange rate exposure, FX borrowing, FX risk management, survey, probit

JEL: C25, C42, F31, G21, G32

[1] derive Kft. and Magyar Kereskedelmi és Iparkamara Gazdaság- és Vállalkozáselemző Intézet (Research Institute of Economics and Enterprises) took part in the preparation and execution of the survey.

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1. Motivation, previous results

Hungarian banks' balance sheets contain an increasing ratio of FX assets and liabilities, though, direct FX risks of banks are still low. Nevertheless, there are many other channels through which exchange rate fluctuations influence banking profits and soundness. One of these channels is exchange rate exposure of the enterprise sector: if enterprises with debt are exposed to exchange rate changes and exchange rate changes cause losses for them, it negatively influences the portfolio quality of the banks, thus, financial stability. Since loans to enterprises represent a significant ratio of the banks balance sheet, the potential effects of exchange rate changes on portfolio quality need to be examined.

Nevertheless, this relationship cannot be examined directly. The reason behind this is that FX lending – mainly to SMEs – is a recent development, thus, there are no long time series. Also, the volatility of the forint exchange rate was low for a long time in the past and even if its volatility influenced the portfolio quality, that was potentially hidden by the quick growth rate of the new loans which always improves portfolio quality indicators. Finally, based on available aggregate data (export and import volumes, FX loans), it is very difficult to assess the risks of banks that are related to the effect of the exchange rate on enterprises, since differences between enterprises disappear by aggregation and effects of shocks may be underestimated or biased.

Because of these problems, I examine the above question through assessing the indebtedness, exchange rate exposure, risk awareness and FX risk management of the enterprises. Thus, the aim of the research is to answer the following questions:

- *What are the characteristics of the enterprises which raise FX debt? What is the motivation of firms to choose FX loans instead of domestic currency ones?* I examine this topic since one of the main questions concerning FX lending to enterprises is whether the borrowers are hedged against FX risks and/or have enough buffers for unexpected losses caused by exchange rate changes. If not, devaluation of the forint increases their repayment which may result in the worsening of the portfolio quality.
- *How would exchange rate changes effect the financial situation of the Hungarian enterprises? Which firms are more exposed to the exchange rate changes? Are they aware of their exposure and risks?* This question is examined because FX loans are not the only source through which exchange rate changes can modify the financial situation of the enterprises. It is total exposure from all potential sources that should be taken into account. On the other hand, creditworthiness of all bank borrowers and potential bank borrowers influence the banks' risks.
- *Do enterprises manage their FX risk? If yes, what FX risk management tools are used and what are the characteristics of the enterprises which use them? If not, what are the reasons behind this?* This topic is closely related to the exchange rate exposure of the enterprises and their risk awareness. It also helps to understand the potential ways to improve the risk management activity of enterprises.

In literature, there are two main methods to measure the exchange rate exposure of the corporate sector and to examine the use of FX risk tools. One uses public stock exchange information and examines the effect of exchange rate changes on stock returns. The other tries to collect information directly from firms through surveys and asks about the currency structure of their balance sheets and income statement and also about their behaviour. The common feature of these methods is that both use micro data. Due to the small number of traded firms and the lack of a database where currency structure of firms' balance sheets, out-of balance items and income statement could be examined, we use a survey to gather the necessary information.

A previous survey of 580 Hungarian small and medium sized enterprises (Bodnár, 2006) showed that around two third of respondents are directly exposed to exchange rate changes, that is, the value of their income, expenditure, assets or liabilities changes if the exchange rate moves. I found that only 4 percent of enterprises use any derivative tools and a quarter of them has natural hedge. Two thirds of the FX loans of the surveyed firms from domestic banks are at firms without any hedge. It follows that if the currency structure of the liabilities are taken into consideration, a forint devaluation leads to a larger negative effect on small and medium sized enterprises (SMEs) than a forint appreciation.

The survey revealed that though exchange rate changes could lead to losses at a high ratio of firms, exchange rate risk is not a major concern for most of them. Nevertheless, several questions remained unanswered in that survey. First, only the behaviour of SMEs was examined, in line with the growing significance of this sector, while both from a macro and a financial stability point of view, large companies also play a crucial role. Second, motives behind FX indebtedness and exchange rate expectations of FX debtors were not examined thoroughly. Third, reasons behind the lack of use of exchange rate management tools were also not explained. And finally, while before the previous survey the exchange rate was quite stabile, in 2006 its volatility increased, so the behaviour of the enterprises could have changed due to it. This is also a question that is worth examining since it can explain a potential link between exchange rate changes and firms' indebtedness and hedging behaviour.

The remainder of this paper is the following. Section 2 summarises recent literature. Section 3 gives an overview on stylised facts of FX indebtedness and aggregated data related to exchange rate exposure. Section 4 introduces the methodology used and gives descriptive statistics of the survey results. Section 5 contains econometric examination of the survey data. Finally, Section 6 concludes.

2. Literature review

2.1. Exchange rate exposure and FX risk management

Exchange rate exposure (or FX exposure) exists if changes in the exchange rate influence the net value of certain items of economic agents, in case of enterprises the firm's value or profit. By contrast, exchange rate risk (or FX risk) is the product of the probability of an exchange rate change and exchange rate exposure (Douch, 1996). There are different sources of exchange rate exposure[1]:

- *translation exposure*: the possibility that accounting positions may change as a result of different denomination of assets and liabilities and/or income and expenditures. In other words, translation exposure is the currency mismatch in the balance sheet or income statement of enterprises (and also that of households);
- *transaction exposure*: it arises from the possibility that the future cash flow of the firm (from external trade contracts, foreign investment, etc.) may change as a result of exchange rate changes;
- *operational exposure*: it means the possibility that the market position of a firm may change through the effect of exchange rate changes on competition, relative prices, quantities, demand;
- *contingency exposure*: it refers to a potential revaluation of future possible liabilities (for example in the case when a company submits an offer on a tender);

[1] See for example Nydahl (1999); Schafer – Pohn-Weidinger (2005).

- *total or economic exposure*: it is often defined as a result of exchange rate changes through all of the above channels on the profit or value of a firm.

The last three channels pertain to all enterprises, even if they have no FX denominated items in their balance sheets or income statements. However, the first two types are present only at enterprises with currency mismatch: when net assets or net income are exposed to exchange rate changes as a result of different denomination (Goldstein – Turner, 2004). In line with these two types of exposures, there are two types of currency mismatch: stock currency mismatch can be measured by net FX assets, while flow currency mismatch is measured by net FX income or their exchange rate sensitivity. It is currency mismatch or total exposure which is mostly measured in the empirical literature.

If a firm is exposed to exchange rate changes, it can decrease the exposure through hedging or can bear the risk. The main motive to hedge is to decrease or eliminate the volatility of profit. This can be explained by tax incentives, the aim to increase leverage, to decrease the expected costs of financial distress, reduce underinvestment costs, or by managerial risk aversion (Graham – Rogers, 2002). Nevertheless, it can also be optimal to bear the risk in case the costs of FX risk management are larger than the expected benefits of bearing the exposure. A firm can also decide to bear the risks in case it does not expect exchange rate changes, thus, if it thinks the FX risks are small even in the presence of exchange rate exposure. This latter, though rational from an individual point of view, might result in the accumulation of systemic risks because of moral hazard problems: the fix exchange rate expectations lead to an underestimation of risks and accumulation of losses in case of unexpected exchange rate shocks.

There are two main methods in the literature to examine exchange rate exposure and FX risk management. The first one is based on the examination of the relationship between firms' performance (profitability) and changes of the exchange rate. Most of these papers analyse the reaction of market returns to exchange rate changes (based on the CAPM model). One advantage of this methodology is that through using a panel database, variance in both cross-section and time can be explored. Nevertheless, as market returns are influenced by many factors, there is uncertainty in this methodology and – mainly in case of emerging countries – the data available are usually not representative for the whole economy. The second method is to carry out surveys with specific questions on exchange rate exposure and firm characteristics. Thus, data on a representative sample can be collected, but this way it is very difficult to receive time-series data or do international comparison.

The main findings of empirical papers on exchange rate exposure[2] that are worth highlighting here are the following: exchange rate exposure is not constant over time, it depends on the magnitude of the exchange rate changes and thus not linear, and not symmetrical: depreciation and appreciation of the same magnitude may have effects of different magnitude. It is worth noticing that this makes forecasting difficult, since based on a period with low exchange rate volatility the possible effects of an exchange rate shock cannot be foreseen.

Empirical papers on FX risk management[3] highlight that FX risk management is usually limited: enterprises are unable or unwilling to hedge their total exposure. Even with this, exchange rate risk is hedged more often than other types of risk (for example interest rate, equity risk, product risk). Firms do not hedge if the exposure is too small to hedge, rather they usually speculate or

[2] See for example Allayannis (1996), Bartov – Bodnar (1994), Bodnar – Gentry (1993), Bodnar – Wong (2000), Chue – Cook (2004), Clarida (1997), Doidge et al. (2002), Dominguez – Tesar (2001 and 2006), Forbes (2002), Hagelin – Pramborg (2002), Ihrig (2001), Jorion (1990), Koutmos – Knif (2003), Nydahl (1999), Priestley – Odegaard (2002), Priestley – Odegaard (2007).

[3] See for example Alkeback et al. (2006), Bartram et al. (2003), Becker – Fabbro (2006), Bodnar – Gebhardt (1998), Bodnar et al. (2001), Bodnar – Marston (1998), Borsum – Odegaard (2005), Briggs (2004), Guay – Kothari (2002), Loderer – Pichler (2000), Nguyen et al. (2007), Nydahl (1999), Pramborg (2003), Schafer – Pohn-Weidinger (2005).

underestimate risks. It is mainly translation exposure what is hedged and enterprises dominantly hedge only over the short term. Researchers also found that enterprises in small, open economies hedge more often as they are more exposed to exchange rate changes; enterprises in more developed countries hedge more often as a consequence of more developed financial markets; and large enterprises are more willing to use sophisticated exchange rate management tools, due to the fixed cost of introducing them.

There are a few papers on the exchange rate risk management of enterprises in CEE countries[4]. In these countries, derivatives are not popular among non-financial enterprises. This can be explained by both demand and supply factors. Demand side factors include lack of knowledge, high costs and underestimation of FX risk, while supply factors are undeveloped markets and regulatory problems, as highlighted by the few surveys which have been conducted.

2.2. Motives to raise FX debt

Raising debt in foreign exchange can decrease or increase exchange rate exposure, depending on the currency structure of the income or assets of enterprises. Thus, FX debt might be the cause for exchange rate exposure, and it can also serve as a hedging tool. In the light of the increasing reliance of enterprises on FX loans in developing and transition economies, more and more studies try to find the motives and determinants of the choice of loan denomination. Firm, bank and country level factors are being examined so that the risks of growing FX indebtedness can be better evaluated.

There are only a few paper that use theoretical models to examine the choice of debt denomination through the profit maximising behaviour of enterprises. *Luca – Petrova (2007)* examine the factors behind credit dollarization in transition economies. They model the behaviour of both firms and banks to receive an equation for demand and supply of loans in domestic and foreign currency. In their model the demand of firms for FX loans is a function of FX income, covariance of exchange rate and domestic prices, relative costs of FX loans, volatility of FX loan payments, risk aversion of firms and exchange rate expectations. On the other hand, the supply of FX loans is determined by the ratio of FX deposits at banks, net external assets, volatility of returns in the foreign currency and the bank's risk aversion. In equilibrium, the higher the ratio of FX loans the higher the real openness of the economy, the smaller the volatility of the exchange rate and the foreign interest rate, and the higher the dollarization of the banks' liabilities. The risk aversion of firms and banks and the market structure determine the relative weight of bank (or supply)-related and firm (or demand)-related factors. In the empirical examination, the authors find that bank-related factors are more important to explain the level of credit dollarization than firm-related ones. The authors also find that the deepness of forward foreign exchange markets decreases the level of credit dollarization.

Brown et al. (2008) build a model on corporate decisions to explain the choice of the firm between FX and domestic currency loans. In their model, firms with foreign currency income always choose FX debt, while among firms with local currency income the ratio of those with FX debt will be higher the smaller their firm-specific distress costs and – given the distress costs – the higher the information asymmetry between the bank and the firm. The information asymmetry is a result of the bank not knowing the currency structure of the firm's income which is usually the case in transition economies. On the country level, interest rate differential, exchange rate volatility, banking sector structure and the degree of dollarization influence the ratio of firms with FX debt. Based on survey data from 26 transition countries (also including Hungary), the authors test their model predictions on SMEs. They find that on the firm level foreign currency earnings and distress costs, while on the country level interest rate differential and – in the case of foreign

[4] See for example Jonuska – Samenaite (2003); Tóth – Szabó (2003).

currency earners – presence of foreign banks and corporate governance reforms have a significant effect on FX indebtedness.[5]

Besides the above, the literature[6] mentions the following factors that may influence the firms' choice between FX debt and local currency debt:

- *costs* (interest rate, financial distress) and *benefits* (for example, tax treatment) of FX debt compared to local currency debt;
- *monitoring and agency costs*: if FX loans require more collateral than local currency loans, then firms with more collateral will prefer FX debt. In this case FX loans can be used for signalling creditworthiness;
- *access to international markets*: firms with access to international markets have FX debt with a higher probability;
- *risk management purposes, currency matching*: firms can use FX debt to decrease their FX exposure, thus, enterprises with FX income will raise FX debt with higher probability;
- *risk aversion*: ceteris paribus, the degree of risk aversion is negatively related to the probability of having an FX debt;
- *exchange rate expectations*: in case enterprises expect that unhedged IRP does not hold, thus, the cost benefit of FX debt remains, they raise FX debt;
- *financial constraints*: financially constrained firms will raise more FX debt because it is cheaper, or because these firms undervalue the insurance effects of local currency debt;
- *deepness of money markets*: enterprises borrow in foreign currency because FX markets are deeper;
- *ratio of FX deposits in the banking system*: according to a few paper, dollarisation of deposits contributes to the dollarisation of liabilities in an economy;
- *pecking order*: firms have a preference list of funds, if the one they prefer is exhausted, they turn to the next one. According to this theory, firms will use FX debt to complement local currency debt if local currency debt is the first in the pecking order.

There are a few studies[7] that examine the role of FX debt in FX risk management. There is no consensus among them, for example, Aabo (2006) finds that FX debt and derivatives are complementing tools (FX debt is used to hedge long term exposure, while derivatives hedge short term exposures), while Elliot et al. (2003) find enterprises used more foreign currency debt in case they were more exposed to exchange rate changes or if they had fewer derivatives. Carter et al. (2003) argue that long term exposure cannot be hedged by financial hedges, thus, this is reduced by having a multinational network structure (operational hedge).

2.3. Macroeconomic and financial stability consequences

There is broad literature on the macro consequences of unhedged currency mismatches (including unhedged exposures): in connection with the Asian and Latin American crises in the 1990s, several studies examined the consequences of unhedged open FX positions in the aftermath of large depreciations. The consensus result of this literature[8] is that this phenomenon (often referred to as dollarisation[9]) is a double-edged sword. It might have several positive effects, mainly in liquidity restrained, underdeveloped economies. Potential positive effects include the

[5] The authors find that in the sample loans with a longer maturity are more likely to be in a foreign currency.

[6] See for example Allayannis et al. (2003), Caballero – Krishnamurthy (2004), Echeverry et al (2003), Pratap et al. (2003).

[7] See for example Aabo (2006), Carter et al. (2003); Elliot et al. (2003) and Keloharju – Niskanen (2001).

[8] See for example Arteta (2003); Claessens – Djankov – Xu (2000, De Nicoló – Honohan – Ize (2003); Goldstein – Turner (2004); Yeyati (2005).

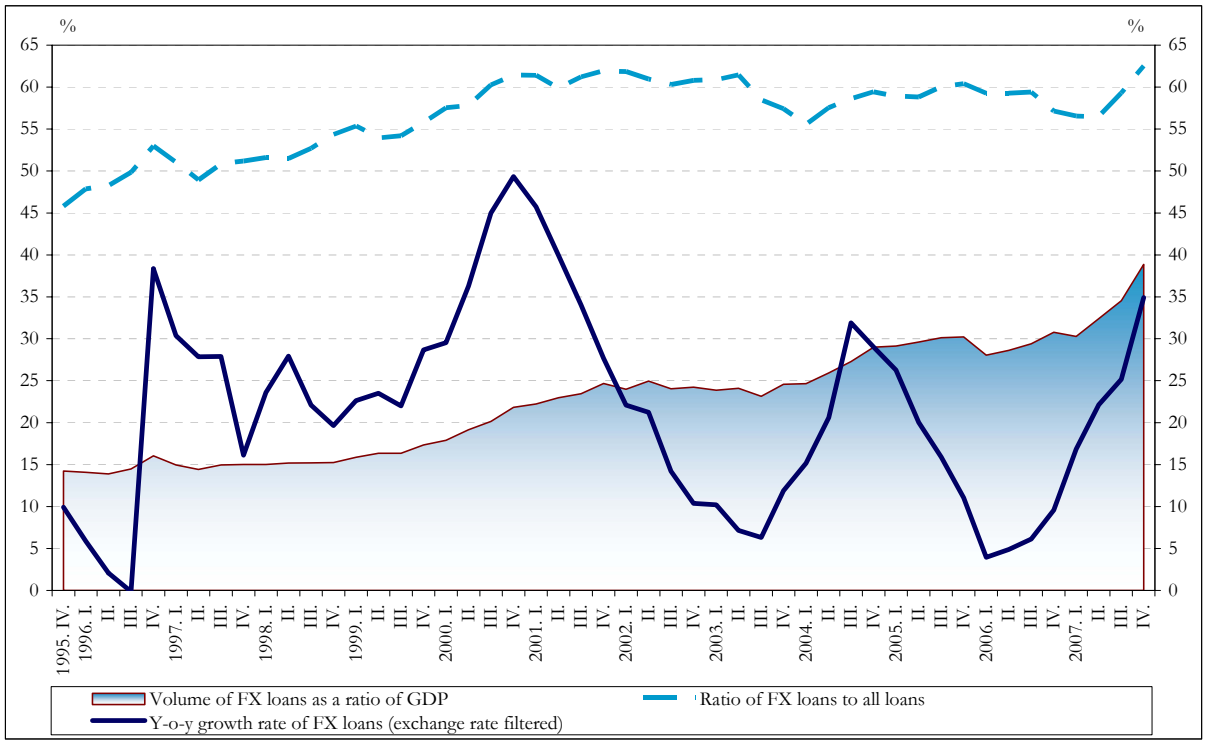
[9] Here dollarization is used, as it is common in the literature, to describe the situation in which any foreign currency is used for some monetary functions instead of the local currency. Particularly, liability dollarization is the situation when liabilities of domestic sectors are denominated in foreign currency.

following: financial dollarisation facilitates the deepening of intermediation, it may alleviate contractionary effect of shocks (for example through its effect on risk management by banks and enterprises) and it contributes to the integration to international markets, that can result in a greater efficiency of financial intermediation. Nevertheless, authors emphasise that in many cases currency mismatches contribute to the fragility of the economy, in many cases being one of the most important reason behind financial crises: contribute to the probability, costliness and length of financial crises. Thus, it is important to examine the exchange rate exposure of private sectors, the possibilities of underestimated risks, and identify the most fragile sectors.

3. Stylised facts

The majority of the total debt volume of Hungarian enterprises, a stable 55-65 percent since 2000 is denominated in foreign currencies. Though this ratio is quite stable, the ratio of FX debt to GDP has increased significantly in the recent years (Chart 1), now reaching 40 percent, and it started to dominate lending of corporations by domestic banks since 2003.

Chart 1: Volume of corporate FX loans to GDP, to all debt and y-o-y growth rate

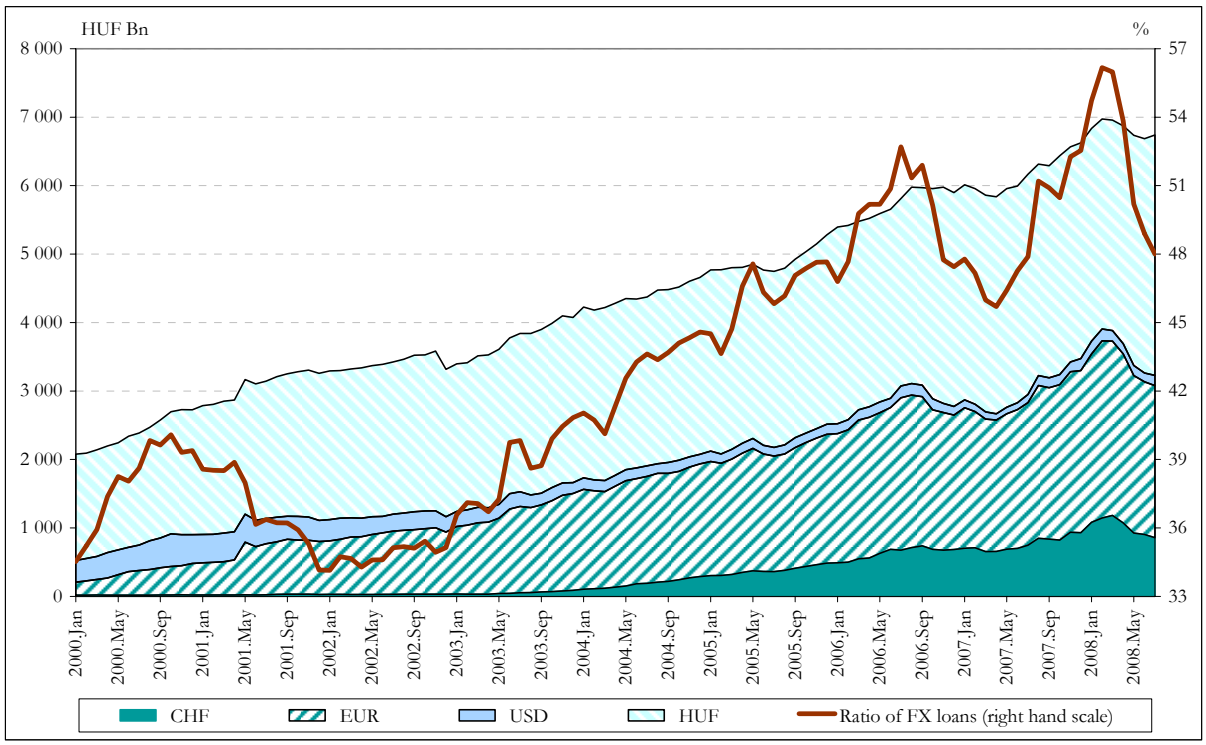


Source: MNB, financial accounts

In a historical context, amongst large enterprises (which are mainly foreign owned and/or exporting companies) borrowing in FX from domestic sources has been wide-spread since the mid-1990s. Lending to the retail sector was restricted both in domestic and in foreign currency until the turn of the millennium. By that time the market of lending to large enterprises had become saturated and growth potential on this market decreased. From 2001, standard products for small and micro enterprises were developed, in line with their improving financial situations, subsidy schemes and EU support.

Thus, the intensive growth of FX loans is not independent from the development of the SME lending market, meaning a supply shock on the lending market. As a result, there are fears that the banks put FX risk on enterprises, while the corporate sector as a whole is less efficient in risk management than the banking sector. This way, banks have indirect FX risk exposure through the direct FX exposure of the enterprises.

Chart 2: Denomination structure of loans of enterprises from domestic banks

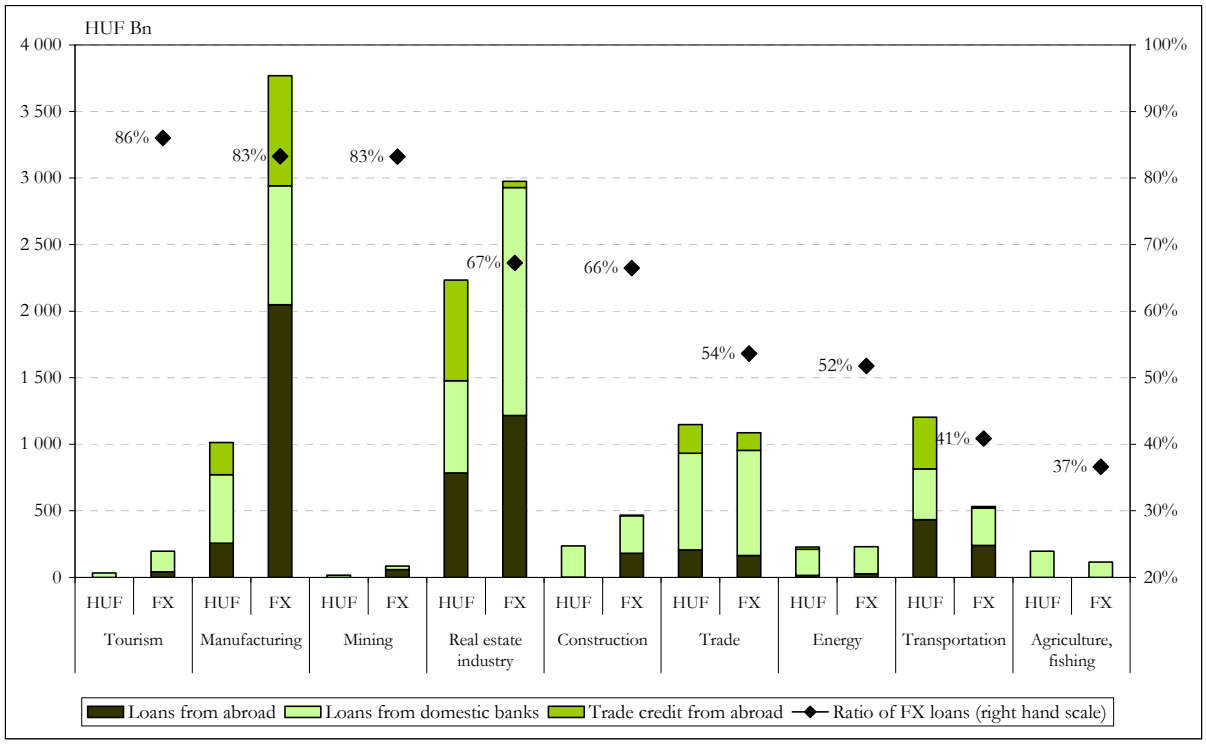


Source: MNB

To assess the risks of FX lending to enterprises, it is worth examining the financing structure by industries, which gives an overall view on possible natural hedges. Since the beginning of 2008, there is detailed information about the denomination structure of loans from abroad by industries[10] (Chart 3). Based on that, it can be seen that FX debt constitutes more than half of all debt (not considering trade credit with domestic partners and loans from domestic non-bank sources). Manufacturing firms predominantly finance themselves by FX loans, mostly from abroad. Since manufacturing enterprises generate a major part of their income from export activity (Chart 4), in case of these enterprises FX debt in many cases serves as a natural hedging tool. In case of loans from abroad, the presence of foreign owners also plays a role in the high ratio of FX loans. The FX debt volumes of real estate industry are also outstanding, though enterprises in this sector finance themselves from domestic sources predominantly. Though this industry has no predominant export activity, part of the income of enterprises in real estate sector is rents from domestic partners, fixed in euro, and the foreign ownership can also be a factor here. The ratio of FX loans to loans from domestic banks is the highest in case of firms operating in tourism; in this industry enterprises have either transaction or operational exposure because of foreign guests, though the majority of their income is fixed in forint.

[10] The new current account data collection methodology makes it possible to examine loans from abroad by industry.

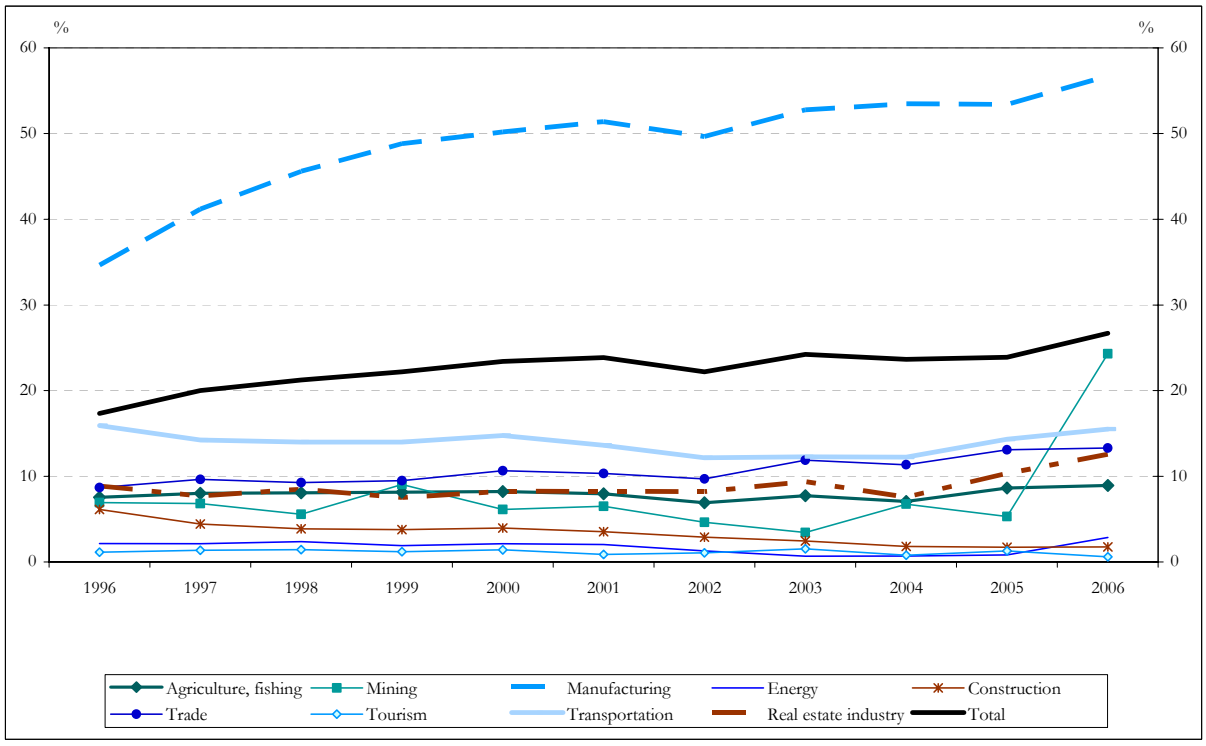
Chart 3: Denomination and source of loans of enterprises by industry



Note: loans from owners are included in the loans from abroad. There is no information about the denomination structure of domestic trade credit and non-bank loans, thus, these are excluded from the chart.

Source: MNB

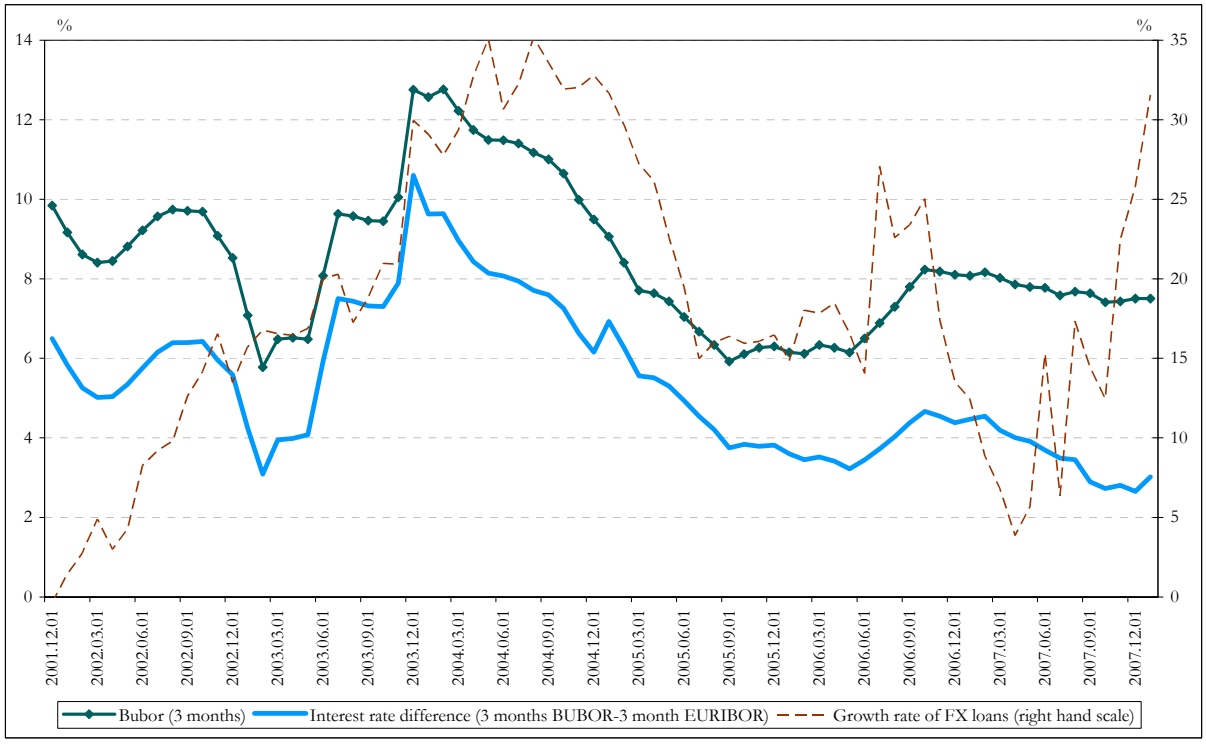
Chart 4: Ratio of export revenues to all revenues by industry



Source: financial statements

As it is seen from the above, manufacturing firms, having the highest export income to income ratio (which I assume is positively correlated with the net FX income to income ratio), seem to have the easiest access to foreign sources, mainly to FX loans. Other industries, being more dependent on domestic banks, raise a major and increasing part of their loans in FX, too. In case of these industries, it can be presumed that the main factor determining the demand for FX loans is interest rate differential. As it can be seen from Chart 5, the increase of the growth rate of FX loans from domestic bank is positively correlated to the interest rate differential to the euro zone for most part of 2003-2006 (correlation: 0.71). Besides, the low historical volatility of the exchange rate also contributed to the increase of the demand for FX loans.

Chart 5: Interest rate differential and y-o-y growth rate of FX loans from domestic banks



Note: FX loans are exchange rate filtered

Source: MNB, Euribor

4. Methodology

4.1. Interviews

Prior to the survey, personal interviews were carried out with some enterprises. On these conversations, we[11] tried to reveal the thinking and behaviour of managers that could serve as a basis for the survey since both questions and answers to them could be formalised in a proper way to get valid survey results. Differences in thinking of firm managers and analysts can lead to misunderstanding of survey results; the purpose was to decrease these potential distortions.

20 enterprises took part in the interviews, where managers were asked to summarize financial data of their companies, and their experiences about the effects of exchange rate changes in the

[11] The sample was chosen and interviews were organised and lead by derive Kft.

past, their decisions concerning indebtedness, and exchange rate management techniques. Though firms were chosen to show high diversity, this small sample is not representative of the economy. The aim was rather to find firms that differ in size, industry, geographic situation, export and import position and ownership structure, so that as many different views could be examined as possible.

As the results of the interviews are reflected in the questionnaire, here I don't give a detailed overview of answers. Nevertheless, some of the answers can be highlighted[12]. Almost all enterprises were exposed to exchange rate changes, if not through foreign trade activity, then through contracts with domestic partners where prices were fixed or paid in foreign exchange. Despite this, firms usually did not assess their exchange rate exposure and they used exchange rate forecasts only for their annual financial plans. Most respondents regularly followed exchange rate changes and calculated accounting profits and losses, but usually they did not do much to prevent its effects. We found several different reasons behind this: some mentioned that nothing can be done; several foreign owned enterprises did not have the right to manage FX risks, some did not even have information whether the parent company did any FX risk management. Some enterprises already tried to use simpler derivatives, but their profits were decreased and this discouraged them from using it again. These firms considered that FX risk management was to realise profits instead of avoiding uncertainty. We also saw examples where the firm or the loss was too small to make preventive steps. Many respondents stated that only the introduction of the euro could result in decreasing their exposure.

As far as FX risk management – where existent – was concerned, it was based on mainly ad hoc decisions. Firms which did FX risk management, almost exclusively used forwards. Other solutions that were mentioned were keeping books in foreign exchange, pulling the FX risks to the parent company or the main seller which was usually a large company that had more room to manoeuvre to manage risks; exchange rate insurance; or to use cash pools[13] with firms in the group. Natural hedging was also used by enterprises which had enough liquidity for that, but it never played a role when choosing the denomination of the loan.

4.2. Survey: sampling, survey design

The questionnaire was filled in by resident non-financial corporations which had external funds and kept double-entry accounting. Data was recorded by data collection staff in the form of personal interviews[14]. The questionnaire[15] consisted of two parts: a set of 'attitude' questions where the opinion of respondents was asked on several questions, and a data sheet where denomination of assets, liabilities, income, expenditures and instalments were asked. Enterprises were required to answer using data on year 2006 and their experiences in two years prior to the survey.

Since for a few things information was asked in both the attitude questions and in the data sheet parts of the questionnaire, in the descriptive statistics part I always mention the source of the results.

The questionnaires were filled in by 698 enterprises, out of 6463 asked. The response rate was so low because of the data requirement. The period when the survey was carried out was July – October 2007.

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[12] Based on the summary of interview results prepared by derive Kft.

[13] Cash pool: common account for the members of a group of enterprises. The members' liquidity and risk management can be improved by using it.

[14] The data collection was accomplished by Magyar Kereskedelmi és Iparkamara Gazdaság- és Vállalkozáselemző Intézet (Research Institute of Economics and Enterprises).

[15] The questionnaire is available upon request.

4.3. Descriptive statistics

4.3.1. Description of the sample

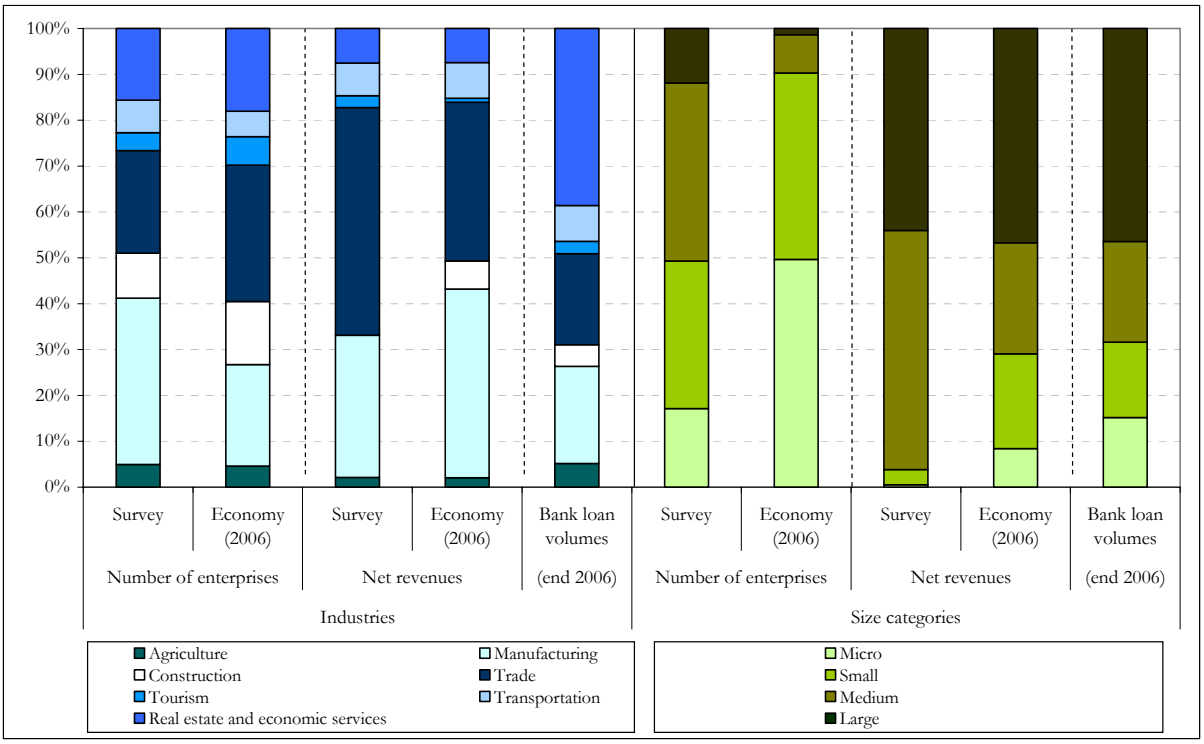
698 enterprises answered the questionnaire, nevertheless, not all answers can be used. As far as questions about the attitude of enterprises are concerned, firms in energy, financial and governmental sectors had to be excluded due to their special characteristics or small share in domestic banks' loan portfolio. 9 enterprises did not prepare a tax declaration in 2006, but had 2005 data. Those that did not prepare a tax declaration since 2004, were also deleted. This left 672 enterprises. Answers for questions on certain data were incorrect in case of some enterprises and could not be corrected, because of this, 26 enterprises were disregarded when analysing balance sheet and profit and loss statement data. 3 enterprises stopped their operation in 2007, their answers were included in the results. The number of enterprises analysed at the different questions might differ because of some missing data and answers.

Chart 6 presents the distribution of enterprises according to industry and firm size, compared to the economy and the bank loan volumes. The composition of the sample according to industries and size categories reflects both the macroeconomic weights of industries and banks' exposure. The industry of the firms is not determined only on the basis of the firms' registered TEÁOR (NACE) code, due to its uncertainty: instead interviewees were asked to define the main activity of their enterprise[16] and they were classified into sectors by these answers. As far as size categories are concerned (based on the number of employees)[17], large enterprises have a larger share in the sample than their share in the macroeconomy (based on their income) in order to ensure a large enough share based on number of firms, and micro enterprises have a smaller share because the aim of this survey was to concentrate on larger enterprises.

[16] This was identical with the official TEÁOR (NACE) sectors in 92 % of respondents.

[17] The size categories are the following ones: micro enterprises: less than 10 employees; small enterprises: 10-50 employees; medium sized enterprises: 50-250 employees; large enterprises: over 250 employees.

Chart 6: Distribution of the sample according to firm size and industry, compared to the economy and bank loan volumes



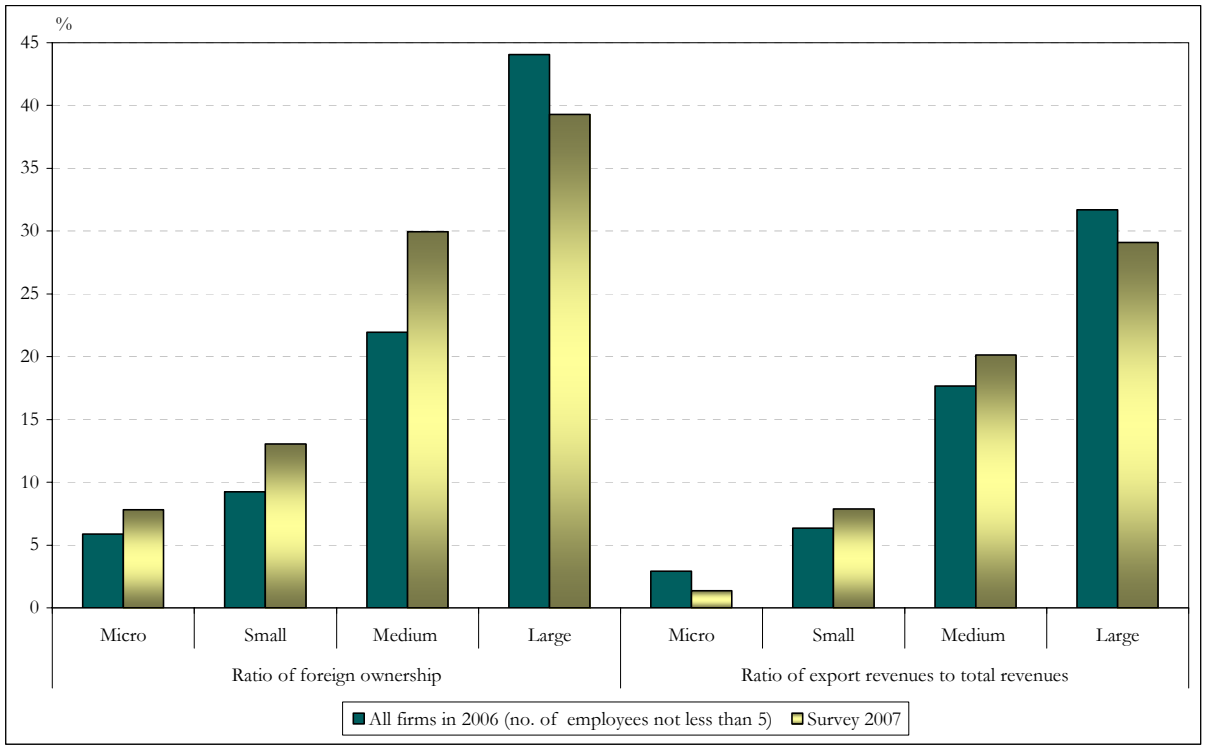
Note: firms with less than 5 employees are excluded from the survey and economy level numbers

Source: MNB, financial statements, survey

63 percent of enterprises in the sample operated and regularly prepared their tax declarations for at least 10 years (see Chart 2). The average age of enterprises in the sample was 12 years (as opposed to the average age of 6.9 years of enterprises operating in 2006). Because of this, the sample is presumably biased towards the better enterprises with a long history which is beneficial because these firms have experience with the exchange rate changes, but it can also lead to an underestimation of risks as they are probably less risky than an average bank client. The difference is partially due to the smaller share of micro enterprises in the sample than in the economy and also to the larger willingness of 'older' enterprises to answer the questions of the survey.

As far as the spatial distribution of the sample is concerned, about half of the enterprises are located in or close to Budapest and most of them operate in large cities. Among small and medium sized enterprises who answered the survey the average ratio of foreign ownership and export income is higher than on the aggregated level (Chart 7).

Chart 7: Average ratio of foreign ownership and export revenues in the sample and among firms operating in 2006 by size categories



Source: financial statements, survey

Some general questions were posed to the enterprises about their financial situation, competitive position and sensitivity to shocks. Based on these, the majority of respondents are in stable financial position (84 percent), and the ratio of those who said their financial situation was at least stable was increasing with firm size. In expected financial situation, there was no difference between size categories: three quarters of respondents expected (or probably it is more correct to say 'hoped') improvement for 2007. The majority (77 percent) of enterprises stated that there is strong competition on the market of their main product or service. Asking enterprises about effects of 2006 shocks served the aim of having an impression about the relative importance of exchange rate shocks, since in 2006 the corporate sector had to face several shocks. Among the shocks in the list, labour costs had far the worst effect on sample enterprises, followed by the increase of corporate tax. Exchange rate shocks also had significant effect: almost 40 percent of respondents experienced negative effects because of increased volatility or depreciation.

4.3.2. Indebtedness

The questionnaire included several general questions about indebtedness, with a major part of the questions concentrating on the motives of raising debt in FX and assessing its risks. The aim of these questions was to examine the main factors influencing the enterprises' decisions about their indebtedness and to test some simple hypothesises that are related to their behaviour. Also, a table set was included in the questionnaire to ask about the FX structure of assets, liabilities, income and expenditures. There is no database that contains information about this data, and firms are not obliged by the law or authorities to keep records of the FX structure of their books.

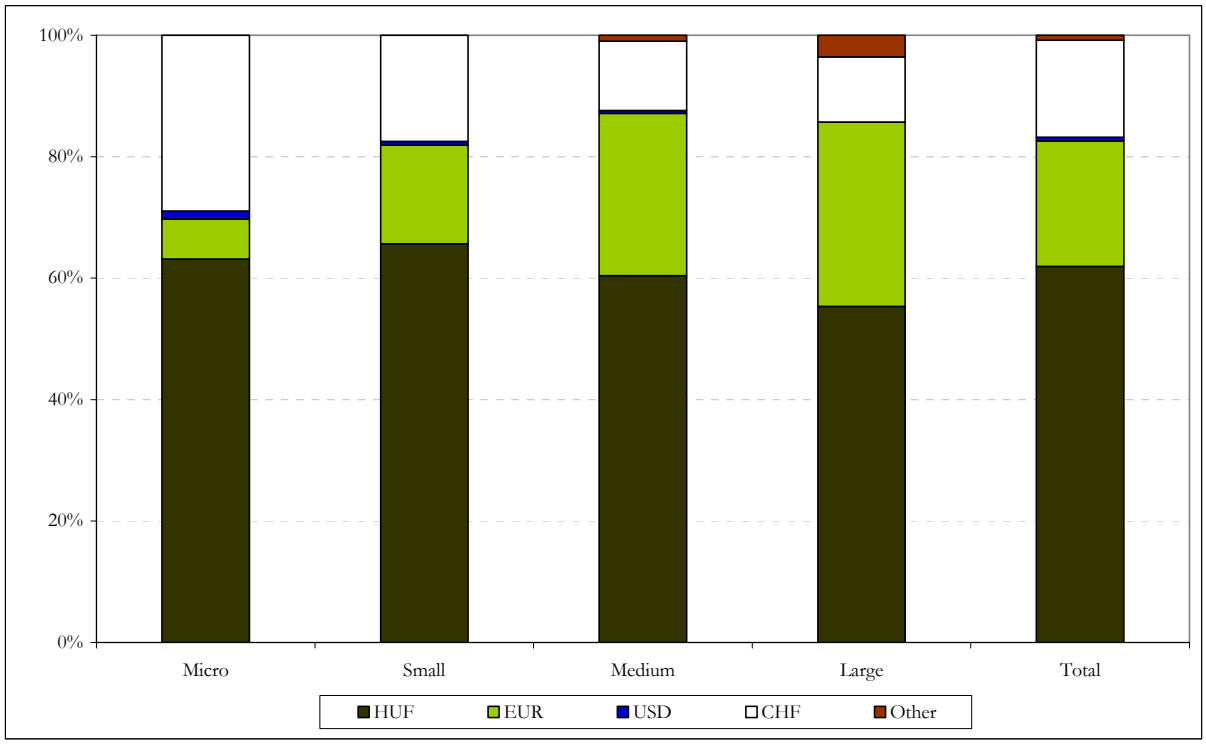
For this reason, this part of the questionnaire is very informative, but the data is biased as many enterprises did not supply the information that we asked for.[18]

Description of indebtedness

Having a debt was a filtering criterion for the enterprises to fill the questionnaire. Nevertheless, the debt could be of any type: it could come from a parent company, a bank, a trade partner, and it could be of any maturity and denomination. Enterprises were asked about their recent experiences with raising a debt. Almost 80 percent of respondents raised a loan within 2 years before the survey. Half of enterprises had FX loans, the others had exclusively HUF debts. The main motives of enterprises to raise a debt were to finance investments or inventories, the increased liquidity needs was the reason behind raising a loan less frequently. The majority of the enterprises had short-term loan (with less than 1 year maturity), and the main source of financing was the banking sector.

The denomination structure of loans is of major interest in this survey. Enterprises were asked to give the denomination of their largest loan within a 2 years period before the survey. Based on these answers, 40 percent of enterprises had FX loans, and the ratio of enterprises with FX loan increases with the size, but the difference among size categories in the ratio of firms with FX loans is not very large. Among FX loans, CHF dominates among micro enterprises, while the significance of EUR loans increases with the firm size. This can be an explanation behind the smaller volumes of CHF loans in bank loan volumes.

Chart 8: Denomination structure of debt

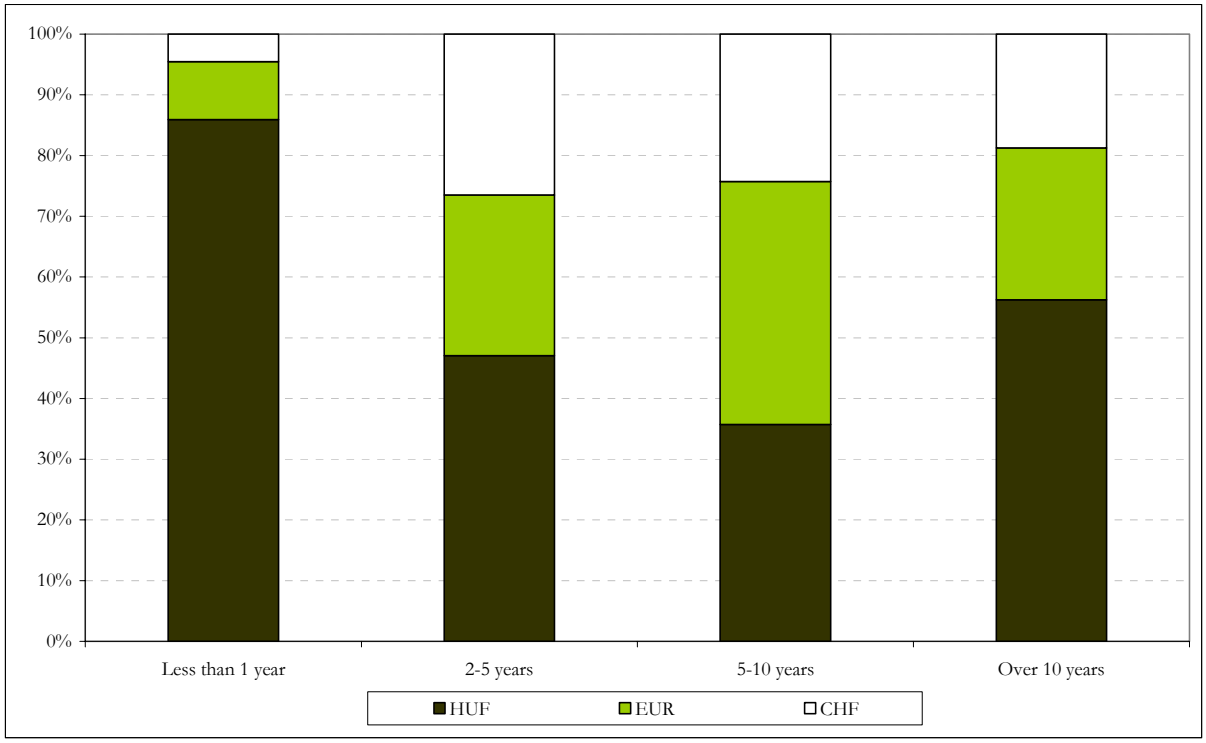


Source: survey, attitude questions

[18] This conclusion is partially drawn from the comparison of export revenues and FX revenues reported in the survey. See 4.3.3.

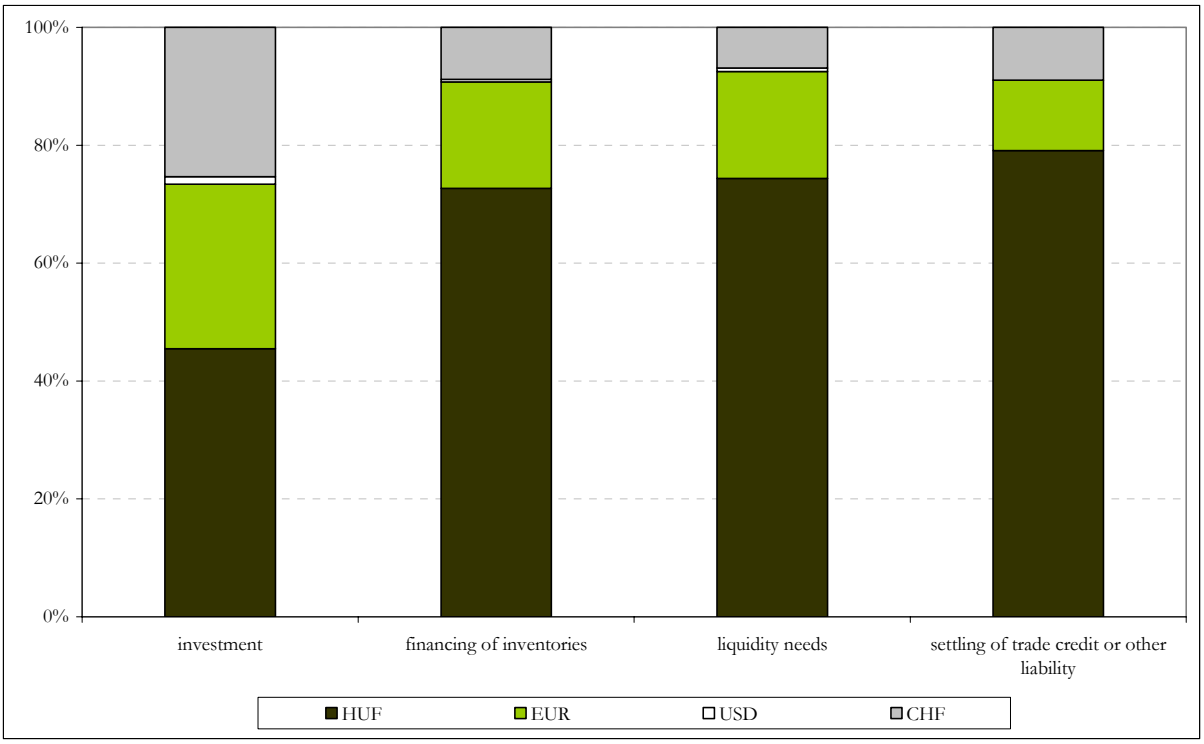
Two differences between HUF and FX loans can be discovered when examining the maturity structure of loans and the loan purposes. First, while short loans are denominated mainly in HUF, longer term loans are in EUR or CHF. On the other hand, ratio of FX loans decreases again in case of loans with more than 10 years maturity. Second, this connection between denomination and the maturity of loans is in line with the denomination structure of loans for different purposes: ratio of enterprises with FX loans is higher in case of investment loans, while loans to finance stocks or short term liquidity needs are predominantly denominated in domestic currencies.

Chart 9: Maturity and denomination structure



Source: survey, attitude questions

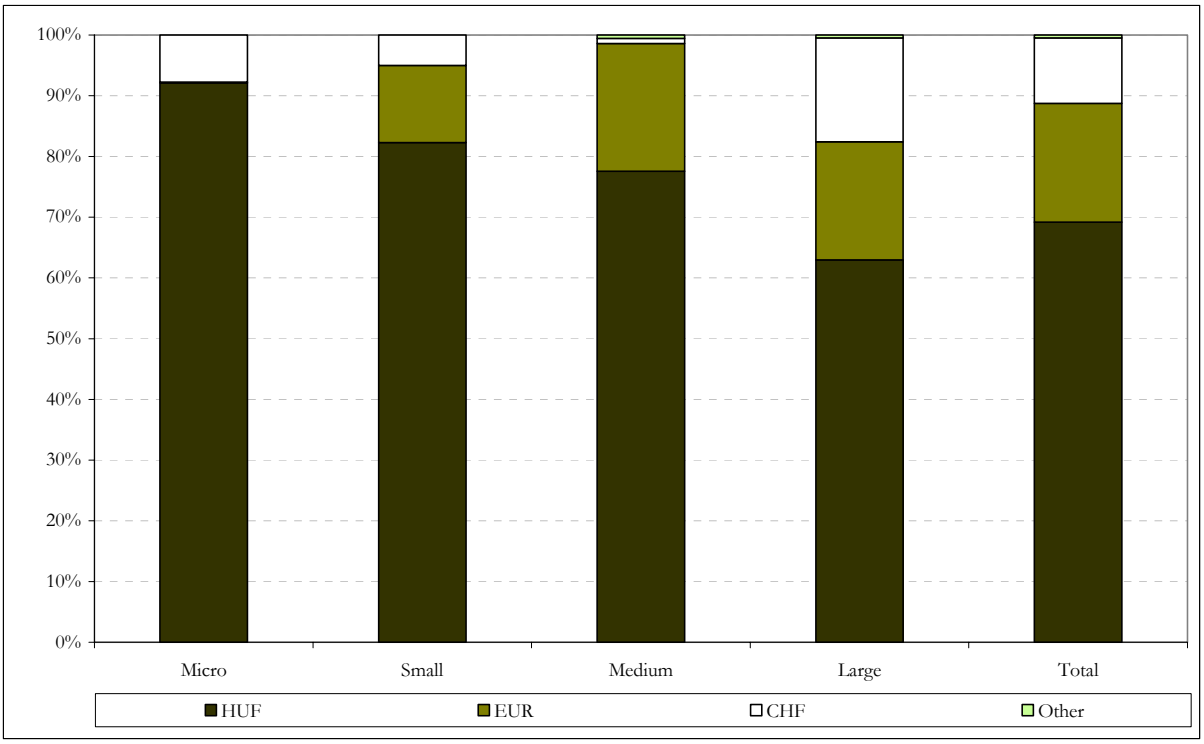
Chart 10: Purpose of the loan and denomination structure



Source: survey, attitude questions

Based on the data we required from enterprises, debt volumes were examined thoroughly. This information reflects a different picture from what we saw based on direct questions on it. Based on data, only 20 percent of all loans are denominated in FX (while the 'real' ratio is 60-65 percent, see Chart 1), concentrated at 25 percent of sample enterprises (the average FX debt to balance sheet total is 17.5 percent). Thus, presumably data are biased towards lower FX loan rates. The positive relationship between ratio of FX loans and firm size, however, also can be stated, though the connection seems to be looser than in case of attitude questions. Loans of sample enterprises from domestic banks, however, show a different picture. Here, 30 % of loans are raised in foreign exchange, and again a positive relationship between firm size and ratio of FX loans can be seen. It is also worth mentioning that micro enterprises in the sample have only HUF and CHF loans from domestic banks, EUR loans are used only by larger enterprises.

Chart 11: Denomination structure of debt from domestic banks at sample companies

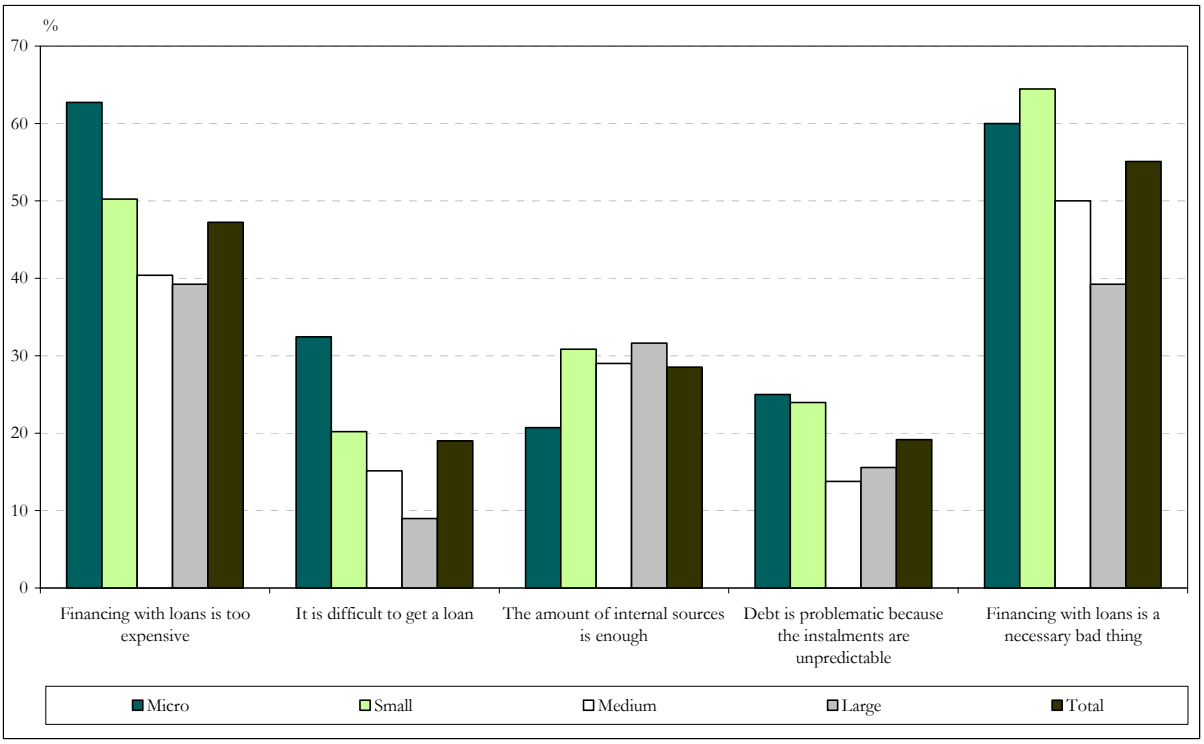


Source: survey, data tables

In the survey a few questions were asked about the enterprises' liquidity constraints which can also be used to explain motives of FX indebtedness. Four potential factors were examined: costs of financing, availability of loans, availability of external sources and predictability of repayment. Finally, we asked about the "psychology" of raising a debt: whether enterprises think about it as a necessary bad thing or rather as a useful tool. Based on the answers, enterprises basically think that raising debt is expensive[19], this causes problems for almost half of enterprises. 20 percent of respondents think that it is difficult to get a loan or that the repayment ratios are hard to predict. However, there is a marked difference between small and large enterprises in case of all questions. It is worth highlighting that still more than 30 percent of micro enterprises think it is difficult to raise a loan. Ratio of enterprises who don't need loans as they have enough internal sources to finance their activity is 30 percent. Finally, more than half of enterprises think that raising a debt is rather a necessary bad thing, the ratio being above 60 percent in case of small and micro firms. Based on this, it seems that liquidity constraints are more severe in case of small firms, which is in line with theory.

[19] It has to be mentioned that according to research on the Hungarian debt market, interest rate margins are the smallest in the corporate debt market, which is close to perfect competition.

Chart 12: Opinion of enterprises on different statements in connection with loans



Note: interviewees were asked to rank the statements on a 1 to 5 scale, 1 meaning the statement is not characteristic of them at all, 5 that it describes their situation fully. The chart shows the ratio of firms giving 4 and 5 marks to the different statements.

Source: survey, attitude questions

Indebtedness decisions, motives to raise FX debt

One of the main purposes of this survey was to shed light on motives behind indebtedness decisions and, mainly on choosing the denomination of the loans. First, firms were asked to range the importance of different characteristics of loans. The aim of this question was to assess the relative importance of exchange rate when firms make their decisions about their loans. From the answers given, it became clear that all factors listed were considered important or very important by most of respondents. Interest rate is considered the most important factor followed by predictability of repayment amounts and availability of loans. Exchange rate is significantly less important than other factors, with 10 percent of respondents thinking it was not important at all.

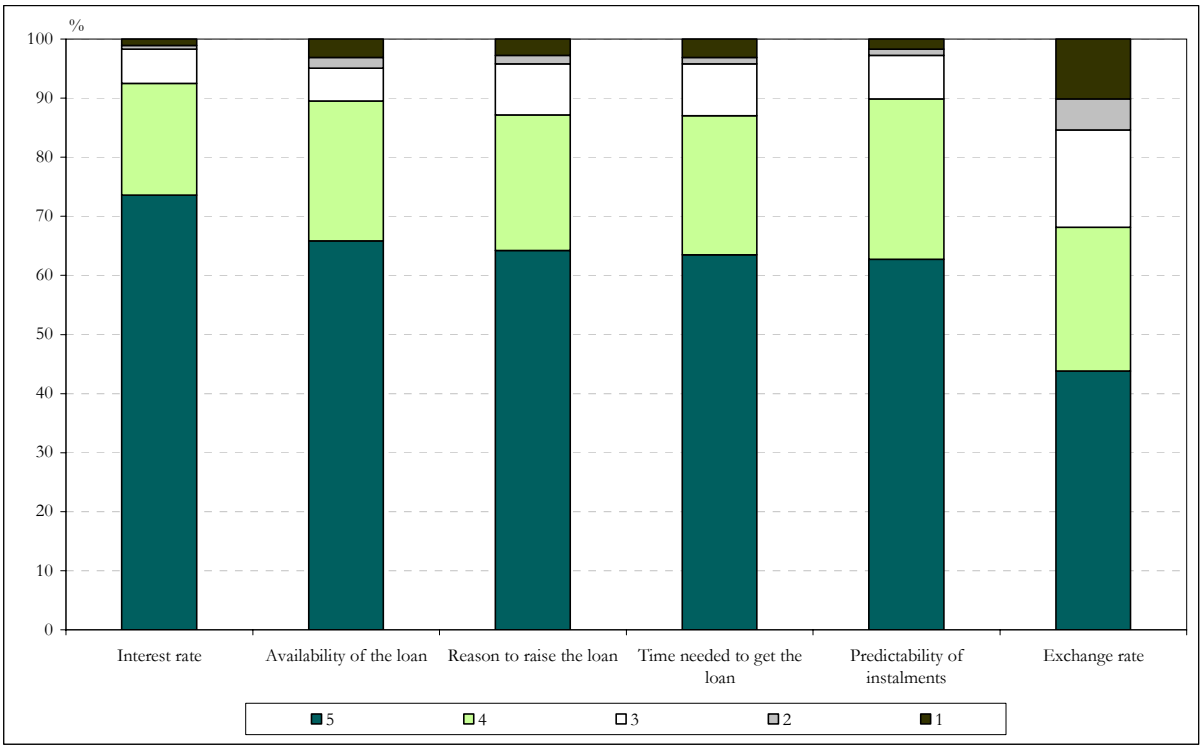
A surprising finding is that the ratio of those who think exchange rate is important decreases with firm size, together with availability and time needed to get the loan. This can be probably explained by the fact that large enterprises have much more room of manoeuvre than small enterprises, and can choose the denomination and source of a loan more easily than smaller firms.

These results are in line with the previous survey[20], with the exception of the relationship between the relative importance of exchange rate and being an FX borrower. This survey reflects that significantly more enterprises give importance to exchange rates if they raise FX loans than if they don't have FX debt (Chart 13). On the other hand, surprisingly there is no significant

[20] Nevertheless, it is not totally comparable since in the 2005 survey this was measured differently.

difference in the ratio of those who rank costs of loans and predictability of repayment ratios as highly important factors.

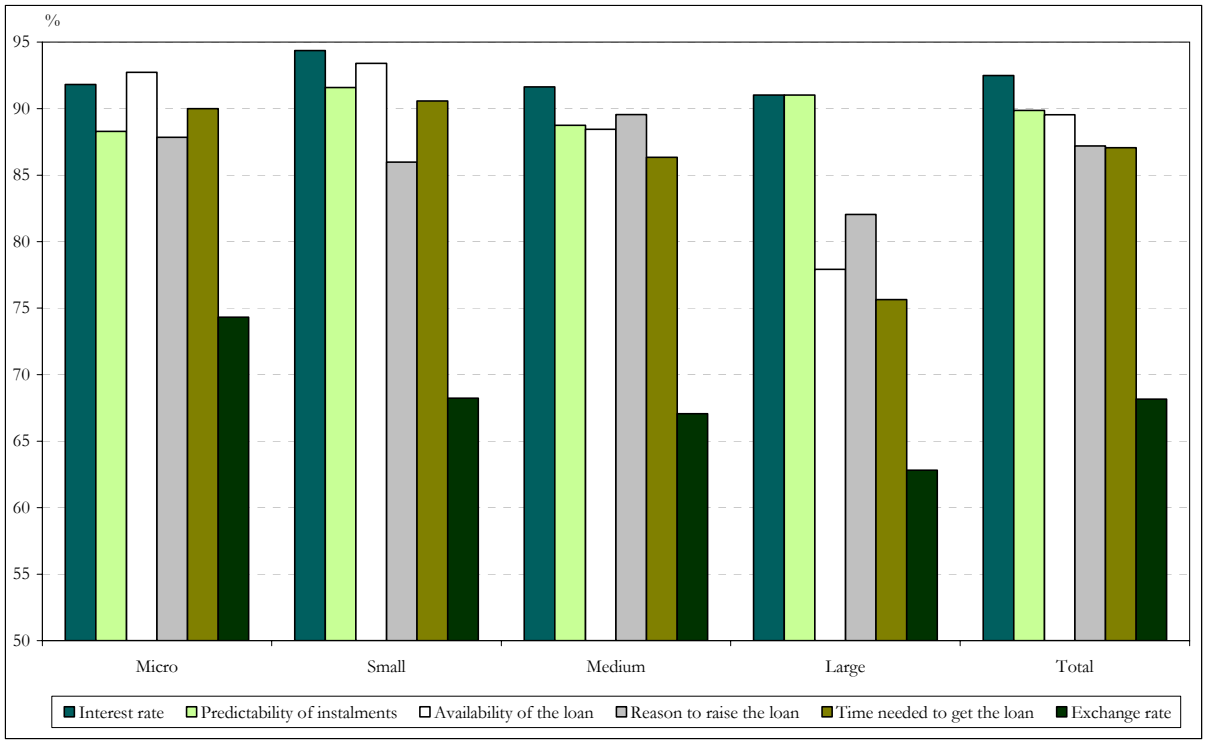
Chart 13: Relative importance of different factors in loan decisions



Note: interviewees were asked to give a mark to the factors, 1 meaning it is not important at all, and 5 meaning it is very important.

Source: survey, attitude questions

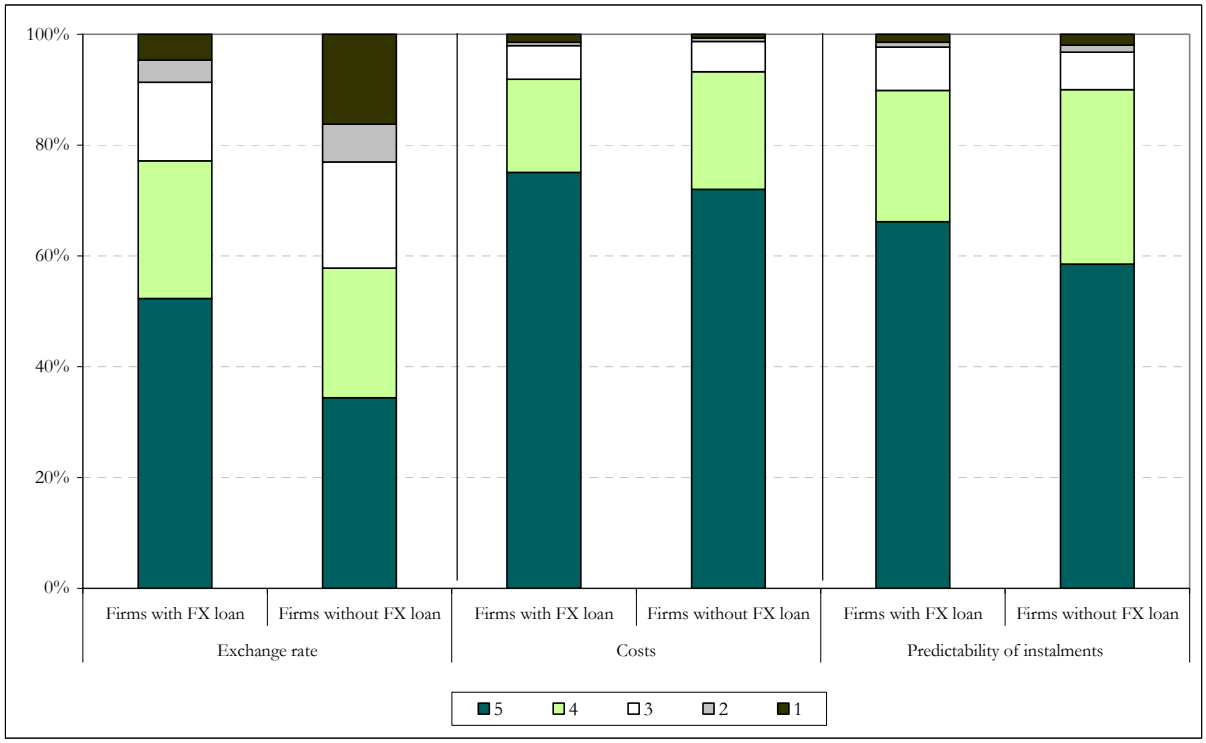
Chart 14: Relative importance of different factors in loan decisions by firm size



Note: interviewees were asked to give a mark to the factors, 1 meaning it is not important at all, and 5 meaning it is very important. The chart shows the ratio of those firms who gave 4 and 5 marks to the different factors.

Source: survey, attitude questions

Chart 15: Importance of loan characteristics in loan decisions of enterprises with and without FX loans



Note: interviewees were asked to give a mark to the factors, 1 meaning it is not important at all, and 5 meaning it is very important.

Source: survey, attitude questions

To examine the factors of the decisions on the denomination of loans more deeply, we asked respondents to give one or a few main reasons of having or not having FX debt. These were open questions, where answers were classified after the collection of all the responses. As far as the motives behind having FX debt is concerned, we found that the main explanation is that it is cheaper than HUF loans: 50 percent of enterprises mentioned this reason, and the ratio of these answers decreased with firm size. Only 29 percent of enterprises with FX loans mentioned that even if they take risks into consideration, FX loans are more reasonable (see Table 1).

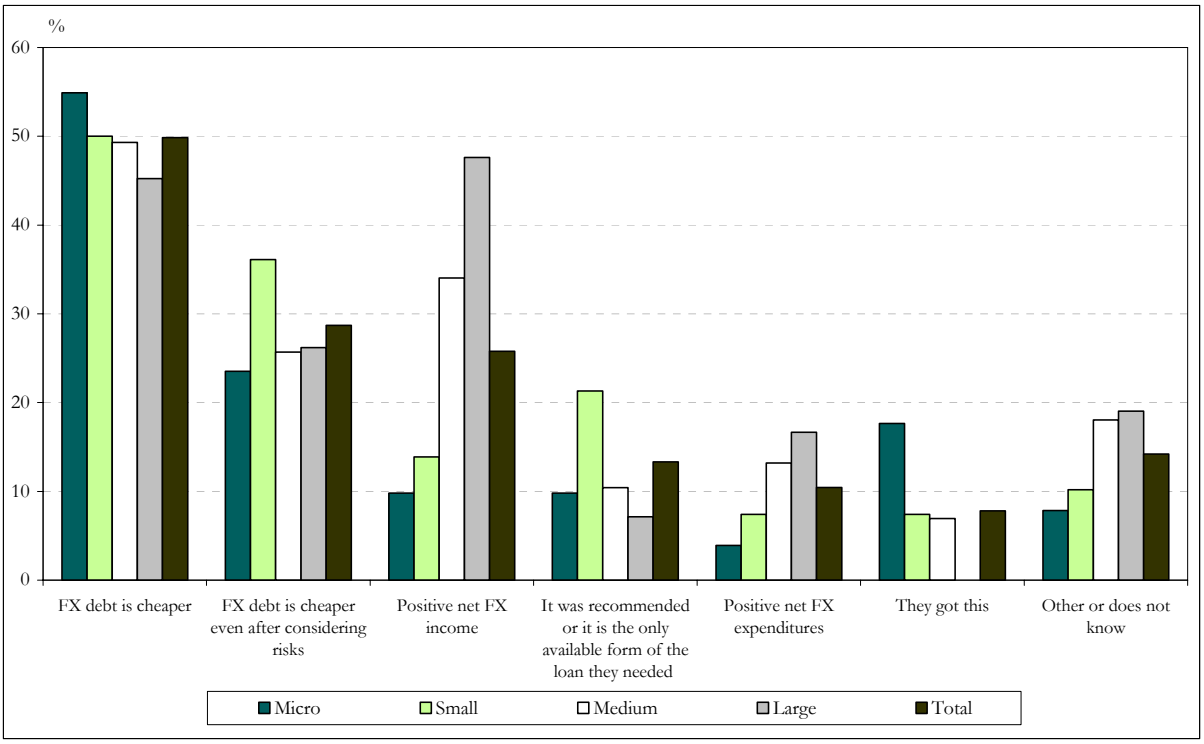
Table 1: Costs and risks of FX loans

		Decided to raise FX loan because it is cheaper, even if considering risks		Total
		Chose	Did not choose	
Decided to raise FX debt because it is cheaper	Chose	55 (16 %)	**119 (34 %)** (enterprises which presumably disregard risks)	174 (50 %)
	Did not choose	45 (13 %)	128 (37 %)	173 (50 %)
Total		**100 (29 %)** (enterprises which take risks into consideration beside prices)	247 (71 %)	347 (100 %)

Source: survey, attitude questions

It worth mentioning that, in case of large and medium sized enterprises, having FX income was a very important reason of raising loans in foreign exchange, thus, they have natural hedging. A not insignificant ratio of enterprises, however, chooses FX loans because they have FX expenditures, as they finance expenditures from the loans. This means that natural hedging does not appear in their case, what is more, if both the value of the FX expenditure and the FX loan is fixed in HUF, their exchange rate exposure is increased.

Chart 16: Motives to raise FX debt



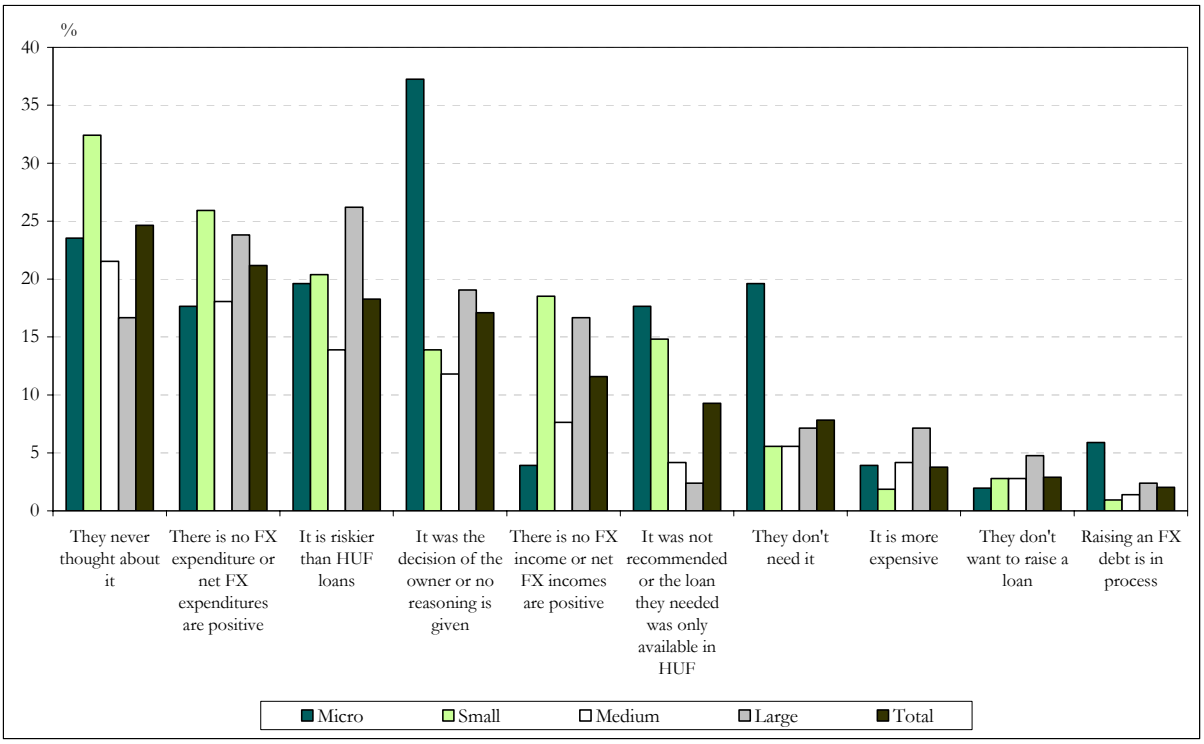
Note: interviewees could mention more than one reason, the answers were classified afterwards. The chart shows the ratio of enterprises who mentioned the different factors.

Source: survey, attitude questions

Based on the experiences of the interviews, we also thought it important to ask enterprises about their motives not to raise an FX debt. This is explained by the experience that in several cases enterprises which would benefit from having an FX loan do not use this opportunity. This is reflected by the results: 25 percent of enterprises stated that they have not even thought about this. 22 percent of answers reflected that in many cases the parent company made a decision or there was no reasoning at all, while another 10 percent stated that they did not need a loan or that they decided not to raise a (bank) debt. Ratio of these answers is highest among micro enterprises.

On the other hand, 18 percent of enterprises consciously decided not to take the exchange rate risks of FX loans and 12 stated that they had no FX income or FX expenditures were higher than FX incomes. Together, 19 percent of enterprises (a ratio of those who did not have FX loan, it is a 10 percent of all firms in the sample) gave at least one of the above reasons as an explanation for not having FX loan, they seem to be aware of the risks of raising a naturally not hedged FX loan. Nevertheless, here again appear that several enterprises think the purpose of an FX loan is to finance FX expenditures: a fifth of respondents explained not having FX debt by not having FX expenditure, even if they had FX income.

Chart 17: Motives not to raise FX debt



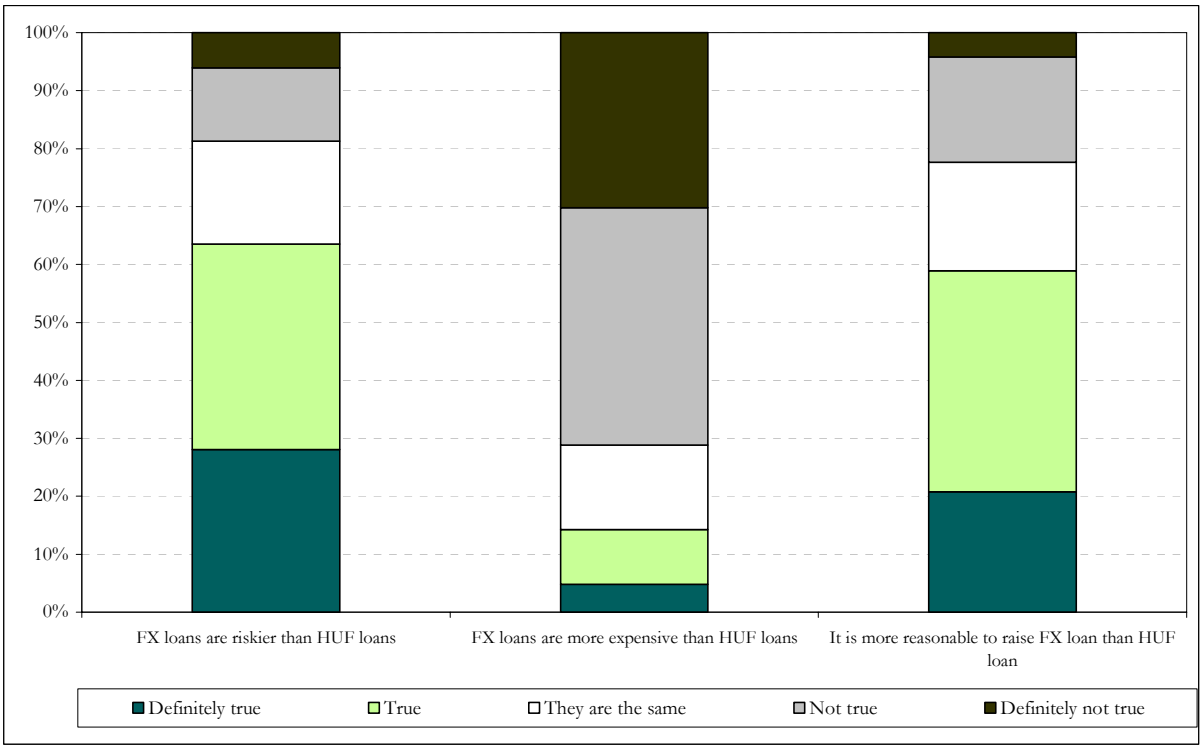
Note: interviewees could mention more than one reason, the answers were classified afterwards. The chart shows the ratio of enterprises who mentioned the different factors.

Source: survey, attitude questions

The final set of questions consisted of three pair of statements about HUF and FX loans. The aim of these was to examine the way enterprises think about FX loans and its risks. One pair of statements compared the risks of the two loans, another the price and the third one was the combination of the two where respondents were asked about which one is worth to be raised. Based on answers, almost two thirds of enterprises think that FX loans are more risky than HUF loans and the ratio of those who think that FX loans are cheaper is a little larger. Finally, 60 percent stated that it is more reasonably to have FX debt than HUF.

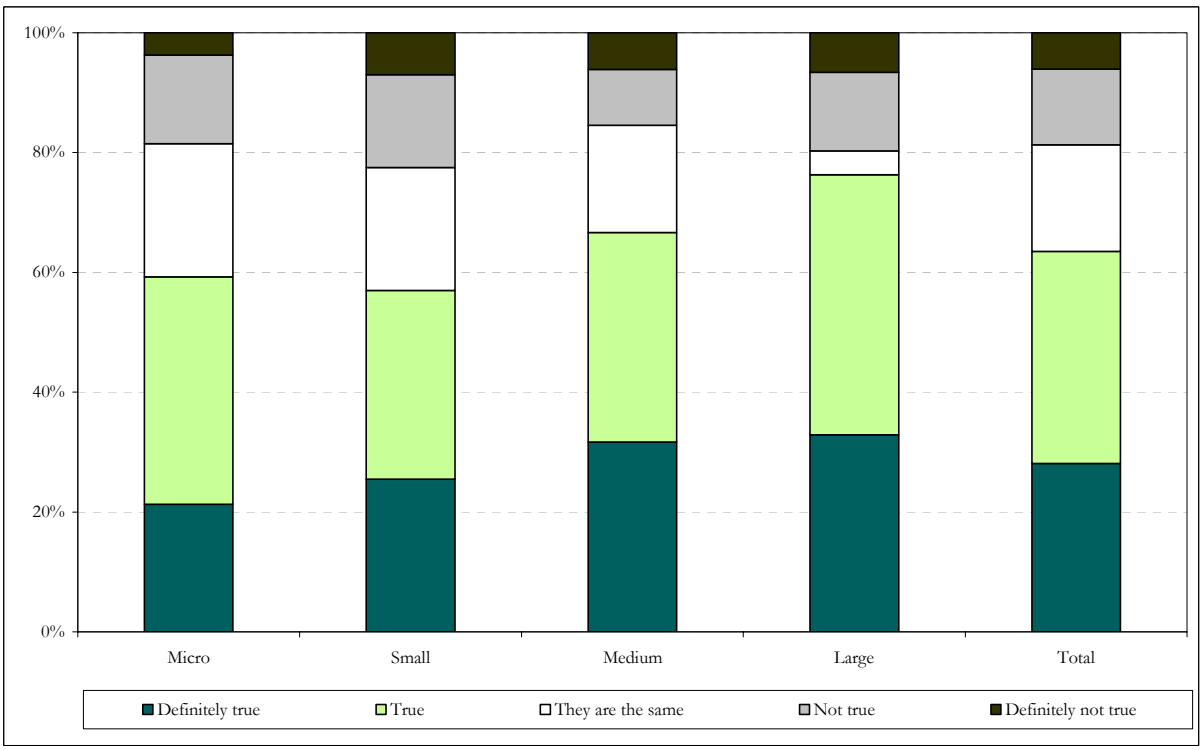
The only question of the above three where there was a significant difference among size categories was the one about the riskiness of FX loans: ratio of those who think FX loans are riskier than HUF loans increases with firm size. Thus, there are less micro and small enterprises who are aware of the riskiness of FX loans, which however, might be related to the results that ratio of firms with FX loans is also increasing with firm size. There are less micro enterprises who had experience with FX loans or ever though about comparing its risks with those of raising a debt in HUF.

Chart 18: Comparison of FX and HUF loans



Source: survey, attitude questions

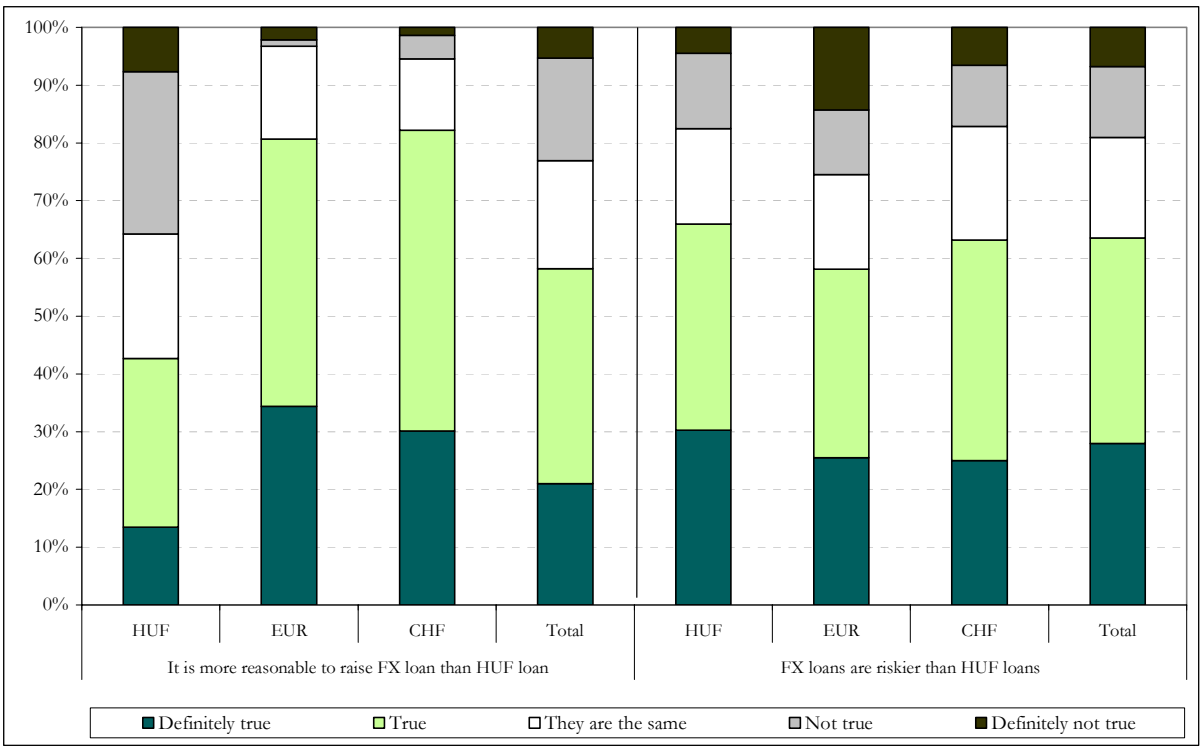
Chart 19: Opinion of interviewees on the following statement: "FX loans are more risky than HUF loans" by firm size



Source: survey, attitude questions

Finally, it is interesting to examine the risk awareness of firms with loans of different denominations. In case if enterprises are rational and make their decision based on taking risks into consideration, there should be no difference between their thinking. On the other hand, if there are less firms with FX loans who think FX loans are risky, that might refer to an underestimation of their risks. Firms in the sample seem to be rational by this definition, since there is only a slight difference among them by groups of denomination of loans. On the other hand, majority of enterprises with EUR or CHF loans seem to be content with their decisions since a great majority of them think it does worth to have FX debt, more than to have a HUF one. Enterprises with HUF loans, on the other hand, are more divided: only less than half of them think HUF loans are more reasonable to raise than FX ones.

Chart 20: Comparison of FX and HUF loans in groups of firms by denomination of the largest loan

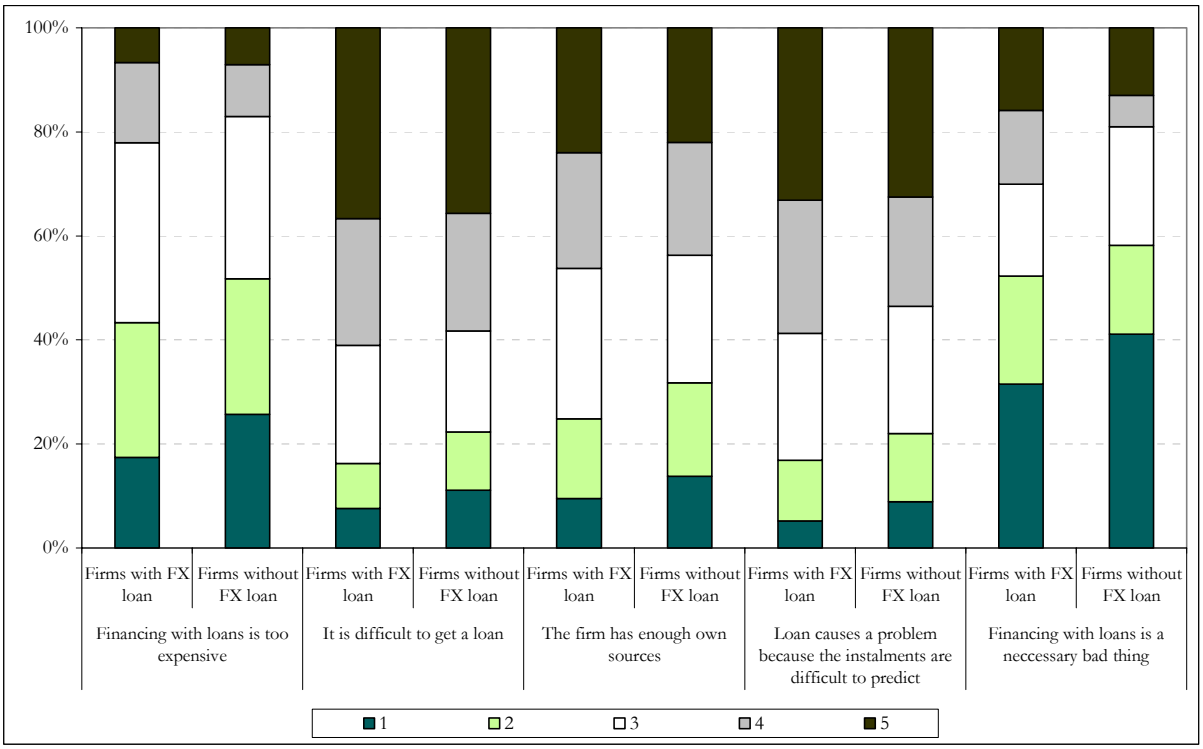


Source: survey, attitude questions

Finally, I examined whether FX debtors differ from HUF debtors as far as their profitability, indebtedness, liquidity constraints and exchange rate expectations are concerned. Based on the results, there is no significant difference between profitability and indebtedness. In case of profitability, it has to be mentioned that the accounting profit ratios do not correlate with the assessment of the interviewees on the financial position of the firm. On the basis of attitude questions, enterprises without FX loan are in a worse financial position on average than enterprises with FX loans.

Where there is some difference between FX debtors and the rest is the liquidity constraints. At FX debtors there is less enterprises which think being indebted is extremely costly, raising a loan is very difficult or that it is a necessary bad thing. Thus, FX debtors feel less liquidity constrained from these aspects than their counterparts. Nevertheless, it is not clear whether FX debt resulted this or FX debtors are those enterprises which were originally less liquidity constrained.

Chart 21: Opinion of enterprises on different statements in connection with loans



Note: interviewees were asked to give a mark to the statements, 1 meaning they totally agree, and 5 meaning they do not agree with it at all.

Source: survey, attitude questions

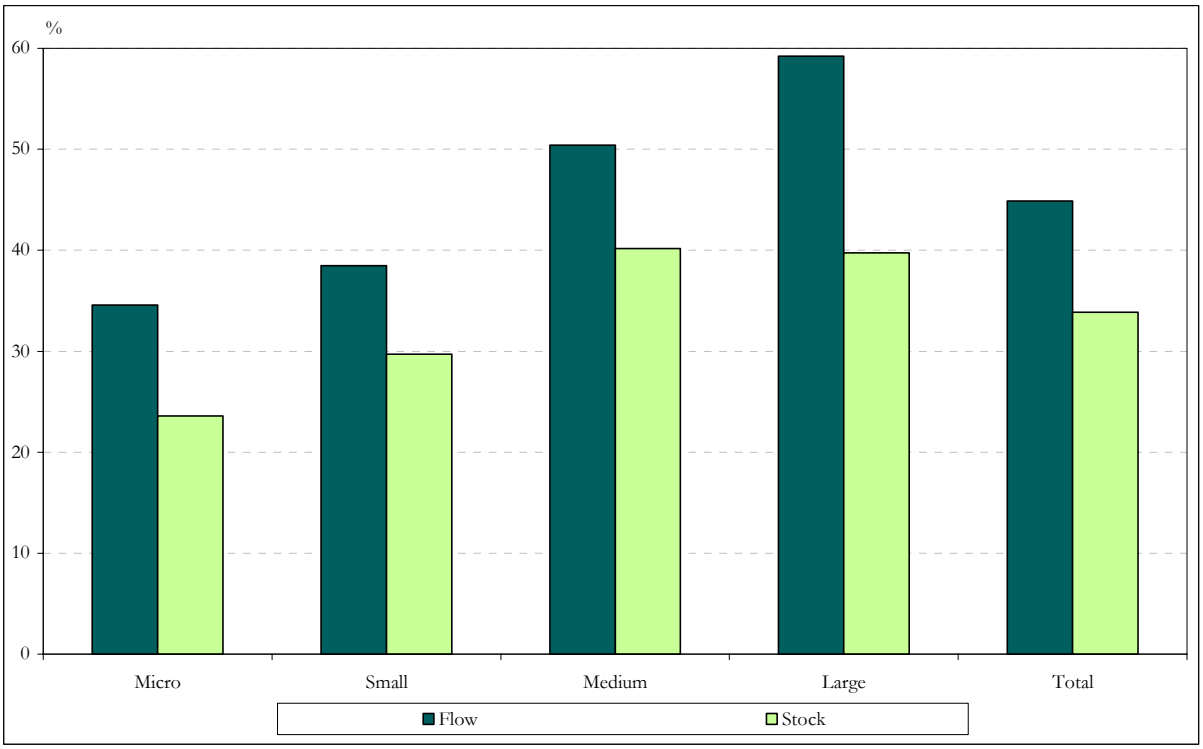
To sum up, the survey answers revealed that a large portion of enterprises raise loans in foreign currency. FX loans are more often used to finance investments than forint loans which are dominantly used for liquidity purposes, and thus FX loans are of longer maturity. Smaller firms choose FX loans because it is cheap, and only a portion of them takes risks into consideration. Larger enterprises use FX loans more often for natural hedging purposes. Firms with FX loans give higher importance to exchange rate in their loan decisions than firms without FX loans. In connection with the relative smaller instalments, FX loans contribute to the easing of the liquidity constraints and the increase of indebtedness.

4.3.3. Exchange rate exposure

The results of the previous survey showed that a significant ratio of enterprises is exposed to exchange rate changes directly. This is, they have an open position in their balance sheet or their income statement. Exchange rate exposure have several other sources, nevertheless, this is the most easily measurable. Indirect effects, i.e. effects of exchange rate changes on demand or competition, can hardly be measured. In the current survey (similarly to the case of FX loans) we included questions in the attitude part of the questionnaire to ask enterprises whether the denomination of their assets and liabilities or incomes and expenditures differed. We also asked firms to give detailed data in the data sheet about the exact denomination of these amounts.

Based on attitude questions, 46 percent of enterprises are directly exposed to exchange rate changes. Flow exposure (different denomination of income and expenditures) is more frequent: 44 percent of enterprises have this type, while 34 percent of respondents had stock exposure (different denomination of assets and liabilities).

Chart 22: Ratio of firms who stated that the denomination structure of their income and expenditure (flow exposure) or assets and liabilities (stock exposure) differs



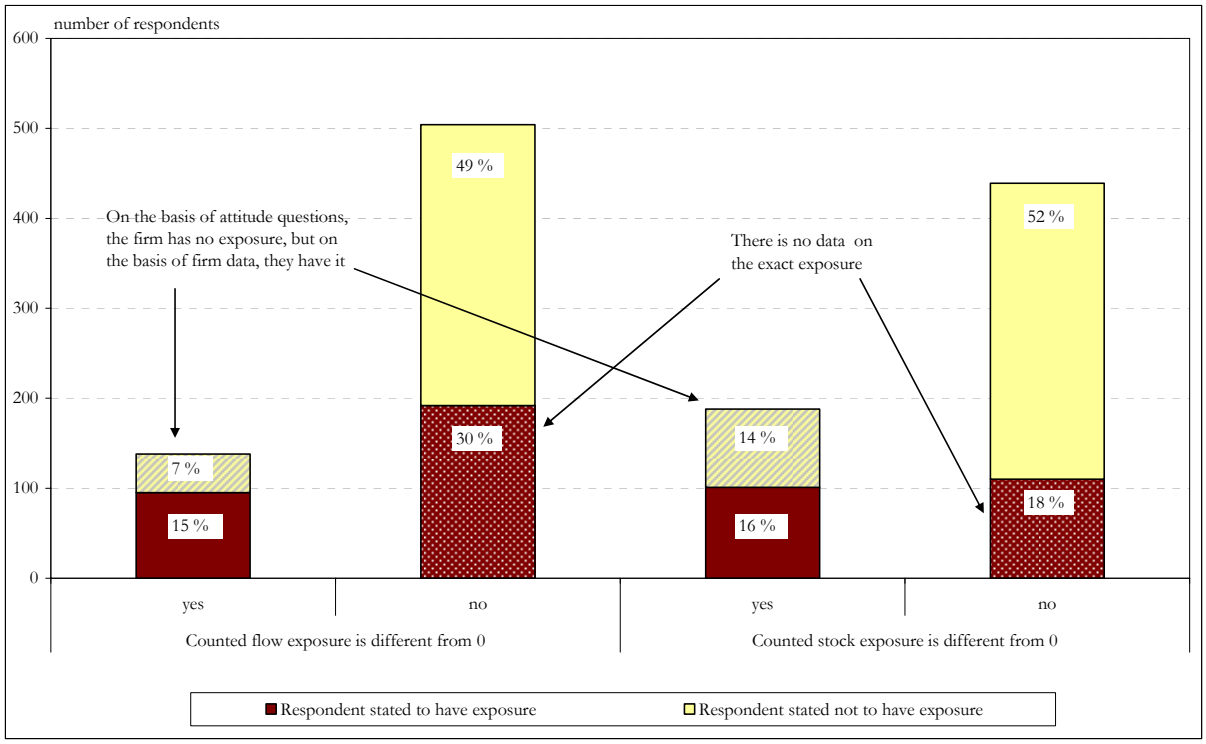
Source: survey, attitude questions

Based on the data that respondents gave in the data sheet, however, I have detailed information only about part of the exposure (Chart 23). 62 percent of enterprises that stated to have flow exposure in the attitude questions and 74 of those that stated to have stock exposure did not give information about the denomination structure of financial data. Nevertheless, there were some firms where the respondent of attitude questions stated they had no FX exposure, while based on the data, they had some, thus, they were not aware of this exposure. The ratio of these enterprises is the highest in case of stock exposure[21]. Surprisingly, the ratio of enterprises where information based on attitude questions and calculations differ, does not decrease with size.

Due to the large ratio of enterprises which did not give their detailed data, the information about FX exposure is biased. If this error is independent from the sign of the exposure, i.e. enterprises which had negative and positive exposure were similarly willing or unwilling to supply detailed data, the data we collected is biased towards zero. I assume that this is the case.

[21] This can be in connected to the fact that firms have to count their export revenues in their profit and loss statement, while in the balance sheet there is no compulsory item that has to be reported in a denomination breakdown.

Chart 23: Exchange rate exposure based on respondents' answers and calculations from their data



Note: the following attitude question was posed to the enterprises: "At your firm does the denomination of income and expenditures (flow exposure)/assets and liabilities (stock exposure) differ?" Counted cash flow is calculated on the basis of data given by the respondents.

Source: survey, attitude questions and data sheets

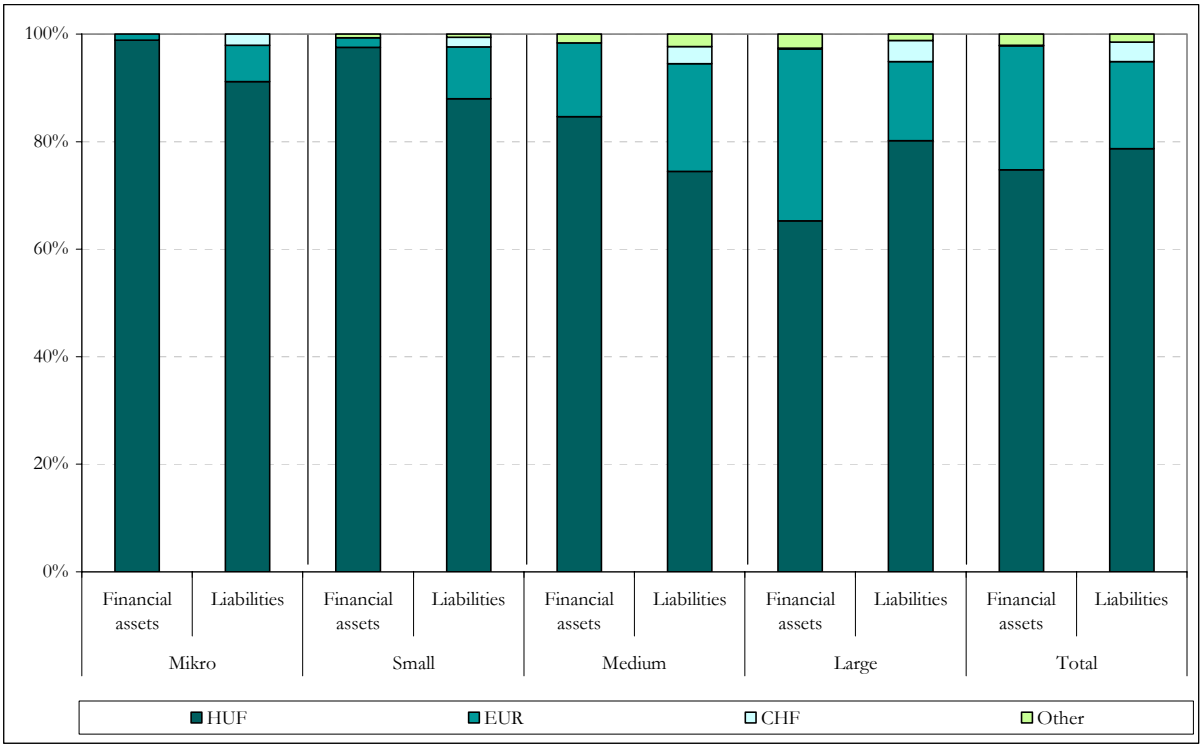
Another factor causing the data collected in the survey to be biased towards lower exchange rate exposure is that firms usually 'forget' to consider the contracts with domestic partners where prices are fixed or paid in foreign currencies (mainly in euro). In the survey, we asked if enterprises had such contracts. 60 percent of enterprises stated to have such contract, 40 percent have contract(s) with prices fixed or paid in foreign currency with both customers and suppliers. Among the firms which stated to have such a contract at least on one side, 70 percent answered to the question about flow exposure not to have that. 81 percent of those who have contracts with customers where prices are fixed or paid in foreign currencies, did not report having FX income. On the expenditures side the ratio is even bigger: 87 percent. Nevertheless, since there is no database on the denomination structure of the balance sheet and the profit and loss account, I use the data of the questionnaires to calculate exchange rate exposure, even if it seriously underestimates the real exposures. Nevertheless, it has to be highlighted that enterprises usually ignore the exchange rate exposure they have because of these contracts[22].

Based on data, *stock exposure* is positive on the average of the sample, nevertheless, there are differences by firm size. In case of SMEs, external liabilities exceed financial assets, while stock exposure is positive only in case of large firms. Thus, HUF depreciation would affect SMEs

[22] There are also examples where large enterprises fix prices in forint with smaller companies, even if it would be beneficial for the large company to have natural hedging. The motivation behind this can be that the larger enterprises can use other FX risk management tools more easily.

negatively through stock exposure, while it would have a positive effect on large enterprises as a whole[23].

Chart 24: Denomination structure of financial assets and liabilities by firm size

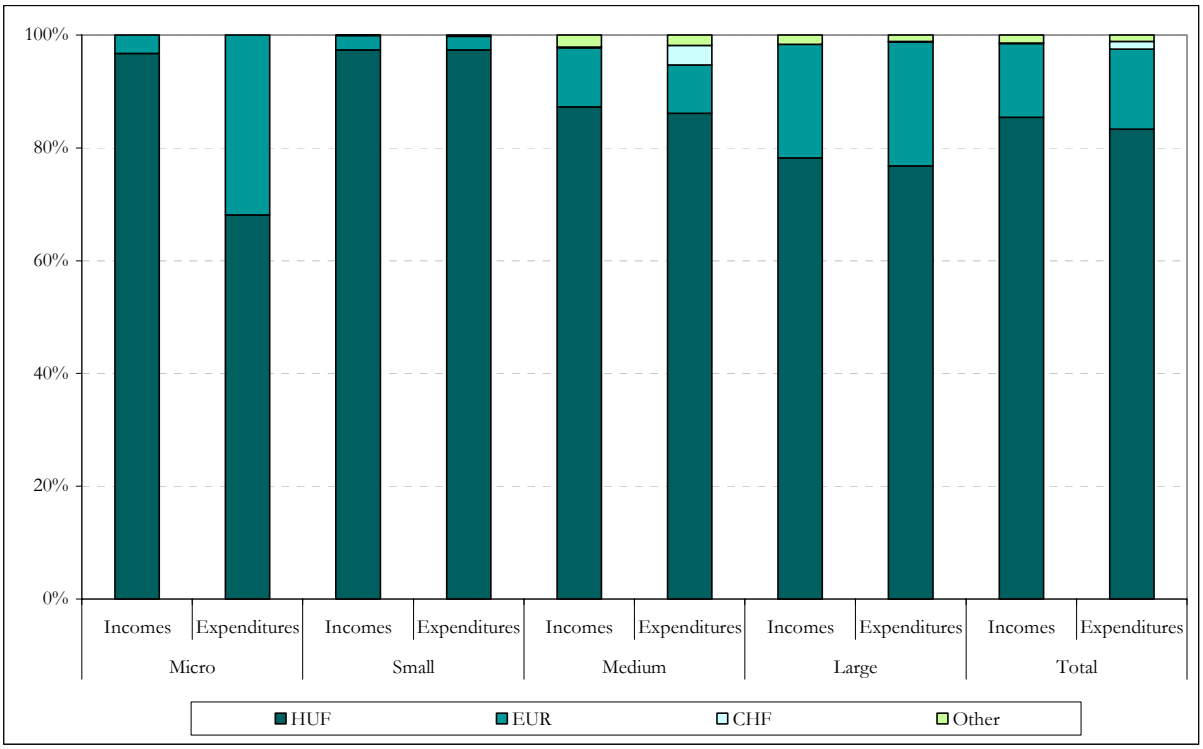


Source: survey, data questions

As far as *flow exposure* is concerned, the aggregate picture is a positive net FX income: FX incomes on average are higher than FX outcomes and the ratio of enterprises with positive net FX income is also higher. Only micro enterprises have a negative net FX income on average.

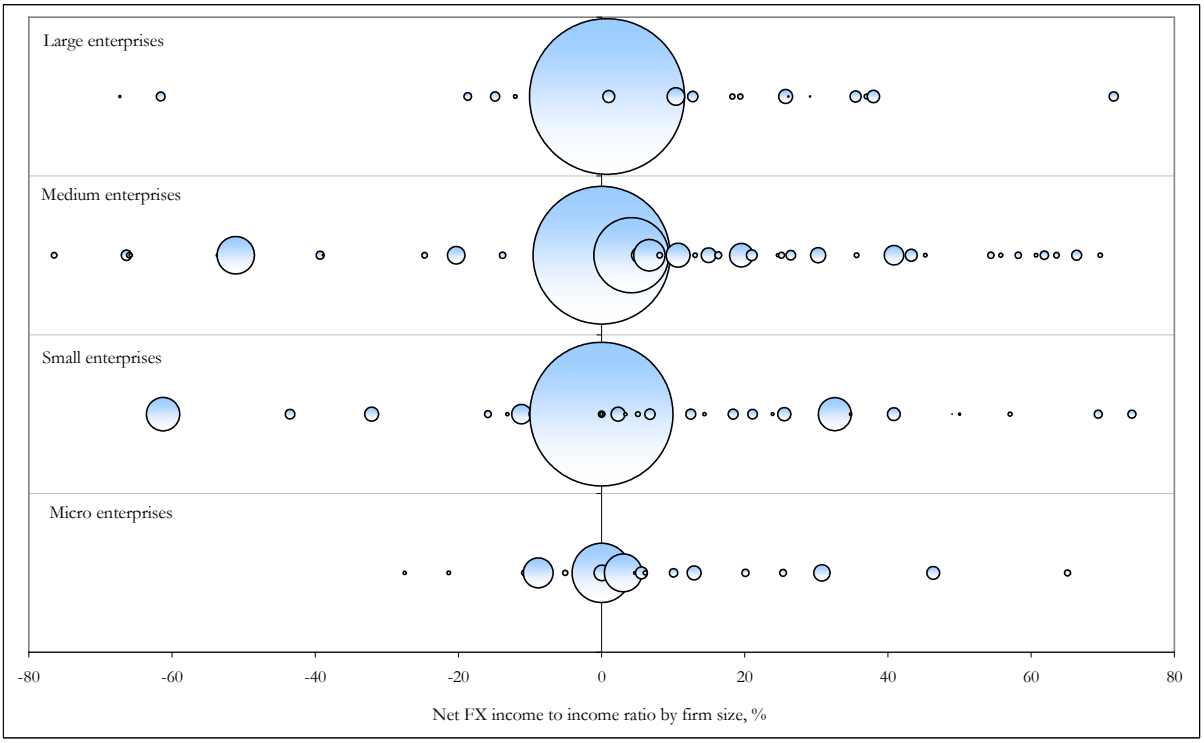
[23] Due to differences between firms, the effect on total profitability can be different, as it can be seen later in this chapter.

Chart 25: FX income and expenditure ratios by size categories



Source: survey, data questions

Chart 26: Net open position by firm size



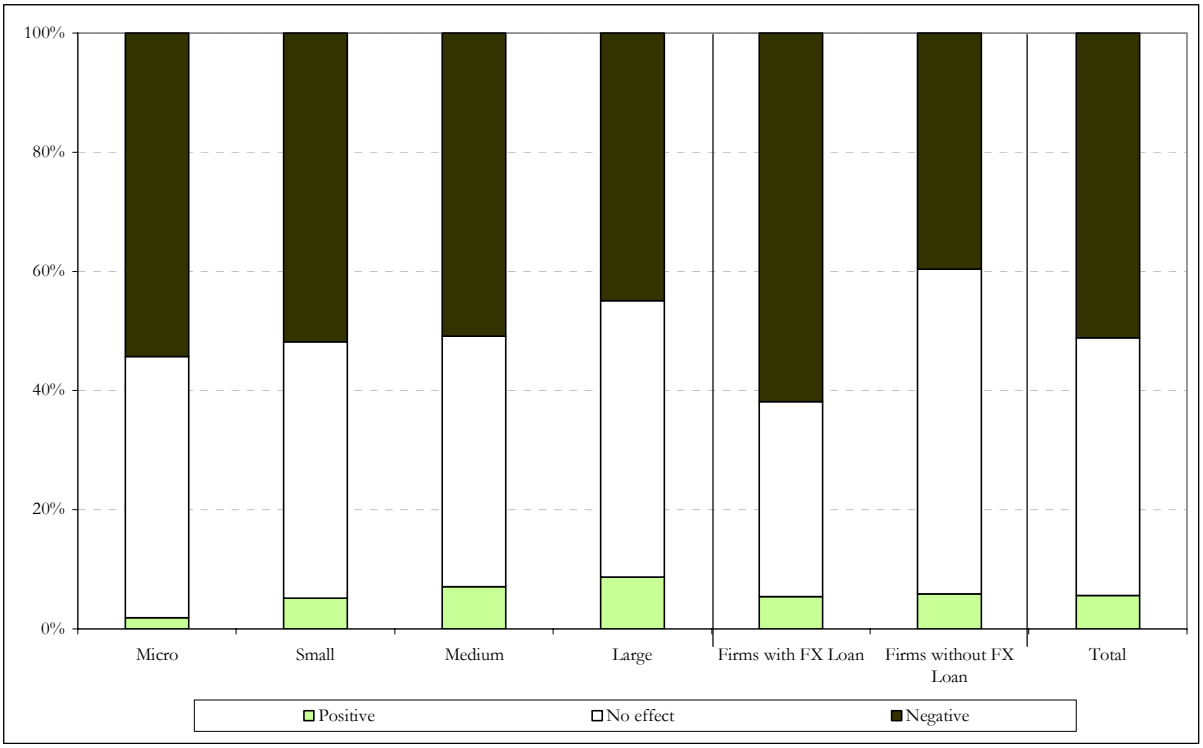
Note: bubble sizes reflect the income ratio of firms in the given category to the sum of income of all firms in the sample

Source: survey, data questions

Expectations about the potential effects of exchange rate changes

Similarly to the previous survey, I also examined the expectations of enterprises in case of exchange rate changes. Enterprises were asked about potential effects of increased exchange rate volatility and also about enduring depreciation or appreciation of 10 percent. Among the three questions, the highest was the ratio of those enterprises which expected a negative effect in case of depreciation: 58 percent of them think they would be hit by this. 51 percent of respondents expect negative effect of higher exchange rate volatility and 23 from forint appreciation. Thus, perceived exchange rate exposure is asymmetric on the aggregate level. On firm level, it seems more symmetric than it was in the previous survey: those enterprises which expect negative (positive) effect from depreciation think that appreciation would positively (negatively) affect them. Nevertheless, a 9 percent of respondents thought that both appreciation and depreciation would affect them negatively.

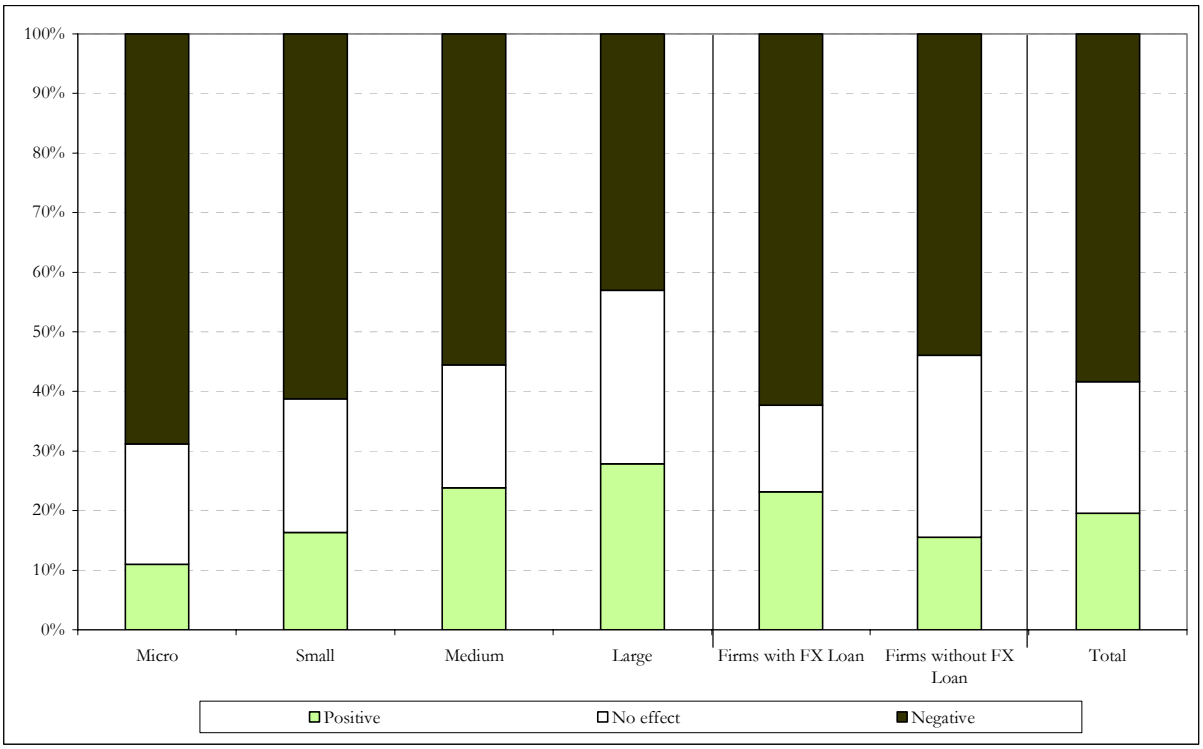
Chart 27: Expected effects of exchange rate volatility



Source: survey, attitude questions

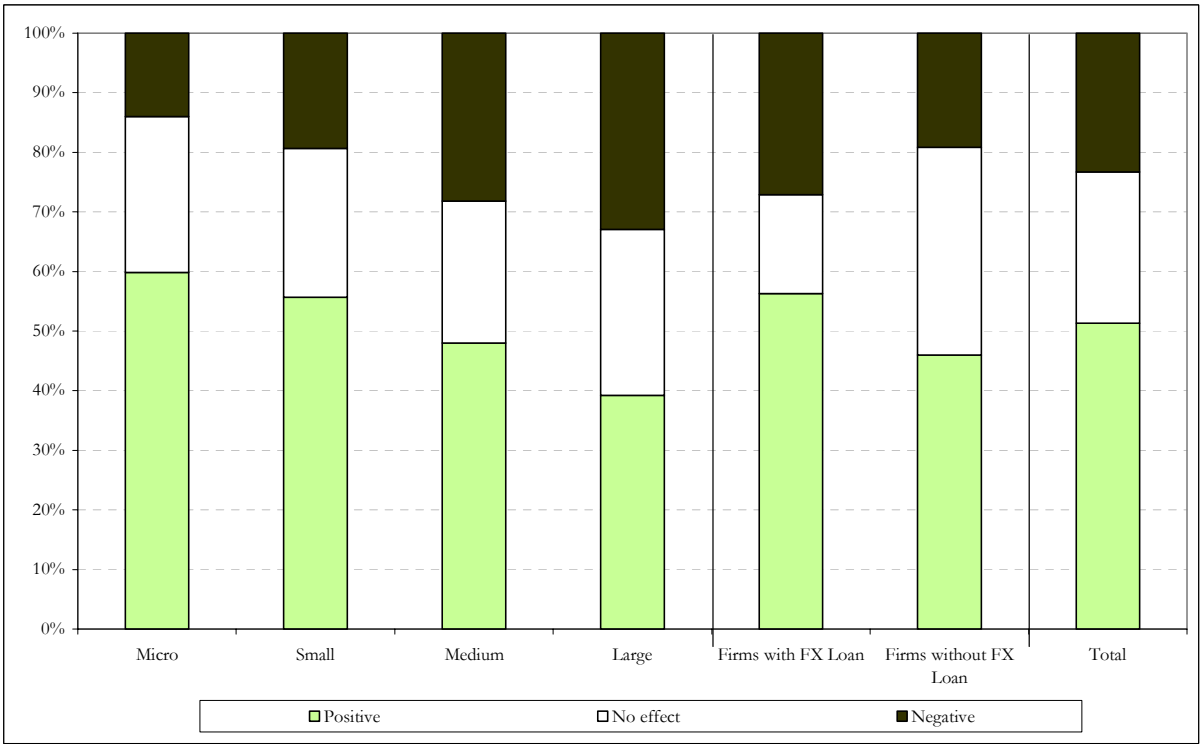
It is worth mentioning that – as opposed to the 2005 survey –, there is a noticeable difference between enterprises with and without FX debt. Enterprises with FX debt expect more severe effects from any exchange rate changes than those without it. Nevertheless, there are more of both those who expect negative and those who expect positive effects from an exchange rate change. It is only increased exchange rate volatility where the ratio of those expecting a negative effect is significantly higher among enterprises with FX loans.

Chart 28: Expected effects of the depreciation of forint by 10 percent



Source: survey, attitude questions

Chart 29: Expected effects of the appreciation of forint by 10 percent



Source: survey, attitude questions

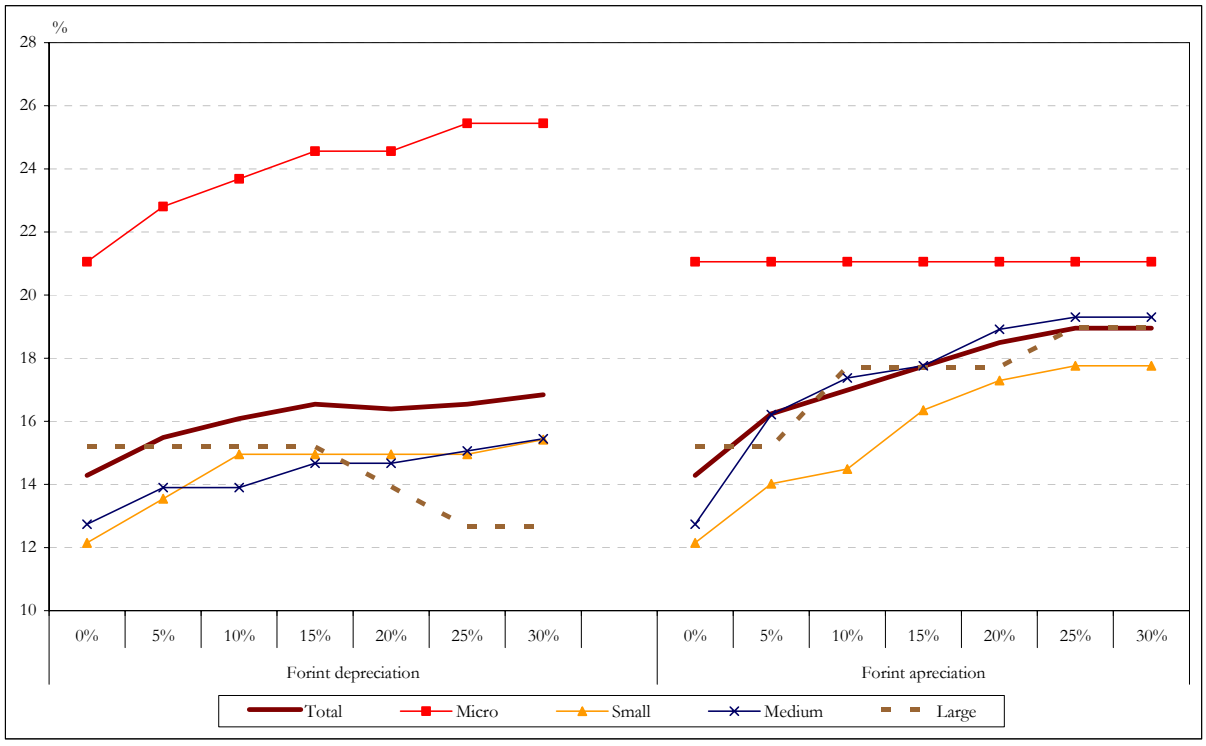
Potential effect of exchange rate changes on profitability of sample firms

Similarly to the previous survey, potential effects of exchange rate changes on the ratio of loss-making firms in the sample were examined. Based on data on net FX income and net FX assets, I examined the effect of depreciations and appreciations on profit before tax and calculate the ratio of loss-making enterprises. The advantage of this indicator as compared to the weighted average profitability indicator is that it is more closely related to the creditworthiness and the portfolio quality of loans. In case exchange rate changes increase the variance of individual profitability indicators, in an average variable these differences can disappear. Nevertheless, it can be posed that firms with negative profitability will find it harder to repay their loans, thus, this ratio is more closely related to the financial soundness and creditworthiness of the corporate sector.

For the calculations, several simplifications were made: exchange rate changes were considered to be enduring and I posed that neither the behaviour of enterprises nor the behaviour of consumers and other firms change. Besides, for those enterprises which said they are managing their exchange rate exposure and do this using natural hedging or derivatives, I posed that they are successfully eliminating the effects of exchange rate changes, thus, they had no exposure.

As far as the effect of exchange rate changes through flow exchange rate exposure is concerned, it is only micro enterprises where depreciation has larger negative effect than appreciation according to the calculations. In case of large enterprises, depreciation exerts a significant positive effect: the ratio of loss-making firms drops to a large degree. This is in line with intuitions and previously introduced results: the ratio of enterprises with negative flow exposure is the highest among micro enterprises in the sample.

Chart 30: Ratio of loss making enterprises at different depreciations and appreciations – effect of flow exposure



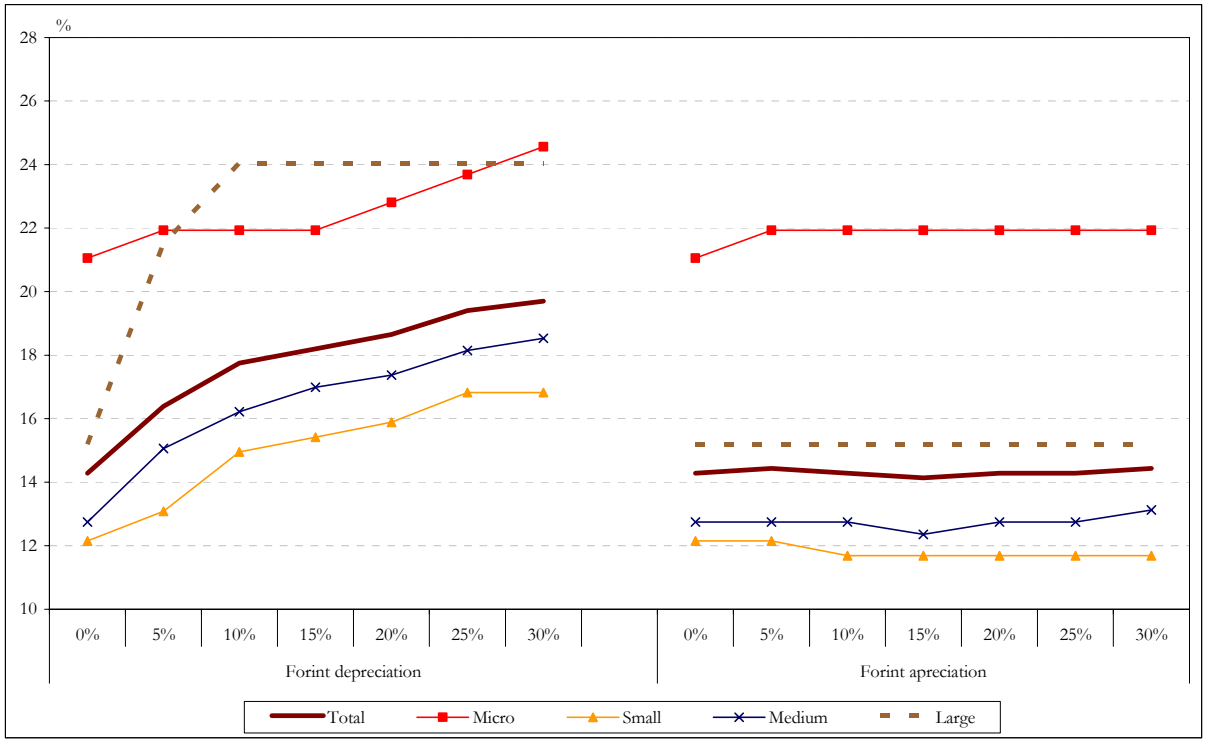
Note: for enterprises which hedge using derivatives or natural hedging tools, the exchange rate exposure was considered zero.

Source: survey, financial statements, own calculations

On the other hand, the effect of exchange rate changes through stock exposures is the opposite: the ratio of loss-making firms in the sample increases steeply as a result of depreciation in all size categories, while forint appreciation has only a small effect (Chart 31).

By simply adding the two effects, there is a negative effect from any exchange rate change: a 10 percentage depreciation decreases the profit before taxes to balance sheet total ratio by 1 percentage point, while a 10 % appreciation increases it by 1 percentage point. Nevertheless, the ratio of loss-making firms, like before, does not change symmetrically (Chart 32): a 10 percent depreciation raises the ratio of loss-making enterprises from 14 percent to above 20, while in case of a 10 percent appreciation the increase in the ratio of loss-making firms is only 3 percentage points. There is obvious non-linearity in both cases: the marginal effect of a small initial exchange rate change is larger, resulting from the fact that there are many firms that operate with a slightly positive profit. In case of large enterprises, after a steep increase, a forint depreciation above 15 percent reduces the ratio of loss-making firms, since the positive effects of the depreciation on net FX income start to be effective from then.

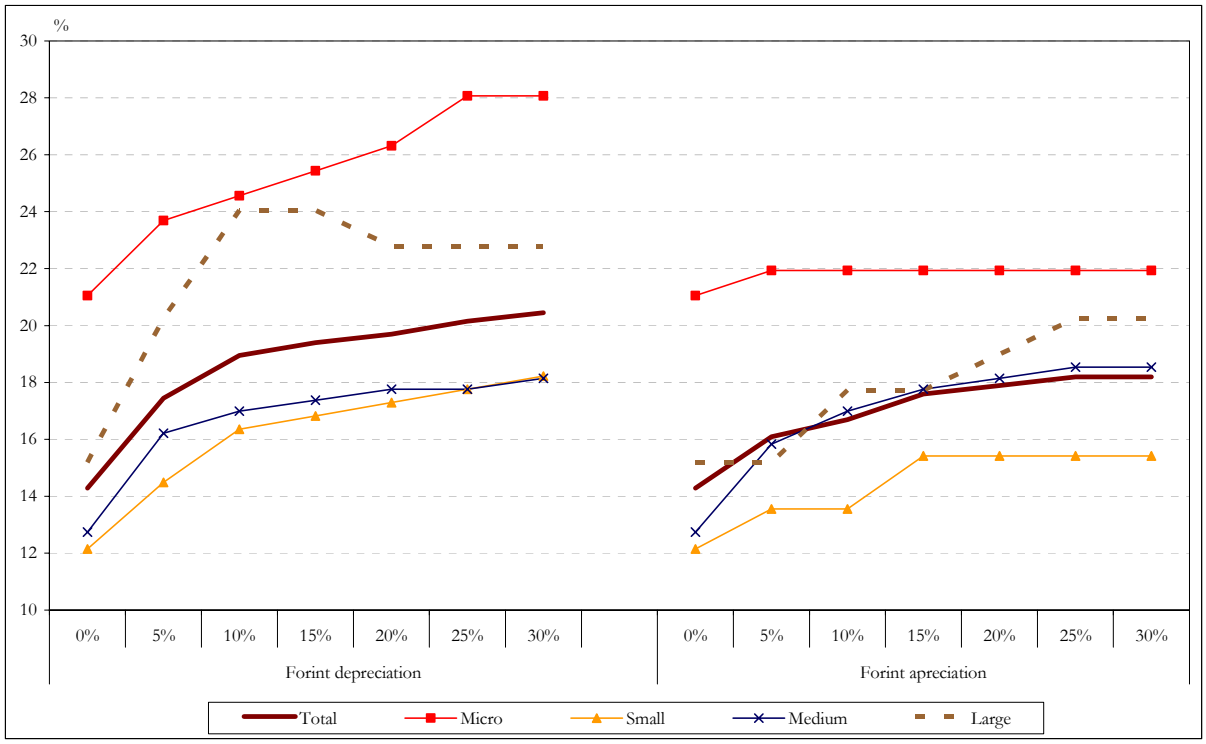
Chart 31: Ratio of loss making enterprises at different depreciations and appreciations – effect of stock exposure



Note: for enterprises which hedge using derivatives or natural hedging tools, the exchange rate exposure was considered zero.

Source: survey, financial statements, own calculations

Chart 32: Ratio of loss making enterprises at different depreciations and appreciations – common effect from stock and flow exposures



Note: for enterprises which hedge using derivatives or natural hedging tools, the exchange rate exposure was considered zero.

Source: survey, financial statements, own calculations

The same exercise was done for those enterprises which are indebted towards the banking sector. For these enterprises, the effects of exchange rate appreciation and depreciation were basically the same as for the whole sample. For micro enterprises which are indebted towards the banks, however, depreciation had more severe effect, while forint appreciation affected large enterprises to a larger degree. The ratio of loss making enterprises in this subsample increased from 13 percent to 20 in case of 30 percent depreciation (reaching 18 percent already after a 10 percent depreciation), while the same degree of appreciation resulted in the increase of loss making firms to 17 percent. Thus, unexpected and long lasting exchange rate changes can influence the portfolio quality of the banks seriously.[24]

4.3.4. FX risk management

As previously mentioned, one of the aims of this survey was to examine the factors behind low ratio of enterprises that hedge their exposures. Thus, several questions were posed to the enterprises about their familiarity with different tools and their usage, or the reasons for not to use them.

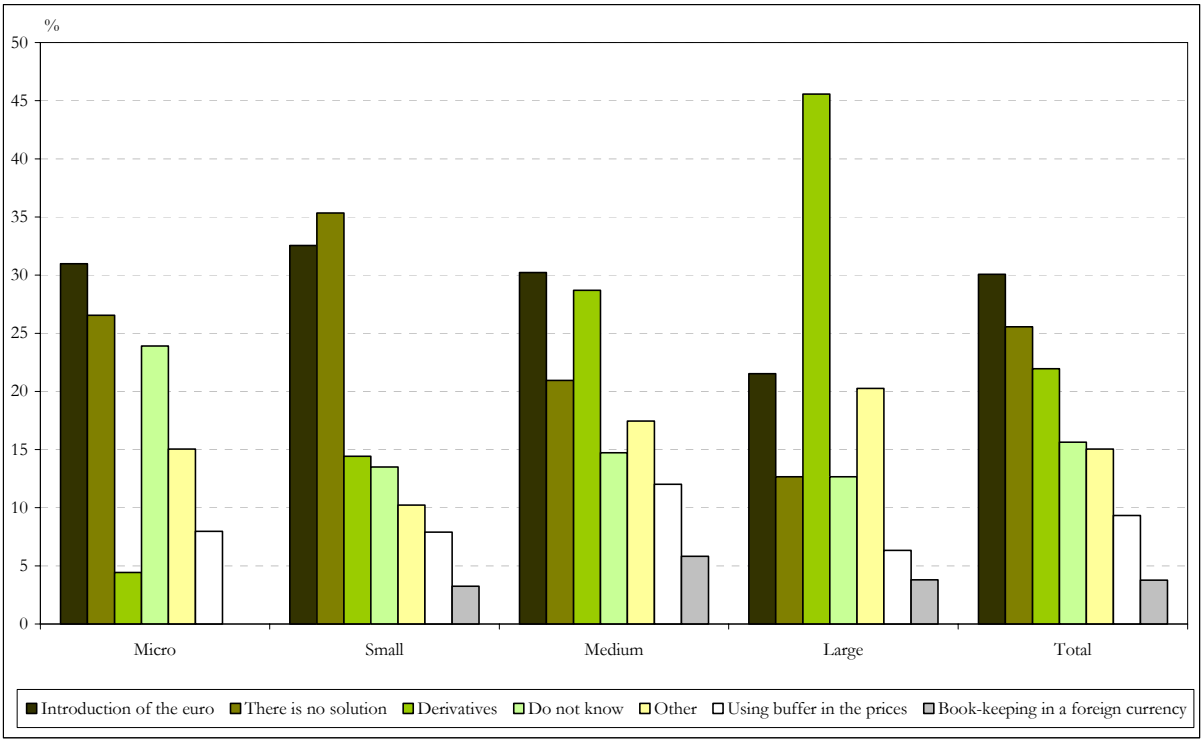
First, enterprises were posed questions that examined their awareness of the potential volatility of the exchange rate. 77 percent of enterprises think that exchange rate changes cannot be forecasted at all or only with a very big uncertainty. As far as exchange rate expectations are

[24] Since the portfolio quality indicators are not available by size category or industry (or the available ones can only be used with serious limitations), the potential effects can be calculated very imprecisely, thus, this exercise is not done.

concerned, in June-October 2007 the majority of respondents did not expect high volatility until the end of the year: 40 percent counted on a stable exchange rate, while 40 percent forecasted somewhat weaker forint and 14 percent somewhat stronger. Thus, though respondents were aware of potentially large movements, they did not think it very possible, nevertheless, they anticipated stable or somewhat weaker forint.

Respondents were also asked to mention tools that they think could help in decreasing FX risks or its costs. It is worth highlighting that the most 'popular' solutions mentioned were the introduction of the euro and the 'there is no solution' answers. Thus, around two thirds of respondents expects external 'help' or does not see any solution to decrease FX risks. 22 percent of enterprises think derivatives could be used for risk management, and the ratio of these enterprises steeply increases with firm size: only 5 percent of micro enterprises mentioned this, while 45 percent of large firms did so. Another quite popular solution is to try to set prices so that they contain some buffer for possible changes or to fix prices in foreign currency with trade partners. And finally, a few enterprises think that by keeping books in foreign currency (a tool available only for those who has the majority of their income and expenditure in one given currency) exchange rate risks can be decreased.

Chart 33: Distribution of answers to the question: "What can you mention as a possible solution to decrease FX risks?" by firm size

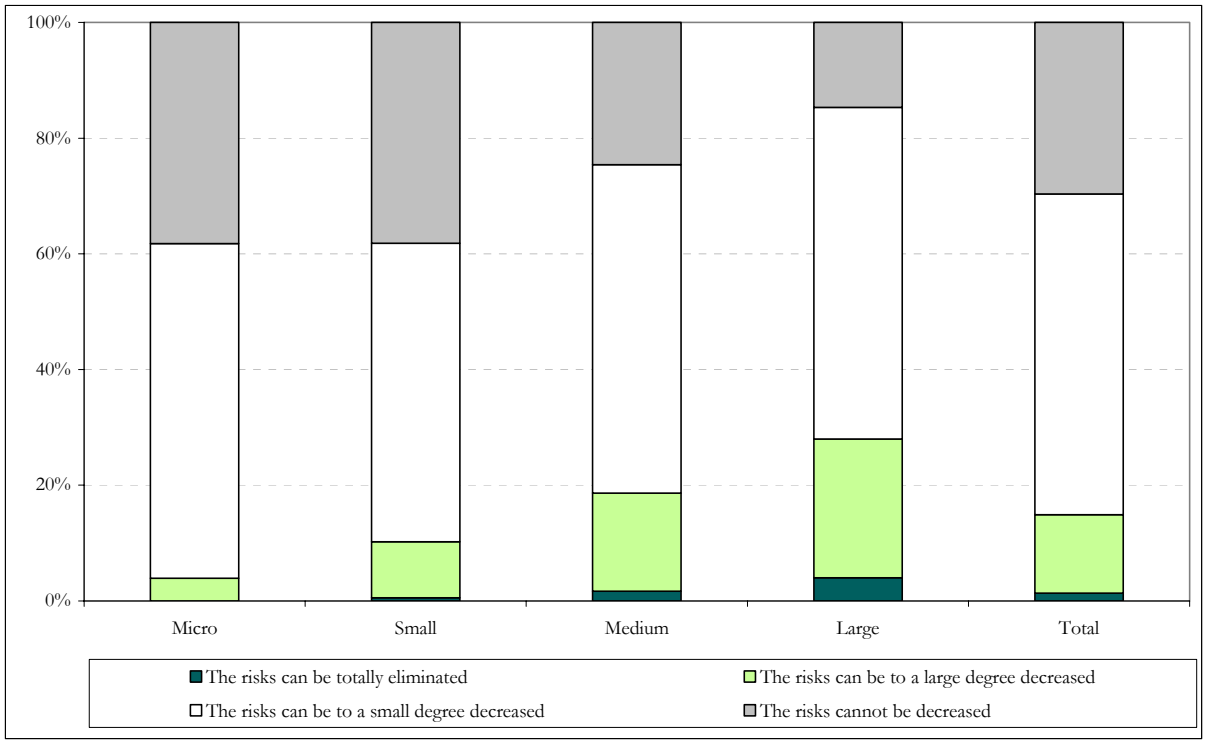


Note: based on an open question.

Source: survey, attitude questions

Another question resulted in similar results: respondents were asked what they thought about the degree of risk decrease that could potentially be reached by using available tools. 30 percent of enterprises stated that it cannot be decreased, with a marked difference among firm size categories. Larger enterprises are more confident about the available risk management tools.

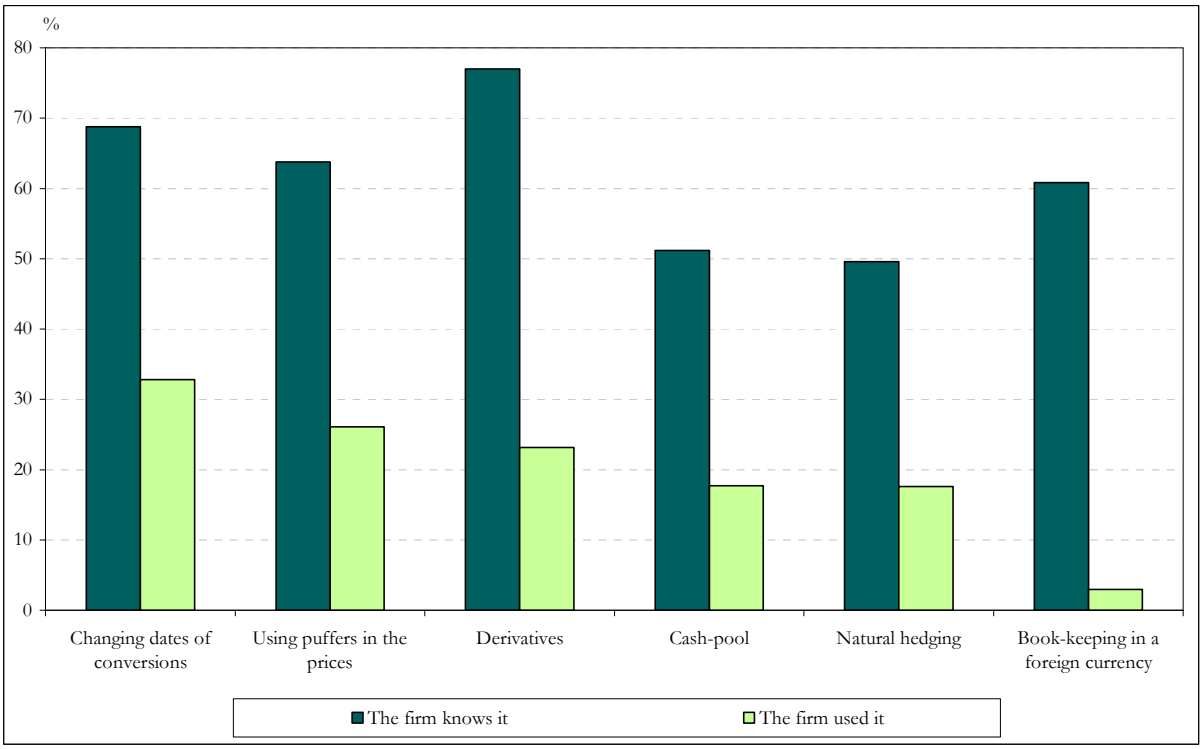
Chart 34: Distribution of answers to the question: "According to your opinion, to what degree can FX risks be decreased by using available FX management tools?" by firm size



Source: survey, attitude questions

Among those who are exposed to FX risks, about 55 percent manages their FX risks in some way. Nevertheless, we asked all enterprises about the tools they have ever heard and the ones they have already used. The most well known risk management tools were derivatives, changing the dates of conversions and using a mark-up in prices to cover potential extra costs. These also were the most often used tools, though only a small ratio of enterprises used them in reality. Natural hedge is used by less than 20 percent of firms, and almost two times as many stated that they could not use natural hedging because of their liquidity problems. Among those who use or ever used derivatives, forward is the most popular, followed with a huge lag by interest rate constructions.

Chart 35: Known and used tools of FX risk management

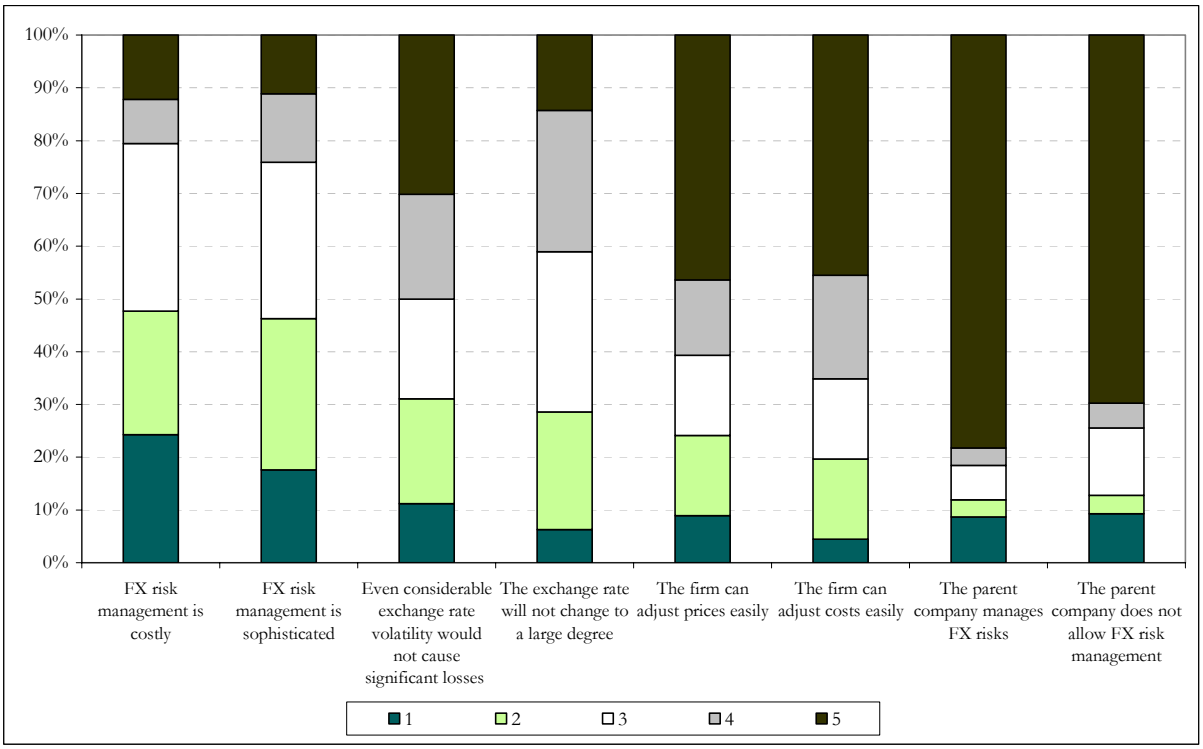


Note: FX risk management tools were listed on the basis of interviews conducted prior to the survey, 4.1.

Source: survey, attitude questions

Enterprises which are admittedly exposed to exchange rate changes but do not hedge it, were asked to assess 8 statements whether they are true for them or not. Based on these, the main reasons for not hedging were costliness and complicatedness of risk management tools. This is followed by fixed exchange rate expectations and opinions about small effect of the exchange rate changes. A 20 percent of enterprises think that they can flexibly adjust prices and the same is the ratio of those who think they would be able to change costs to escape losses. More than 10 percent of enterprises stated that the parent company either does not allow them to manage FX risks or it is done at the parent company in a centralised way.

Chart 36: Reasons for the lack of hedging



Note: interviewees were asked to give a mark to the statements, 1 meaning they totally agree, and 5 meaning they totally disagree with it.

Source: survey, attitude questions

5. Econometric analysis

Based on the literature on exchange rate exposure, motives to raise FX debt and using FX risk management tools, I examine a reduced form model. I examine the relationship between different firm characteristics and the above mentioned factors. The examined firm characteristics were collected using the empirical literature on these topics. I use probit estimation method for the econometric examination.

To explore the information in both the 2005 and 2007 surveys, I also run pooled probit estimation. Nevertheless, this examination has a few limitations, given the different structure of the two surveys.

5.1. Analysis of 2007 survey

On the data of the 2007 survey, I examine the following reduced form model:

$$Pr(y=1 \mid x)=f(x),$$

where Pr(y=1) refers to the probability that

- the firm has FX debt (D_devhit), measured by attitude questions.
- the firm has currency mismatch (D_exp), measured by attitude questions.

- the firm uses FX risk management tools (D_fedez), assuming there is exchange rate exposure. It is measured in three different ways:
    - D_fedez=1 if the interviewee stated they hedge their exchange rate exposure;
    - D_fedez1=1 if the interviewee stated they hedge their exchange rate exposure using derivatives or natural hedging;
    - D_fedez2=1 if the interviewee stated they hedge their exchange rate exposure using derivatives.

The explanatory variables are basically the same in the 5 regressions, with the only exception of the equation on being exposed to FX risk.

I use the following explanatory variables:

- size, measured by balance sheet total or size dummies: I pose that larger firms are more likely to raise an FX debt, hedge their exposure or be exposed to exchange rate changes.
- age of the firm: I examine if older firms are more likely to raise an FX debt, hedge their exposure or be exposed to exchange rate changes.
- sectoral dummy: I examine sectoral differences among the enterprises, agriculture and construction industries being the reference group.
- ratio of foreign ownership: I pose that foreign owned firms are more likely to raise an FX debt, hedge their exposure or be exposed to exchange rate changes.
- ratio of export revenue, as a proxy of net FX income (with the exception of the equation on exchange rate exposure): I examine if exporting firms raise an FX debt with a higher possibility (to do natural hedging), and if they are more willing to hedge their exposure since they are probably the most exposed.
- answers to the question on being liquidity constrained:
    - k9a: the answer to the question *"To what degree the following statement is true for your company: For a company like ours, credit is too expensive."*
    - k9b: the answer to the question *"To what degree the following statement is true for your company: For a company like ours, it is very difficult to raise a credit."*
- leverage ratio (debt to balance sheet total ratio): I examine whether more leveraged firms has more FX debt and if they have less capacity to do FX risk management.
- ratio of long-term debt to total debt: this is important in the equation on the FX indebtedness, where a positive and significant covariate confirms that firms with long term debt are more willing to raise an FX debt.
- profitability: examined by ROA, profit margin and answers to the survey question k3: *"How do you assess the current financial position of your firm?" (1 meaning very good financial position and 5 very weak)*
- dummy variables on short term exchange rate expectations (with the exception of the equation on exchange rate exposure): I examine whether firms that expect depreciation or appreciation of the forint are more willing to raise FX loan or manage their FX risks.

See the results of the equations with the highest explanatory power for each dependent variable in Table 2.

Table 2: Results of probit estimations

	D_devhit	D_fedez	D_fedez1	D_fedez2	D_exp
Balance sheet total	**0.00*** **(0.00)**	**0.00**** **(0.00)**	**0.00***** **(0.00)**	**0.00***** **(0.00)**	0.00 (0.00)
Age	0.03 (0.03)	0.001 (0.04)	0.004 (0.04)	0.08 (0.05)	0.03 (0.34)
Age*age	**-0.002*** **(0.001)**	0.0002 (0.001)	-0.0003 (0.002)	-0.003 (0.002)	-0.001 (0.001)
Industry: manufacturing	**0.44**** **(0.19)**	0.34 (0.24)	0.46 (0.31)	-0.26 (0.22)	**0.41*** **(0.21)**
Industry: services	0.17 (0.18)	0.33 (0.23)	0.46 (0.31)	-0.17 (0.21)	0.33 (0.21)
Ratio of foreign ownership	0.002 (0.002)	**0.003**** **(0.002)**	**0.004**** **(0.002)**	**0.004**** **(0.002)**	**0.01***** **(0.001)**
Ratio of export revenues	**0.01***** **(0.002)**	**0.01**** **(0.002)**	**0.01***** **(0.002)**	**0.01***** **(0.002)**	
Financially constrained 1	-0.07 (0.05)	-0.02 (0.05)	-0.03 0.06)	-0.08 (0.05)	-0.02 (0.05)
Financially constrained 1	0.02 (0.05)	**-0.09*** **(0.05)**	-0.07 (0.06)	-0.002 (0.05)	0.03 (0.05)
Ratio of long term debt	**0.02***** **(0.003)**	-0.0001 (0.0003)	-0.0001 (0.0003)	0.00 (0.00)	
Assessment of financial position	**-0.19***** **(0.07)**	**-0.13*** **(0.08)**	-0.14 (0.09)	-0.11 (0.08)	**-0.28***** **(0.07)**
Exchange rate expectations: forint appreciation	0.09 (0.17)	0.21 (0.17)	0.21 (0.20)	0.03 (0.19)	
Exchange rate expectations: forint depreciation	-0.01 (0.12)	0.09 (0.12)	**0.24*** **(0.14)**	0.07 (0.13)	
Constant	**0.78**** **(0.33)**	-0.67 (0.44)	**-1.26**** **(0.54)**	-0.71 (0.46)	-0.37 (0.40)
Obs.	627	627	627	627	627
Log likelihood	-354.94	-321.12	-235.01	-300.85	-364.50
Pseudo R2	0.10	0.09	0.14	0.12	0.10

Note: ***, **, * refer to statistical significance at 1%, 5 % and 10 % level, respectively. Standard errors are in parenthesis.

As it can be seen above, the probability of having an FX debt is significantly larger in case of exporting and larger enterprises. Manufacturing firms, even after controlling for the export revenues, are more probable to have FX debt. Nevertheless, after controlling for export revenues and sector, ratio of foreign ownership has no explanatory power. Firms that have long term debt are also more willing to have FX debt, a result which is worth further examination. As far as profitability is concerned, accounting ratios on profitability had no explanatory power at all, while the assessment of interviewees on their financial position was related to the explained variable. The age of enterprises is significant only in its quadratic form, and with a negative sign, meaning that the probability of having an FX debt increases with age, but only up to a turning point. The probability to have an FX debt is not related to exchange rate expectations or to leverage ratios.

As far as FX risk management activity is concerned, firm size, ratio of foreign ownership and export revenues have significant covariates that are basically the same, independently from the specification. Larger companies with more export revenue and higher ratio of foreign ownership are more probable to use FX risk management tools. Liquidity constrains, profitability and exchange rate expectations play a role, but the significance of the covariates is low in all cases and they are significant only in the 'broader' definitions. The age of enterprises and the sector do not play any role in FX risk management activity.

Finally, as far as the probability to have an exchange rate exposure from any source (stock or flow, as reported by the interviewees among the attitude questions) is concerned, it is a function of sector, foreign ownership and assessment of the financial position.

5.2. Pooled panel analysis of 2005 and 2007 surveys

Using pooled panel estimation, I examine whether the probability to have FX debt, to be exposed to exchange rate changes and to use FX risk management tools has changed from 2005 to 2007, after controlling for several firm-specific characteristics. To put it differently, I examine whether the change in the above factors between the two survey is due to differences in the sample or to other factors. This can be done if the sample of both surveys is normally distributed, random sample. This examination is carried out exclusively for SMEs, given that large enterprises were excluded from the first survey.

Table 3 shows the description of the dependent variables. The ratio of firms with FX loans, exchange rate exposure and FX risk management activities increased between the two periods, the increase is biggest in case of FX indebtedness. Nevertheless, it has to be mentioned here that the measurement of this variable was different in the two surveys (in the first one we asked data about the structure of indebtedness, which caused this ratio to be downward biased, while in the second one we identify firms with FX debt on the basis of the attitude questions). In this case the different identification might cause bias in the estimation, thus, to control for these differences, I also do the estimation by dropping the observations in the 2007 survey where the enterprises stated they had FX debt but did not supply the necessary data on these stocks. As far as FX risk management is concerned, here I considered as hedging the use of derivatives and natural hedging. Other hedging tools were not examined.

Table 3: Dependent variables in the two samples

	Ratio of enterprises with FX loans	Ratio of enterprises with FX loans (modified definition)	Ratio of firms directly exposed to exchange rate changes	Ratio of firms managing FX risk if there is exposure	Total
Survey 2005	14.8 %	14.8 %	49.3 %	26.3 %	513
Survey 2007	59.0 %	25.4 %	62.9 %	39.6 %	593
Total	38.5 %	20.8 %	56.6 %	34.9 %	1106
Number of observations	1106	1106	1106	680	

Table 4 shows the description of financial variables in the two samples. From the means it can be seen that enterprises in the second survey are significantly bigger in terms of balance sheet total, income and employees. The mean ratio of foreign ownership, export revenues to total revenues and long term indebtedness is also larger in the 2007 survey than two years before. Surprisingly though, the profitability ratios are much lower, as well as liquidity of the enterprises.

Table 4: Description of variables by survey date (mean values)

variable	Survey 2005	Survey 2007	Total
Balance sheet total	311 741	2 265 997	1 359 547
Net revenues	429 072	3 210 570	1 920 418
Number of employees	20	58	40
Foreign ownership	9	19	14
Ratio of export revenues	8	12	10
RoA	5	0	2
Profit margin	2	1	2
Leverage	64	77	71
Ratio of long term debt	19	32	26

In the estimations, the following dependent variables were used:

- the firm has FX debt, measured in two ways:
  - D_devhit=1 if the firm had an FX debt based on accounting data in 2005 survey and based on attitude questions in 2007 survey,
  - D_devhit_2007q=1 if the firm had an FX debt based on accounting data in both surveys, 0 otherwise.
- the firm has currency mismatch (D_exp), measured by attitude questions.
- the firm uses FX risk management tools, where D_fedez1=1 if the interviewee stated they hedge their exchange rate exposure using derivatives or natural hedging.

The explanatory variables are basically the same as in the 2007 survey, if they were available for both surveys. **d_2007** is a dummy variable, equal to 1 for the data of the 2007 survey. If this coefficient is significant, then there is a difference between the two surveys, even after controlling for firm-specific variables.

The results of the estimations are below:

Table 5: Pooled probit estimation results on the common sample

	D_devhit	D_devhit_2007q	D_fedez1	D_exp
Constant	**-1.06*** (0.21)**	**-1.42*** (0.22)**	**-1.20*** (0.34)**	**-0.56*** (0.19)**
d_2007	**1.52*** (0.10)**	0.16 (0.10)	-0.01 (0.13)	**0.16* (0.09)**
Size: small	**0.20* (0.11)**	**0.20* (0.11)**	**0.29* (0.15)**	**0.42*** (0.10)**
Size: medium	**0.26** (0.13)**	**0.31** (0.12)**	**0.66*** (0.17)**	**0.49*** (0.12)**
Industry: manufacturing	-0.09 (0.18)	0.004 (0.18)	-0.004 (0.25)	**0.43* (0.16)**
Industry: services	**-0.30* (0.17)**	-0.05 (0.17)	0.25 (0.24)	0.17 (0.16)
Industry: construction	**-0.34* (0.20)**	-0.22 (0.22)	0.18 (0.30)	-0.22 (0.19)
Age	0.02 (0.03)	0.03 (0.03)	0.0008 (0.05)	0.02 (0.02)
Age*age	**-0.002* (0.001)**	-0.001 (0.001)	0.0001 (0.002)	**-0.002* (0.001)**

	D_devhit	D_devhit_2007q	D_fedez1	D_exp
Foreign ownership	**0.003** **(0.001)**	**0.01*** **(0.001)**	**0.004**** **(0.006)**	**0.007*** **(0.001)**
Ratio of export revenues	**0.01*** **(0.002)**	**0.01*** **(0.002)**	**0.004**** **(0.002)**	
Profitmargin	0.005 (0.003)	-0.0002 (0.002)	0.002 (0.006)	0.005 (0.003)
Profitmargin*profitmargin	**0.00002*** **(0.00001)**		-0.0002 (0.0002)	**0.00002*** **(0.00001)**
Leverage	0.0001 (0.0002)	-0.00004 (0.0002)	0.0001 (0.002)	-0.0002 (0.0002)
Liquidity	0.00002 (0.00004)	-0.00002 (0.00005)	0.00002 (0.00005)	0.0001 (0.0001)
Obs.	1086	806	616	1086
Log likelihood	-540.17	-362.85	-352.02	-669.49
Pseudo R2	0.27	0.22	0.09	0.10

Note: ***, **, * refer to statistical significance at 1%, 5 % and 10 % level, respectively. Standard errors are in parenthesis.

D_fedez1: 2005-ben nagyon alacsony 1-es érték!

As far as the probability of having an FX debt is concerned, there is a significant increase in it, even after controlling for the firm-specific data. Nevertheless, there is no increase in case the measurement method is equalised in the two surveys. The main, significant explanatory variables are basically the same as those of the 2007 survey: firm size, export revenues, and in this case foreign ownership are positively correlated with the probability of having an FX debt, while the quadratic form of the firm age is negatively. Profitability and long term debt ratio was not significant in these estimations.

As far as FX risk management activity is concerned, there is no difference between the two surveys, thus, FX risk management did not improve during the two years between the surveys. As to the firm characteristics, size, foreign ownership and export revenues are positively correlated with the probability of managing FX risks is also significant in these equations. Surprisingly though, age and profitability do not play a role in explaining this dependent variable.

The probability to have an exchange rate exposure increased significantly from 2005 to 2007. This probability is positively related to firm size and foreign ownership, and a negative function of the quadratic form of the firm age.

6. Conclusion

On the basis of the literature on financial crises, it can be said that small open economies are more exposed to exchange rate changes, and that in emerging countries devaluation often has negative effects. One of the main reasons behind this is dollarisation leading to currency mismatches. As in Hungary dollarisation of liabilities is increasing not only in case of exporting large firms but also in the retail sector, potential risks have to be examined.

A survey was prepared among SMEs in 2005, reflecting the low FX risk awareness of enterprises and the prevalence of unhedged FX debt. Nevertheless, several questions were raised by the survey or remained unanswered. Besides SMEs, large enterprises were also of interest. The

reasons behind raising FX debt and the low risk-awareness of firms, as well as the effects of the increased exchange rate volatility and its effect on the behaviour of firms also needed investigation. Because of these aspects, a new survey was carried out in 2007.

This survey contained several questions concerning FX indebtedness. It revealed that both SMEs and large enterprises raise FX debt to a large degree, and FX loans are more dominant among long term loans and investment loans than HUF debt. The main motivation to choose a foreign currency loan is interest rate difference, but in case of large enterprises, natural hedging also plays a role. Nevertheless, several enterprises do not raise an FX loan even if it could serve as a natural hedging tool, while others use it to finance FX expenditures. FX loans could contribute to the easing of financial constraints and to the increase of indebtedness.

Data on exchange rate exposure are difficult to collect and the data quality collected in this survey is far from perfect. The measured exchange rate exposure is presumably biased towards zero, due to the fact that the majority of enterprises do not keep track of their FX positions. Based on the data received, however, firms are more exposed to exchange rate depreciation than to appreciation, at least as far as the ratio of loss-making enterprises is concerned. Since the effect of exchange rate changes on the average profit ratio of enterprises could be misleading, hiding the distribution of the exchange rate sensitivity, the ratio of loss-making firms is used as a proxy of exchange rate exposure on the aggregate level. Based on these numbers, unexpected and long lasting depreciations would increase the ratio of loss-making enterprises significantly, both in the whole sample and among the debtors of banks.

As far as exchange rate risk is concerned, a major part of enterprises think about it as an external factor that cannot be dealt with. They think a solution to decrease FX risk should come from an external source, FX risks can be decreased only to a small degree, and that the available FX risk management tools are too expensive or complicated.

The credit risk of the banking system may be indirectly derived from the above results. The survey indicated that a shift in the exchange rate can produce an unexpected effect on domestic enterprises through two channels: directly through foreign exchange debt and indirectly through other foreign exchange items. Several enterprises underestimate their foreign exchange exposure and do not use any conscious risk management techniques. The analyses did confirm, however, that a possible weakening of the exchange rate would generally adversely affect the SMEs and large enterprises as well. In addition to the rising credit loss of the banking system, this would likely result in a significant fall in aggregate credit demand and demand for foreign exchange loans.

As further research, it would be interesting to examine the motives behind long term loans being more foreign currency ones than domestic currency ones. Also, the degree of dollarisation in contracts with domestic consumers and suppliers, its motives and consequences would need further investigation. From policy point of view, the exchange rate risk awareness of Hungarian enterprises should be increased to decrease potential unexpected losses of firms.

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