Borrowing in Foreign Currency: Austrian Households as Carry Traders

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Abstract

Household borrowing in a foreign currency is a widespread phenomenon in Austria. Twelve percent of Austrian households report their housing loan to be denominated in either Swiss franc or Japanese yen for example. Yet, despite its importance, peculiar character, and immediate policy concerns, we know too little about the attitudes and characteristics of the households involved in this type of carry trade.

We analyze a uniquely detailed financial wealth survey of 2,556 Austrian households to sketch a comprehensive profile of the attitudes and characteristics of the households involved. We employ both univariate tests and multivariate multinomial logit models.

The survey data suggests that risk-loving, wealthy, and married households are more likely to take a housing loan in a foreign currency. High-income households are more likely to take a housing loan in general. These findings may partially assuage policy concerns about household default risk on foreign-currency housing loans.

Keywords: foreign currency borrowing, mortgages, banking sector, Austria, Swiss francs.

JEL: G21, G15, F34, F37.

I. Introduction

Investors borrowing in a low-yielding currency and investing in a high-yielding one, in a so-called "carry trade", are now a widespread phenomenon. Galati, Heath, and McGuire (2007) for example estimate that the Swiss franc-denominated global claims, which likely reflect the amounts of money in carry trade, reached a staggering $ 678 billion in the first quarter of 2007, almost double the estimated 2006 Gross Domestic Product for Switzerland.

While large financial institutions and leveraged institutions, such as hedge funds, have been traditionally the main parties in most carry trades, in some countries carry trade activity is now also widespread among households. In Austria, for example, twelve percent of households report their housing loan to be denominated in foreign currency, mostly Swiss franc and Japanese yen.

The choice of the Swiss franc for a housing loan is especially peculiar, as Austria adopted the euro immediately in 1999. 320 million people currently use the euro as legal tender, less than 8 million people the Swiss franc. Hence, an Austrian household taking a housing loan in Swiss franc is in this respect like a Minnesota household getting a loan in Canadian dollar, a phenomenon one could dub a "dollarization-in-reverse".

What makes this widespread borrowing in Swiss franc further noteworthy is that Austrian households, which are otherwise known to be conservative investors, willingly take extra risks through other novel features of Swiss franc loans, such as its variable interest rate and a repayment vehicle often invested in equity.

The concern about "household carry traders" being less sophisticated than the real ones is therefore not without grounds. "Typical [institutional] carry trade investors are steeped in the complexities of currency risk and far more likely to protect themselves when engaging in currency bets than ordinary borrowers" (Perry (2007)). If indeed financially illiterate and exposed, Austrian household carry traders may pose an immediate and systematic credit risk to the lending institutions, should an unexpected and sharp appreciation of the Swiss franc coincide with a drop in returns on the underlying equity repayment vehicle of the loan, for example, a scenario that is not too farfetched but with potentially thorny cross-border policy implications. In addition, these carry traders may also be jeopardizing their comfortable retirements (as in Lusardi and Mitchell (2007) for example) – possibly an Austrian governmental policy concern.

Yet, despite their widespread presence, peculiar character, and related policy concerns, very little is known about the main agents in the household carry trade. This paper aims to fill this gap, in two ways. First, we draw upon existing sources to sketch a comprehensive profile of the parties and contracts involved in a typical Austrian household carry trade. Second, we analyze data from a uniquely detailed 2004 financial wealth survey of 2,556 Austrian households to determine how financially educated, risk averse and wealthy for example the household carry traders are. We employ both univariate tests and multivariate (multinomial) logit models to analyze the correspondence between household borrowing and the households' attitudes and characteristics.

We find an interesting pattern in the configurations of parties and contracts involved in the Austrian household carry trades. In particular, financial advisors that

are not directly connected to any of the credit granting institutions seemingly play a important role in arranging some of the contracts. Despite the role of these financial advisors, the survey data nevertheless suggests that risk-loving, wealthy, and married households are more likely to take a housing loan in a foreign currency. High-income households are more likely to take a housing loan in general. These findings therefore may partially assuage policy concerns about household default risk on foreign currency loans.

We organize the rest of the paper as follows. Section II first describes the recent developments and main features of foreign currency household loans in Austria; it then discusses the role of the banks and financial advisors in this household carry trade, and finally turns its attention to its main players, the households. Section III describes the data and our empirical methodology. Section IV discusses the results and Section V concludes.

II. Austrian Household Carry trades

A. Household Loans in Foreign Currency

Loans to Austrian households in foreign currency have been growing rapidly since the late 1980s and are now a widespread phenomenon (Figure 1). By the end of 2007, more than є 32 billion ($ 50 billion) were outstanding in loans to Austrian households in foreign currency, almost 30 percent of the total amount of loans that were made to Austrian households (Figure 1, Top Panel).

[Figure 1 around here]

From the late 1980s to late 2006, annual growth rates of household loans in foreign currency exceeded growth rates of household loans in domestic currency by far, except during a few months in the late 1980s and early 1990s (Figure 1, Middle Panel). Between 1995 and 1999, the amount of household loans in foreign currency practically doubled every year, rising from about є 480 million in early 1995 to almost є 13 billion at the end of 1999. Since late 2006, loans in foreign currency are becoming somewhat less popular. Loans to households in Swiss franc are by far the most common, accounting for more than 95 percent of all household loans in foreign currency (Figure 1, Bottom Panel).

Besides many standard features, these household loans have a few rather peculiar characteristics (Würz and Hubmer (2006), Tzanninis (2005)). A typical foreign currency loan to an Austrian household is predominantly used for purchasing a house and has a size of about EUR 100,000; has a maturity of between 15 and 25

years; is secured by real estate collateral but has a lower loan-to-value ratio (usually 70%) than a comparable euro-denominated loan; it usually also has a variable interest rate that is set at a spread of around 150 basis points above the 3-month LIBOR of the respective loan currency and repriced every three months; is a balloon loan (involving monthly payments of interest only, with full principal repaid at maturity); offers the borrower the option to switch to another currency (including the euro) at contractually specified roll-over dates (usually the repricing dates) for a fee; has forced conversion clauses, allowing the bank to convert the loan into a euro loan at any time without the borrower's consent; and is usually coupled with a repayment vehicle (usually a life insurance contract or a mutual fund) to which monthly payments are made and which is to be used to repay the principal at maturity.

We now describe the main parties in the market for household loans in foreign currency. We focus our discussion on the housing loans in Swiss franc. This type of loans is the most prevalent and a description of their main characteristics can be reasonably well pieced together from the various sources we had access to. We first briefly discuss the supply by banks of Swiss franc housing loans and then describe the role of the financial advisors as brokers. The main focus of this discussion and our subsequent empirical analysis will be on the households, however, as it is their demand that seems to be driving this market.

B. Supply by Banks

Banks claim that the market for Swiss franc housing loans is actually very demand-driven and that the intensity of competition in the Austrian banking sector does *not* allow them *not* to offer Swiss franc housing loans (Jetzer (2005)). This claim

is consistent with the findings of Tzanninis (2005) and the observation by Boss (2003), p. 45, that intermediation spreads[1] in the Austrian banking sector are lower in foreign currency lending (110 to 140 basis points) than in domestic currency lending (200 to 400 basis points). However, banks' claims could also be partly self-serving. To minimize legal and reputational risks, banks indeed need to be very careful not to be seen pushing Swiss franc loans and allege especially to worry about the possible legal actions of the many debtors if these loans turn out to be a bad investment (Boss (2003)).

Besides worrying about the legal issues in offering Swiss franc housing loans, Austrian banks also face a potential currency mismatch between these loans and their deposits that are mainly in euros. To refinance their Swiss-franc loans, Austrian banks are relying mainly on Swiss-franc-denominated interbank loans, issuance of Swiss-franc-denominated securities, or off-balance-sheet transactions denominated in that currency (e.g. currency swaps). For large banks, such refinancing may have turned out to be actually less expensive than attracting more core deposits (Boss (2003)). But for the many banks in Vorarlberg and Tyrol for example (where Swiss franc borrowing is most widespread) that are small and not rated themselves, interbank borrowing can be a more expensive or less accessible source of funding than core deposits. The few foreign banks that are also sourced in Swiss franc are not major providers of Swiss franc housing loans. Securitization of Swiss franc loans is also not a viable option as there is simply no demand for it.

[1] The intermediation spread is defined as the difference between the average interest rate charged on lending to non-banks and the average rate charged on interest-bearing liabilities (interbank deposits, customer deposits, own securities issued).

Banks also need to deal with the currency-risk-induced credit risk embedded in the Swiss franc housing loans. As mentioned, most Swiss franc loan contracts allow banks to force conversion into the euro, an option banks will use if the borrower cannot afford the loan any more (for example, in case the household's income dropped). Surprisingly, exchange rate fluctuations are not that important in this context. A few years ago, for example, when the appreciation of the yen against the euro led to widespread losses for the households and – consequently – increases in credit risk for the banks, industry observers noted that banks rarely triggered the conversion clause on any of the many yen loans they then had in their portfolios. Forced conversion – it is widely recognized – gives rise to problems in practice as borrowers may contest the banks' assessment and expectations about the current and future macro-economic conditions. And unless the borrower is in a distressed – and hence weakened – position, the banks may be unwilling to go through this trouble.

C. Brokerage by Independent Financial Advisors

In contrast to banks, independent financial advisors and financial advisory firms (like AWD) seemingly market Swiss franc loans more actively to bolster and sustain household demand (Boss (2003); Tzanninis (2005)). Data from the 2004 financial wealth survey of Austrian households for example (we will describe the survey in more detail later and employ it in our empirical investigation) suggests that independent financial advisors are an important source of information on financial matters for households that have taken out foreign currency loans. 27 percent of households with a foreign currency loan mentioned independent financial advisors as one of their information sources on financial matters, compared to only 13 percent of

households that have taken out a loan in euros. Households with foreign currency loans consult their bank only slightly less often (86 percent) than households with a euro loan (88 percent).

Why are independent financial advisors apparently less apprehensive about pushing Swiss franc loans, because – as banks – advisors are also liable for their advice?[2] The sales commissions involved may provide an explanation. Indeed, independent financial advisors receive sales commissions also on the repayment vehicles (in particular those based on life insurance products) that underpin most Swiss franc loans. These may provide the advisors with monetary incentives to prefer pushing Swiss franc loans. Often it is not even possible to amortize Swiss franc loans in a regular way, especially not (and this should therefore not come as a surprise) when obtaining these loans through independent financial advisors, a study by the *Bundesministerium für Soziales und Konsumentenschutz* suggests (BMSK (2007)).

How can independent financial advisors actually push Swiss franc loans? The way independent financial advisors operate in general may determine the choice households make. It is not clear whether independent financial advisors usually include an all-in-cost comparison of euro and Swiss franc loans. If financial advice focuses only on the nominal interest rate differential, this may have convinced households to borrow in Swiss franc, as Swiss franc loans will always have appeared cheaper.

D. Demand by Households

[2] Though admittedly, as the loans are eventually taken from the banks, it seems not easy to separate the banks entirely from the independent financial advisors in this "game".

1. Reasons for Carry Trade

a) Interest Rate

One of the main reasons for the attractiveness of Swiss franc loans appears to be that interest rates on such loans have been lower than comparable interest rates in euro (and its predecessor currencies) during most of the recent past (Abele and Schäfer (2003), Boss (2003), Tzanninis (2005)). In addition, the exchange rate of the franc *vis-à-vis* the euro (and the currencies of the *Deutsche Mark* block) has been — and is still perceived to be — quasi-fixed. This perception is not surprising given that the volatility of the franc/euro exchange rate has been very low for a protracted period of time (compared to other exchange rates in the same or other time periods). Studying the fundamental determinants of the demand for foreign currency loans in Austria over the period 1987-2004, Tzanninis (2005) finds that positive Austrian-Swiss and Austrian-Japanese interest rate differentials and expectations of mean-reverting Swiss franc and Japanese yen exchange rates have indeed played a major role in the growth of such loans.

As Austrian households taking a housing loan in Swiss franc indeed borrow in a low interest rate currency to "invest" (in housing) in a higher yielding one (the euro), and as household currency exposure is in principle always reversible thanks to the currency switching option, Austrian households have been and still are essentially

operating as carry traders.[3] However, they may lack the required financial sophistication to succeed in their "currency bet".

b) Repayment Vehicle

There are indeed some grounds for concern in this regard. Households may have been injudiciously attracted by the combination of the Swiss franc loan and the underlying repayment vehicle. Observers reckon households are unable to discern the composing financial parts of the loan and therefore view the resulting "structured product" as a kind of "auto-amortizing mortgage", whereby the savings in interest payments and the higher expected returns from the repayment vehicle are themselves providing the resources to amortize the loan.

At the end of June 2007, more than 70% of foreign currency loans to households were indeed balloon loans coupled to a repayment vehicle (Lamatsch (2007)). And foreign currency loans with a remaining maturity exceeding ten years actually almost always feature an underlying repayment vehicle (see Figure 2 and Zöllner and Schubert (2007), p. 17). Unfortunately there is no information available on the typical currency of the repayment vehicle. One would need to know which mutual funds are part of the repayment vehicle, for example, and the currency split of the investments of these funds. This information was not solicited in the 2004 financial wealth survey and seems not available elsewhere.

[Figure 2 around here]

[3] The 2004 financial wealth survey unfortunately does not contain any information on the currency of denomination of the surveyed households' financial assets. However, any home bias implies that

Though repayment vehicles are also possible on euro loans, they are rarely used in practice. Only 5% of euro loans to households were balloon loans coupled to a repayment vehicle (Lamatsch (2007)). One reason may be that such balloon euro loans (with or without repayment vehicle) are more expensive than comparable amortizing euro loans. Another reason could be that households regard balloon euro loans with repayment vehicle as more risky than comparable foreign currency loans, in the sense that to achieve similar returns as with foreign currency loans, they figure they would need to invest directly in even more risky assets. Here again a worrying lack of financial sophistication might be at play.

c) Fees and Loan Currency

Fees may have an impact on, if not the choice of the loan currency, then at least the amount borrowed in foreign currency. Regular bank fees seem not higher on Swiss franc loans than on euro loans for comparable services, various surveys run by the *Arbeiterkammer Wien* suggest.[4] But the "catch" seems to be the various fees and commissions on all the foreign currency components of the transaction, e.g., the currency conversion fee paid each time interest or amortization payments are made, the fixed fee of having an underlying foreign currency bank account in addition to the regular account in euros, or the fee for switching currencies. Back-of-the-envelope calculations suggest these additional fees may make it unprofitable for borrowers to

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households will invest relatively more in the domestic, higher yielding currency (euro).

[4] See Prantner (2005) and Kollmann and Prantner (2006) for example.

obtain loans of less than 73,000 euros and 20 years duration in Swiss franc (Prantner (2005)).

Fees have been relatively constant for some years now. Earlier in time the variability in fees was more pronounced on Swiss franc loans. Changes occur more often in fees that are either somewhat hidden to and/or conditional on the state of the borrower. Banks are often willing to negotiate both the fees and the spread over the LIBOR over a wide range.

d) Herding

In sum, Austrian households seemingly engage in some form of carry trade, placing a bet on the Swiss franc, lured by the underlying repayment vehicle and possibly partly unaware of all future fees involved. Questions can therefore be raised about the households' ability to understand and bear the risks involved, even more so because one of the explanations for the rapid growth of Swiss franc loans in Austria is herd behavior (Waschiczek (2002)).

The practice of taking out foreign currency loans started in Vorarlberg, the Austrian federal state bordering Switzerland, where tens of thousands of Austrians commute to work in Switzerland and Liechtenstein. Not surprisingly, most foreign currency loans are in Swiss franc. Already at the end of the 1980s, the share of foreign currency loans in total household loans was around 5% in Vorarlberg, while it was a mere 0.2% in Austria as a whole (Waschiczek (2002), p. 85). Even then it was clear that more than just those households that received part of their income in Swiss franc (because of cross-border business) were engaged in Swiss franc borrowing.

From around 1995 on, the phenomenon started to spread eastwards within Austria (Tzanninis (2005)) and this pattern of geographical diffusion is not inconsistent with herding, exacerbating potential concerns one may have about the positions Austrian households are taking. Tzanninis (2005) concludes that the rapid spread of foreign currency loans among households after 1995 seems to reflect to a significant extent herd behavior.

2. *Qualifications*

a) Interest Rate Arbitrage

A number of qualifications on the potential riskiness of these carry trade "bets" are in order, however. According to Abele and Schäfer (2003), for example, the differential between three-month euro and Swiss franc interest rates (LIBOR) has on average been 1 to 1.7 percentage points higher than the average annual appreciation of the franc over the past 30 years, making a loan in Swiss franc rational arbitrage, at least *ex post*. Even the (credit) spread over the reference interest rate that is being paid by borrowers may be lower on Swiss franc loans than on domestic currency loans (Abele and Schäfer (2003), pp. 23-24 and p. 45).[5]

Ultimately it seems that taking a Swiss franc loan is taking a bet on a *de facto* fixed exchange rate regime. Reinhart and Rogoff (2004), for example, classify Switzerland's exchange rate regime as a *de facto* moving band around the *Deutsche Mark* / euro, with a band width of +/- 2 percent. In recent years the Swiss franc has

[5] Though numbers released by the *Oesterreichische Nationalbank* seem not to confirm this spread differential (*OeNB Press Release* of October 16th, 2003).

actually even been depreciating *vis-à-vis* the euro, pushing existing carry trade bets even deeper into the money.

b) Currency Switching Option and Collateralization

Further qualifying the classification of all Swiss franc loans taken out by Austrian households as ill-conceived bets is the presence in the loan contracts of a currency switching option allowing conversion to euros at the contractually specified roll-over date. It is not entirely clear, however, how common this option is. In the earlier cited study by the *Bundesministerium für Soziales und Konsumentenschutz* (BMSK (2007)), for example, the currency switching option is reported to be available in only 14 out of the 25 analyzed contracts, and in five out of these contracts conversion itself is actually dependent on the bank's consent and hence potentially less valuable.

On the other hand, Dlaska (2002), Boss (2003) and conversations with an experienced industry observer suggest that the currency switching option is common (though not legally mandatory). Currency switching seems to occur often at the contractually specified roll-over dates. Switching fees seem not excessive and in line with common foreign exchange transactions (though fee structures vary considerably among lenders, see Kollmann and Prantner (2006)). Switching further seems almost tax neutral and switching was never perceived to be a problem until now, except in the rare case borrowers would want to switch to another carry trade currency and in the eyes of the financiers would take on excessive risk. Remember also that forced conversion clauses allow the bank to convert the loan into a euro loan at any time without the borrower's consent.

Though we lack precise data on actual switching behavior, the bottom panel of Figure 1 suggests that households in aggregate switched away from Japanese yen loans between October 2002 (the start of available data) and May 2007. During this period, characterized by a depreciation of the yen against the euro of about 30%, the euro amount of yen loans outstanding dropped by more than 90%, from over 50% of total foreign currency loans to just below 3%. While part of this drop is a mechanical consequence of the yen depreciation and another part might be due to maturing loans, the major part of the decline must be due to currency switching. Still, it is possible that Austrian households do not switch currency often enough because of the switching fees. Exchange rate volatility and interest rate volatility make the option to delay switching also valuable. But sluggish switching may also be an incorrect financial decision made by the households. Lack of financial education may be a potential cause (see Campbell (2006) on the optimal refinancing of fixed rate mortgages by US households).

Foreign currency loans usually have higher collateral requirements than comparable euro loans (Dlaska (2002), p. 878; Boss (2003), p. 18). While the types of collateral required are similar, loan-to-value ratios tend to differ: they are around 30% for foreign currency loans and around 20% for euro loans. In addition, banks usually grant a foreign currency loan only under the condition that the borrower is also able to service a euro loan of similar size.

c) Not Only Herding

It is also not clear that herding is a major factor in the popularity of Swiss franc loans in Austria. For example, households that take out foreign currency loans spend

more time comparing the different financing possibilities, seem better educated , and mention friends and colleagues significantly less often (28 percent) as an information source than households with a traditional euro housing loan (46 percent), a recent study shows (market-Institut (2003)).

In addition, recent household borrowing in Swiss franc not only in Germany and France,[6] but also in countries that have no border with Switzerland, such as Denmark (Bernstein (2007)), Greece (Perry (2007)), Hungary, Poland, the Czech Republic and Slovakia for example (Saunders (2007)), suggests other drivers may also be at work.[7] In the case of the central and eastern European countries, some Austrian banks may actually have played a role in spreading the loans in Swiss franc.

d) Neutral Taxation

Finally, it also important to note that taxation seems to play an almost neutral role in the choice of loan currency, such that foreign currency borrowing by households in Austria is not merely an unintended consequence of some tax regulation.

Deduction of interest rate payments is not possible in Austria if a house was bought for private purposes. In addition, the notional rental value is not taxed. Expenses for building or other home-related expenses can be tax relevant as special expenses. If the notional rental value of an owner-occupied residential property is taxed as income but interest payments on loans can be deducted from income, as is

[6] Total loans denominated in Swiss franc to domestic non-monetary financial institutions for end-2007, in billion Swiss francs: Austria: 68.9, Germany: 35.3, France: 22.7 (Source: central bank websites).
[7] During the 1980s mortgages in Swiss franc (and Japanese yen) were also common in the UK, but the depreciation of the sterling ended their popularity, painfully for some households (Saunders (2007)).

the case in Switzerland for example, homeowners may have an incentive to obtain mortgages with interest payments that are greater than or equal to the notional rental value. In that case, higher household income and likelihood of owning a home may go hand in hand with a higher likelihood of obtaining a housing loan.

Housing subsidies are important in Austria, but are often granted irrespective of the choice of loan currency. In some federal states (*Bundesländer*) though, housing subsidies may be given in form of a low interest rate loan in euros. The effect on household demand for Swiss franc loans may therefore be ambiguous, increasing household possibilities to invest in housing while reducing the attractiveness of a foreign currency loan *per se* as seemingly cheap financing in euros is available.

Taxation is further neutral regarding the repayment vehicles that can be used. Not only mutual funds but also life insurance products can be employed, and capital income from the latter set of products remains exempt from taxation. On the other hand, gains stemming from exchange rate changes are taxable, but only if conversion occurs within one year after the loan was taken out. But if the loan was taken out to finance property that is subsequently rented, changes in the interest payment will have an impact on the tax payments by the household. To conclude, it seems difficult to argue that taxation is a strong unidirectional factor determining the choice of loan currency.

3. Concerns Nevertheless

The strong demand for Swiss franc loans in Austria may be driven by the interest differential between Swiss franc and euro borrowing, which for extended

periods of time now has made Swiss franc borrowing an act of rational arbitrage, at least *ex post*.

However, the somewhat murky role financial advisors played in the sales process, the suspicion that households may lack the necessary financial education to separate the loan from its repayment vehicle and recognize all future fees, and a geographical diffusion in Austria not incompatible with herding seem to necessitate further research into the characteristics of the borrowers involved in this peculiar Austrian household carry trade.

This paper therefore analyzes a recent survey on Austrian households' financial decisions.

III. Data and Empirical Model

A. Data

Our sample is drawn from an existing survey about Austrian households' financial wealth that was commissioned by the *Oesterreichische Nationalbank* (OeNB) and conducted by the market research institute *FESSEL-GfK* during the summer and fall of 2004.[8] The purpose of the survey was to gather micro data on private households' financial wealth, investment, and debt. The survey consisted of a 15-page questionnaire containing 87 questions about households' socio-demographic characteristics; types, amounts, and sources of asset and debt holdings; information sources about financial market topics; and attitudes towards, and knowledge of, financial market issues.

Households were stratified by federal state, except for Vienna where households were stratified by the 23 political districts. The survey was carried out through a mix of face-to-face and written interviews. The interview partner was the household head or the household member with the most accurate knowledge about the household's finances. Analyzable data sets from 2,556 households were compiled, corresponding to a response rate of 54.9 percent (1,026 of 1,869 households) for Vienna and 63.5% (1,530 of 2,408 households) for the remaining eight federal states.

[8] For more details about this survey, see Beer, Mooslechner, Schürz, and Wagner (2006).

B. Loan Type as Dependent Variable

Households taking the survey report their outstanding loans. We categorize the 2,556 sample households into six groups according to the type of loan they report (Figure 3).

[Figure 3 around here]

First, we distinguish households that have a loan from those that do not. Then, among the borrowers, we distinguish those that have a housing loan from those that have taken out another type of loan. Finally, among those reporting a housing loan, we distinguish those with a housing loan denominated in euros from those with a housing loan denominated in foreign currency.

A few households have more than one type of loan and can thus be assigned to more than one of these categories. Figure 3 implies that 103 households have both a housing loan and also another type of loan, and 40 households have both a housing loan in euro and a housing loan in foreign currency. In the following empirical investigation, the number of observations used is 2,699 (=2,556+103+40) but multiple observations for a single household are appropriately down-weighted. Randomly retaining only one observation per household does not alter our findings.

Our dependent variable is the choice by the household of one of the four branch ends in Figure 3. These categories are: (1) No Loan, (2) Other Loan, (3) Housing Loan in Euros, and (4) Housing Loan in Foreign Currency.[9]

C. Multinomial Logit Model

This dependent variable is categorical, but the categories cannot be ordered in any directly meaningful way. In addition, our explanatory variables comprise only household characteristics, and do not include variables specific to the options being chosen. We therefore opt for the multinomial logistic regression (or multinomial logit) model and pick the Housing Loan in Euros as the comparison category. For household *i* the choice model for the loan type can consequently be written as:

$$\Pr(y_i = j) = p_j = \frac{\exp(X_i \beta_j)}{\sum_{k=1}^{4} \exp(X_i \beta_k)}, \text{ for } j = 1,...,4 . \quad (1)$$

β_4 can be set equal to the zero vector as a normalization and thus:

$$\Pr(y_i = 4) = p_4 = \frac{1}{\sum_{k=1}^{4} \exp(X_i \beta_k)} . \quad (2)$$

As a result, the jth log-odds ratio has the form:

$$\log \frac{p_j}{p_4} = X_i \beta_j , \; j = 1,...,3 . \quad (3)$$

[9] Other categorization schemes, such as splitting the Other Loan into Other Loan in Euro and Other Loan in Foreign Currency, or removing the Other Loan category altogether, for example, does not alter our main findings, suggesting no apparent violation of the independence of irrelevant alternatives assumption.

Given the non-linear form of the multinomial logit model, in the tables we will at once report the marginal effect of each covariate at its mean and at the mean of all other explanatory variables.

D. Household Characteristics as Explanatory Variables

The household characteristics we retain for this study can be grouped into a set of *subjective* and a set of *objective* variables. The subjective variables include those that rely on answers to questions about the financial education and risk-aversion of the interviewed main decision-maker in the household. The objective variables on the other hand are the answers to straightforward questions about location, income, wealth, age, marital status, household size, employment, and education. Most of the objective variables are commonly featured in studies estimating the household demand for debt (Crook (2006)) and are most likely also to influence the choice of loan type.[10]

1. Subjective Variables

a) Financial Education

The exact structure and wording of questions in surveys are important, especially when assessing subjective questions about financial saviness and risk-aversion. Hence we maintain the original structure and wording of the original questions in the definition of the variables we report in Table 1. We translated the original questions in German, a language all three co-authors of this study speak (to

[10] Following the seminal work by Campbell and Cocco (2003), papers that study the choice between fixed and adjustable rate mortgages feature household location, wealth, income, marital status, size, employment, and education, among other variables (see Paiella and Pozzolo (2007) for example).

varying degree of fluency), into English ourselves. Table 1 also indicates in the third column whether the answer to question pertains to the household, its head or its head and partner.

[Table 1 around here]

A first aspect of financial education is captured by *d(Indifferent)*, a dummy variable that equals zero if the surveyee likes to deal with financial issues and one if he or she does not. Notice that in order to maintain the structure and wording of the original question, but at the same time to facilitate coefficient interpretation, the variable definition is somewhat non-standard.

The dummy variable *d(Ignorant)* equals one if the surveyee agrees that he/she is not well informed about financial issues and fully relies on advice from the bank, and equals zero otherwise (i.e., if the surveyee does not agree with being uninformed).

A third financial saviness variable is *d(Negligent)*. This dummy variables equals one if the surveyee agrees with the statement that "once I have decided on an investment product I want to have to deal with it as little as possible – that's the bank's job", and equals zero if the surveyee does not agree.

Finally, a fourth financial saviness variable is *d(Passive)* which equals zero if the surveyee agrees always to look at various banks' offers to find the best product, and equals one if he/she does not agree with this statement.

The four financial saviness variables capture various aspects of the household's education and attitude towards financial products and decisions. If households act rationally and in accordance with their own self-assessment on this account, we

expect less financially "educated" households to avoid carry trades and hence housing loans in foreign currency.

These four variables measure quite different aspects of financial knowledge. The survey data show that the people surveyed do not answer these questions uniformly. For example 69% of those that like to deal with financial issues (i.e., are *not* indifferent), 60% of those that are *not* ignorant, and 68% of those that always look at various bank offers (i.e., are *not* passive) want to deal as little as possible with an investment product after they have decided on it (i.e., are negligent). Conversely, 56% of those that do not shop around for the best offer (i.e., are passive) and 60% of those that do not want to deal with an investment product after the initial decision (i.e., are negligent) like to deal with financial issues (i.e., are *not* indifferent). Not surprisingly therefore the Spearman correlation coefficients that are tabulated in Table 2 between the four financial education variables are very low.

[Table 2 around here]

b) Risk Aversion

Next we construct three measures for the household's aversion to risk. The dummy variable *d(Risk Aversion)* equals zero if the surveyee agrees with the statement "When I invest, a high return is more important to me than a lot of security," and equals one if the surveyee does not agree. *d(Bank Risk Aversion)* equals one if the surveyee thinks banks often grant loans too light-heartedly, and zero otherwise. Finally, *d(Stock Risk Aversion)* equals one if the surveyee thinks stock

investment is too risky and equals zero if the surveyee doesn't think so. In all cases risk-averse households may want to, and consequently be expected to, avoid carry trades through taking a housing loan in another currency than the euro.

As with the financial education variables, the risk aversion variables measure different dimensions of risk aversion. For example, 75% of those that do not think that investment in stocks is too risky (i.e., are stock risk loving) do not find that high return is more important than a lot of security (i.e. are risk averse). Table 2 shows that the variable *d(Bank Risk Aversion)* is only weakly correlated with the two other risk variables *d(Risk Aversion)* and *d(Stock Risk Aversion)*. Financial education and risk aversion variables in general are not very highly correlated.

2. *Objective Variables*

We also include a number of key objective variables in our multinomial logit models. A variable *Distance to Swiss Border* assigns a value to each province that is increasing in the distance to the border. In particular, the variable equals one for households that are located in the federal state of Vorarlberg, two for a location in Tyrol, three for Salzburg and Carinthia, four for Upper Austria and Styria, and five for Lower Austria, Vienna, and Burgenland. People living close to the border may have income in Swiss franc (e.g., because they work in Switzerland), making a loan in franc a natural hedge and not a carry trade *stricto sensu*. More banks may also offer loans in Swiss franc in the border region.

We further include the log of monthly *Income* and financial *Wealth*, both in euros. The correspondence between income and wealth may be complex. Higher-earning and richer households may be less likely to take a housing loan but, if really

wealthy, more likely to engage in carry trades when doing so. In a robustness check, we also introduce a dummy variable *d(Top Wealth Class)* that equals one if the financial wealth of the household is in the top 5 percentile and equals zero otherwise.

As control variables we also include *Age*, in years, *Age^2* to capture life-cycle savings dynamics, a dummy marital status variable *d(Married)*, the *Number of Children* younger than or equal to 14 years, and the *Number of Adults* in the household. A dummy *d(Civil Servant)* equals one if the household head or his/her partner is a civil servant and equals zero otherwise. On the other hand a dummy variable *d(Self-Employed)* equals one if the household head or his/her partner is self-employed and equals zero otherwise. Most civil servants have a safe source of income while most self-employed people face a more risky income stream. This may determine the willingness to undertake additional speculative carry trades. While self-employed people may also be more risk-loving by nature, risk aversion variation should be already captured by the three subjective risk-aversion variables. Finally, a variable *Education* equals one if the key household decision-maker has at most compulsory grammar school, equals two if at most high school, and equals three if his or her educational level is more than high school.

IV. Results and Discussion

A. Univariate Tests

Table 3 lists the means of the explanatory variables for all surveyed households as well as for the six categories depicted in Figure 3. The differences between the means at each of the three levels in the categorization tree are also indicated, together with the significance levels of a t-test of differences assuming unequal variances.

[Table 3 around here]

Though only univariate, the results are interesting *per se*. Households with a loan seem more financially educated and less risk-averse than those households who do not borrow. Borrowers further live somewhat closer to the Swiss border, receive 528 euros more in monthly income,[11] but have 4,620 euros less in wealth, are 13 percentage points more likely to contain a civil servant and 3 percentage points more likely to include a self-employed person. The reference person is on average 9 years younger, 15 percentage points more likely to be married, and has a better education. Theses households are also larger with 0.3 more children and 0.4 more adults.

Among those households that borrow, households with a housing loan seem more financially educated and possibly more risk-averse than those households with another loan. Households taking out a housing loan also live somewhat closer to the Swiss border, have 25,094 euros more in wealth, are 7 percentage points more likely

to be married, with 0.2 more children, and the household head is somewhat more educated.

Most interesting for our purpose is the comparison between households with a housing loan in euros and households with a housing loan in foreign currency. Foreign currency borrowers seem unambiguously less financially uneducated (less indifferent, ignorant, negligent and passive) and less risk-averse than euro borrowers. Foreign currency borrowers live significantly closer to the Swiss border, receive 543 euros more in monthly income, have 19,678 euros more in wealth. The household with a foreign currency loan is 6 percentage points more likely to contain a civil servant and 8 percentage points more likely to include a self-employed person, with 0.3 more children living in the household. Its head is somewhat more educated, 5 years younger and 20 percentage points more likely to be married.

To conclude, the Austrian households that obtain a housing loan in foreign currency are significantly more financially educated but less risk averse than any other category we consider. They also live closer to Switzerland, have a higher income, are more wealthy, younger, more likely to be married, with more children and more adults in the household, are more likely to be employed as civil servant or self-employed, and are more likely to be well educated than any other category. From a policy perspective this group seems better suited than any other to "engage in carry trades".

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[11] As we use the median values for each of the twenty income ranges indicated in the survey, the comparisons of the mean income for each of the loan categories are only indicative.

B. Multivariate Tests

We now investigate whether these univariate findings hold up in a multivariate setting. We focus on the category of households with a housing loan in foreign currency. For ease of assessment, Table 4 reports immediately the imputed partial derivative estimates from (multinomial) logit regressions of household characteristics on the choice of loan type.

Each estimated and reported partial derivative measures the change in probability of observing a given loan type, $\Pr(L)$, given a small change in a regressor, Z, holding all other variables constant at their sample means, $\overline{Z}$, i.e. the table reports $(\partial \Pr(L)/\partial Z)_{\overline{Z}}$.[12] Hence, as is common, we calculate the marginal effects at the mean as a good (asymptotically valid) approximation of the average marginal effects (Greene (1997), p. 876). For ease of interpretation and comparison we follow the same procedure for our dummy and categorical independent variables, as none of these variables describe different categories of a single variable (Bartus (2005)).

The sums of the estimated partial derivatives equal zero across the four loan types (No Loan, Other Loan, Housing Loan in Euros, Housing Loan in Foreign Currency) of the multinomial logit model because the sums of the probabilities must equal one. The number of observations used is 2,688.[13]

[12] For dummy variables, the reported marginal effects represent the change in probability of observing a given loan type following a change in the dummy variable from 0 to 1.
[13] When taking natural logarithms, we drop the 10 households—one of them possessing two types of loans— reporting zero wealth, resulting in a loss of 11 observations (i.e., 2,688=2699-11).

[Table 4 around here]

In Model I we feature all subjective financial education and risk-aversion measures; in Model II we retain only the *Indifference* and *Risk Aversion* variable (other variable line-ups give similar results). Given the focus of this paper we also report the results from a simple logit model (Model Ib) that isolates the currency choice for the housing loan. Here, the number of observations used is 740.[14]

Overall the results from simple multivariate exercises are consistent with the univariate tests, with a few qualifications. Low risk aversion makes it more likely that an Austrian household takes out a housing loan in foreign currency. Proximity to the Swiss border,[15] higher income, age, and marital status also make this choice more likely.

Notice that the estimates for the No Loan category can be readily compared to other findings in the literature. Households having a higher income, lower wealth, an older head, more children and more adults are more likely to take a loan, we find. Our results on income and household size are as such fully in line with most studies (Crook (2006), Table 3.4). While age seems mostly insignificant in other studies, wealth also sometimes has a negative sign.

[Table 5 around here]

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[14] When taking natural logarithms, we drop the 4 households reporting zero wealth among the 89 households with a housing loan in foreign currency and the 655 households with a housing loan in euro, resulting in 740 observations (i.e., 740=89+655-4).

[15] Replacing *Distance to Swiss Border* with regional dummies does not alter the coefficients on the other variables. The coefficients on the dummy variables themselves are suggestive of a decrease in Swiss franc borrowing with distance.

In Table 5 we replace the log of wealth by a dummy variable *d(Top Wealth Class)* that equals one if financial wealth of the household is in the top 5 percentile, and equals zero otherwise. Here, the logit results suggest that very wealthy households with a loan are 17 percent more likely to have a housing loan in foreign currency than a housing loan in euros.[16] Otherwise results are mostly unaffected: Austrian households that have low risk aversion, live close to the Swiss border, have higher income, age, and are married, are more likely to obtain a housing loan in foreign currency than households that have higher risk aversion, live farther from the Swiss border, have lower income, age, and are single.

Table 5 also features an additional assessment of economic relevancy of the estimated coefficients (the reported marginal effects of course allow already such an assessment). The bottom three rows of the table report the actual probabilities of each loan type (calculated from Table 3), the mean of the predicted probabilities when taking the household characteristics actually observed, and the mean of the predicted probabilities for a household that is risk loving, living in Vorarlberg, in the top 5% wealth bracket and married, but with otherwise mean characteristics. The probability of taking a housing loan in foreign currency for this subset of households increases from 3% to 48% and 37%, respectively, in the two multinomial logit models, and from 11% to 81% in the simple logit model.

[16] Austrians have become wealthier over the last few decades, possibly providing a partial explanation for the substantial growth in volume in foreign currency loans during the last fifteen years.

C. Discussion

Though seemingly robust as such, our results are subject to a number of obvious caveats. The data clearly does not allow us to disentangle demand and supply factors, and our multivariate model is a simple reduced-form. In addition, households without debt may never have applied for credit or may have been denied credit. Imposing somewhat more structure on the empirical model (though admittedly also *ad hoc*) by estimating a nested multinomial logit model – whereby the decision to have a loan is followed by a loan type decision and then a loan currency decision – does not alter our main findings.

Further, we only know that a household has taken out a loan but we do not know when. Hence, we cannot take into account differences in interest rates and exchange rates at the time the loan was taken, for example. Also the characteristics of the household may have changed since the loan was obtained. On the other hand, loan decisions are to some extent reversible or loans are convertible such that current household attributes may also matter. We leave to future research the further investigation of these potential drivers for the household to take out a housing loan in a foreign currency.

V. Conclusion

Twelve percent of Austrian households report their housing loan to be denominated in foreign currency, mostly Swiss franc and Japanese yen. Yet, despite its importance, peculiar character, and immediate policy concerns, we know too little about the attitudes and characteristics of the main agents in this Austrian carry trade.

We draw upon existing sources and analyze a uniquely detailed 2004 financial wealth survey of 2,556 Austrian households to sketch a comprehensive profile of the attitudes and characteristics of the parties involved in the Austrian household carry trades. We employ both univariate tests and multivariate (multinomial) logit regressions.

We find that despite the noteworthy role of financial advisors in arranging the Swiss franc loans, our survey data suggests that risk-loving, wealthy and married households are more likely to take a housing loan in a foreign currency. Financially informed or high-income households are more likely to take a housing loan in general. These findings therefore may partially assuage potential policy concerns about household credit risk.

TABLE 1. VARIABLE DEFINITIONS

This table lists Variable Names and Definitions.

Variable Name	Variable Definition	Subject
d(Indifferent)	0=I like to deal with financial issues; 1=Don't agree.	Head
d(Ignorant)	1=I am not well informed about financial issues – I fully rely on advice from my bank; 0=Don't agree.	Head
d(Negligent)	1=Once I have decided on an investment product I want to have to deal with it as little as possible – that's the bank's job; 0=Don't agree.	Head
d(Passive)	0=I always look at various banks' offers to find the best product; 1=Don't agree.	Head
d(Risk Aversion)	0=When I invest, a high return is more important to me than a lot of security; 1=Don't agree.	Head
d(Bank Risk Aversion)	1=Banks often grant loans too light-heartedly; 0=Don't agree.	Head
d(Stock Risk Aversion)	1=I think stock investment is too risky; 0=Don't agree.	Head
Distance to Swiss Border	1=Vorarlberg; 2=Tyrol; 3=Salzburg, Carinthia; 4=Upper Austria, Styria; 5=Lower Austria, Vienna, Burgenland.	Household
Income	Income, in euros (20 income ranges).	Household
Wealth	Gross financial assets, in euros. (= Current account holdings + Savings deposits, including deposits made under building loan contracts + Value of bonds + Value of stocks quoted on the stock exchange + Value of mutual fund shares (equity funds, bond funds, mixed funds, hedge funds, money market funds) + Value of holdings in enterprises + Accumulated payment of life insurance premia).	Household
d(Top Wealth Class)	1=Wealth in > 95% percentile; 0=Otherwise.	Household
Age	Age (in years).	Head
d(Married)	1=Married (or partnership); 0=Otherwise	Head
Number of Children	Number of children younger than or equal to 14 years.	Household
Number of Adults	Number of adults in the household.	Household
d(Civil Servant)	1=Civil servant; 0=Not a civil servant.	Head or Partner
d(Self-Employed)	1=Self-employed; 0=Not self-employed.	Head or Partner
Education	1=At most compulsary grammar school; 2=At most high school; 3=More than high school.	Head

TABLE 2. SPEARMAN CORRELATIONS BETWEEN FINANCIAL EDUCATION AND RISK AVERSION VARIABLES

This table lists the Spearman rank correlation coefficients between the financial education and risk aversions variables. The number of observations equals 2,556.

	d(Indifferent)	d(Ignorant)	d(Negligent)	d(Passive)	d(Risk Aversion)	d(Bank Risk Aversion)	d(Stock Risk Aversion)
d(Indifferent)	1						
d(Ignorant)	0.17	1					
d(Negligent)	0.08	0.24	1				
d(Passive)	0.14	0.16	0.09	1			
d(Risk Aversion)	0.04	0.03	0.08	0.06	1		
d(Bank Risk Aversion)	-0.02	0.03	0.02	-0.04	0.06	1	
d(Stock Risk Aversion)	0.04	0.11	0.11	0.00	0.10	0.03	1

TABLE 3. DESCRIPTIVE STATISTICS

This table lists the means of all variables for All surveyed Households and for the categories: households with Loans and without Loans, with Housing Loans and with Other Loans, and with Housing Loans in Euros and in other (foreign) currency. The definition of the variables can be found in Table 1. The differences between the means in the various categories are also indicated and the significance levels of a t-test of differences assuming unequal variances is also reported. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Mean	All Households	Loan	No Loan	Difference	Housing Loan	Other Loan	Difference	Housing L. in Euros	Housing L. in Forex	Difference
d(Indifferent)	0.382	0.321	0.420	-0.099 ***	0.298	0.369	-0.071 ***	0.297	0.259	0.038 ***
d(Ignorant)	0.559	0.533	0.575	-0.043 ***	0.533	0.552	-0.019 ***	0.543	0.429	0.114 ***
d(Negligent)	0.724	0.733	0.718	0.015 ***	0.729	0.754	-0.025 ***	0.740	0.618	0.122 ***
d(Passive)	0.514	0.462	0.548	-0.086 ***	0.470	0.469	0.001	0.481	0.446	0.035 ***
d(Risk Aversion)	0.820	0.788	0.841	-0.053 ***	0.803	0.757	0.046 ***	0.812	0.702	0.110 ***
d(Bank Risk Aversion)	0.778	0.736	0.805	-0.069 ***	0.750	0.688	0.062 ***	0.754	0.698	0.056 ***
d(Stock Risk Aversion)	0.829	0.809	0.841	-0.033 ***	0.794	0.862	-0.068 ***	0.799	0.737	0.062 ***
Distance to Swiss Border	4.114	4.025	4.171	-0.147 ***	3.915	4.283	-0.368 ***	3.941	3.186	0.755 ***
Income	2,470	2,793	2,265	528 ***	2,862	2,682	180 ***	2,834	3,377	-543 ***
Wealth	54,666	51,841	56,461	-4,620 ***	57,820	32,726	25,094 ***	55,448	75,126	-19,678 ***
d(Top Wealth Class)	0.050	0.033	0.061	-0.027 ***	0.038	0.014	0.024 ***	0.027	0.124	-0.097 ***
Age	50.7	44.9	54.3	-9.380 ***	45.2	44.4	0.799 ***	45.5	40.9	4.603 ***
d(Married)	0.595	0.685	0.538	0.147 ***	0.713	0.640	0.073 ***	0.700	0.895	-0.196 ***
Number of Children	0.412	0.611	0.286	0.325 ***	0.671	0.443	0.228 ***	0.663	0.973	-0.310 ***
Number of Adults	2.008	2.273	1.840	0.434 ***	2.326	2.190	0.135 ***	2.321	2.370	-0.049 ***
d(Civil Servant)	0.233	0.314	0.182	0.132 ***	0.314	0.312	0.002	0.312	0.366	-0.055 ***
d(Self-Employed)	0.108	0.123	0.098	0.025 ***	0.116	0.142	-0.026 ***	0.110	0.192	-0.082 ***
Education	1.988	2.045	1.952	0.093 ***	2.057	2.005	0.052 ***	2.045	2.136	-0.091 ***
Memo items:										
Loan Amount (in euros)	18,646	47,985	0	47,985 ***	59,437	27,035	32,402 ***	55,577	120,948	-65,371 ***
Number of Households	2,556	934	1,622		704	333		655	89	

TABLE 4. MULTIONOMIAL LOGIT AND SIMPLE LOGIT REGRESSIONS

This table reports imputed partial derivative estimates from the (multinomial) logit models of household characteristics on the choice of a loan. Each estimated partial derivative measures the change in probability of observing a given loan choice given a small change in a regressor (a change from 0 to 1 for dummy variables, respectively), holding the other variables constant, evaluated at the sample mean of the explanatory variables, i.e., $(\partial \Pr(R)/\partial Z)_{\bar{Z}}$. The definition of the variables can be found in Table 1. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Model	I. Multinomial Logit				Ib. Logit	II. Multinomial Logit			
Dependent Variable	No Loan	Other Loan	Housing L. in Euros	Housing L. in Forex	Housing L. in Forex vs Euro	No Loan	Other Loan	Housing L. in Euros	Housing L. in Forex
d(Indifferent)	9.44 ***	-1.48	-7.83 ***	-0.12	0.90	9.08 ***	-1.40	-7.52 ***	-0.16
d(Ignorant)	-2.06	0.37	1.71	-0.01	-0.63				
d(Negligent)	-0.73	-0.21	1.08	-0.13	-1.20				
d(Passive)	-0.07	-0.06	0.36	-0.24	-1.84				
d(Risk Aversion)	5.07 *	-3.30 **	-0.91	-0.86 **	-6.56 ***	5.72 **	-3.47 **	-1.20	-1.05 **
d(Bank Risk Aversion)	6.05 **	-3.00 **	-2.62	-0.43 *	-3.47 *				
d(Stock Risk Aversion)	3.20	0.61	-3.53	-0.27	-0.20				
Distance to Swiss Border	2.39 ***	0.92 *	-2.92 ***	-0.40 ***	-2.50 ***	2.21 **	1.00 *	-2.81 ***	-0.40 ***
Log(Income)	-15.87 ***	4.72 ***	10.66 ***	0.50 **	0.88	-15.96 ***	4.79 ***	10.62 ***	0.54 ***
Log(Wealth)	6.09 ***	-4.19 ***	-1.99 ***	0.09	1.33 *	6.27 ***	-4.29 ***	-2.08 ***	0.10
Age	-3.12 ***	1.27 ***	1.75 ***	0.10	0.53	-3.11 ***	1.29 ***	1.73 ***	0.10
Age^2	0.04 ***	-0.02 ***	-0.02 ***	0.00 **	-0.01	0.04 ***	-0.02 ***	-0.02 ***	0.00 **
d(Married)	1.10	1.12	-3.00	0.79 **	6.29 ***	1.25	1.10	-3.15	0.80 **
Number of Children	-2.76 **	-0.80	3.43 ***	0.14	0.06	-2.72 **	-0.80	3.40 ***	0.12
Number of Adults	-3.31 **	0.39	2.98 ***	-0.07	-1.45	-3.31 **	0.40	2.99 ***	-0.09
d(Civil Servant)	0.94	-0.17	-0.73	-0.04	-0.76	1.10	-0.27	-0.78	-0.05
d(Self-Employed)	4.41	-0.11	-4.65 *	0.34	4.14	4.10	-0.13	-4.42 *	0.45
Education	-1.74	0.73	0.85	0.16	1.43	-1.45	0.62	0.66	0.17
Log Likelihood	-2250.02				-203.83	-2259.76			
Wald Chi2	482.83 ***				70.51 ***	473.56 ***			
Pseudo R2	0.13				0.17	0.13			
Number of observations	2688				740	2688			

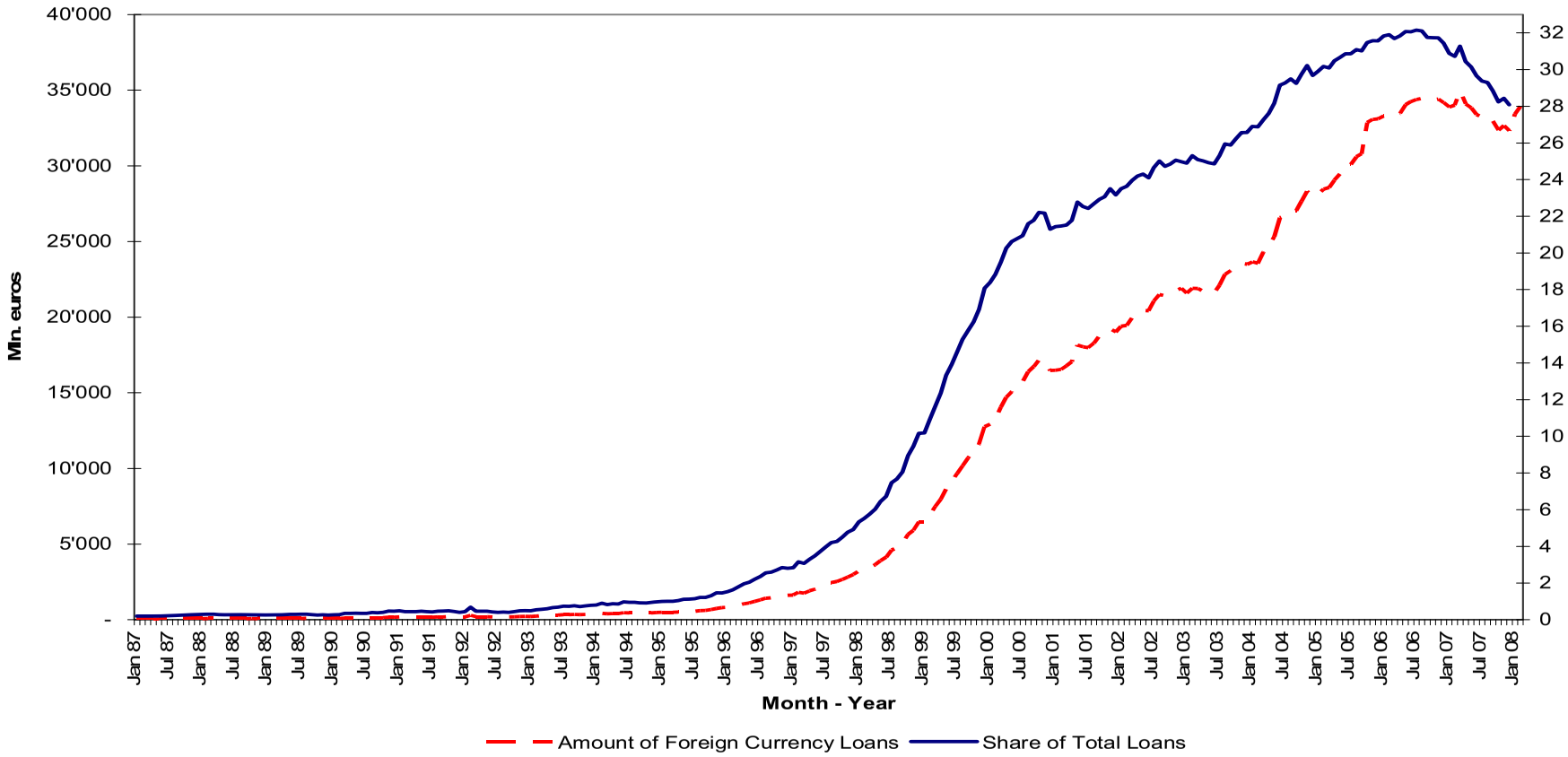
TABLE 5. ROBUSTNESS TESTS

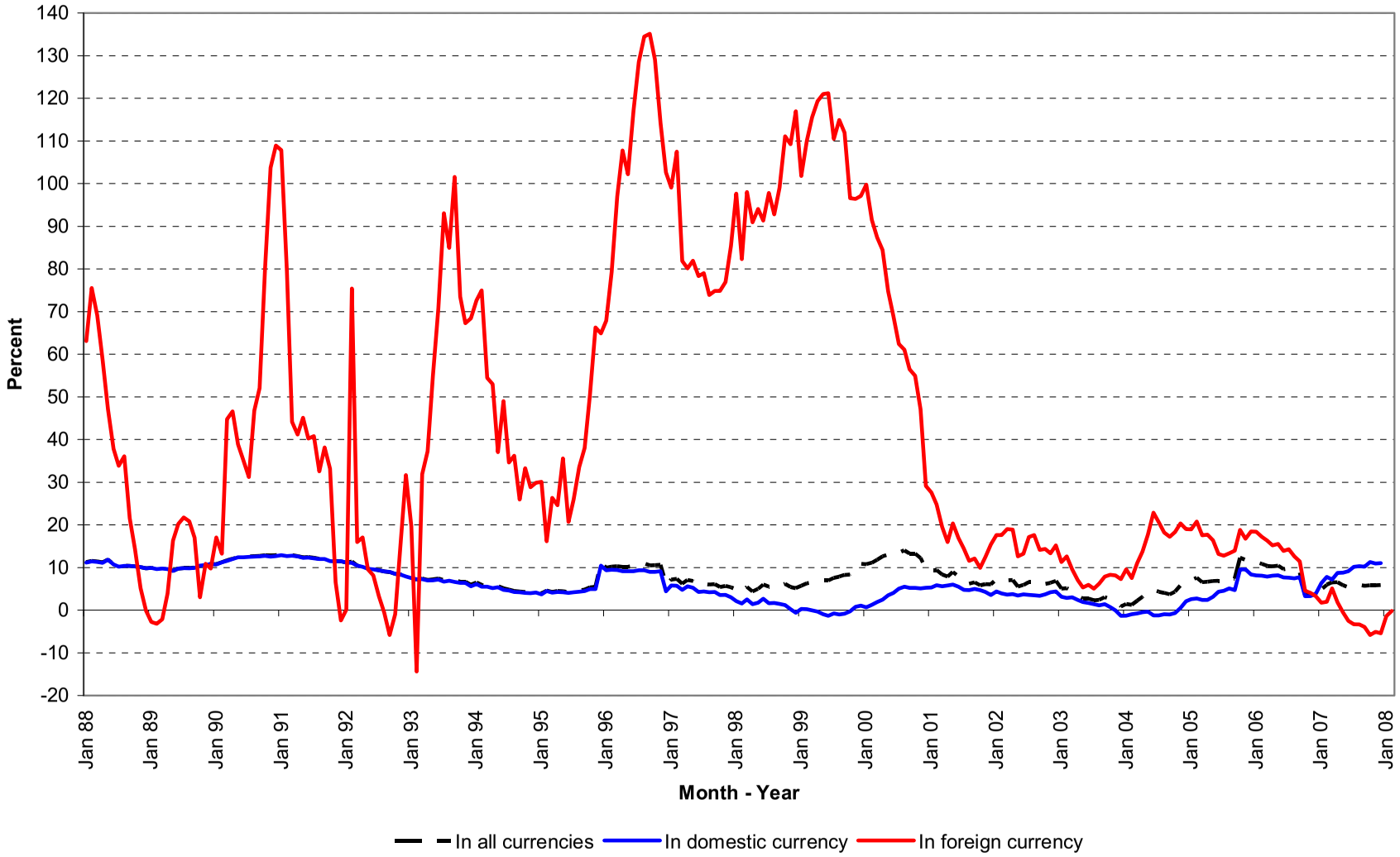
This table reports imputed partial derivative estimates from the (multinomial) logit models of household characteristics on the choice of a loan. Each estimated partial derivative measures the change in probability of observing a given loan choice given a small change in a regressor (a change from 0 to 1 for dummy variables, respectively), holding the other variables constant, evaluated at the sample mean of the explanatory variables, i.e., $(\partial \Pr(R) / \partial Z)_{\bar{Z}}$. The definition of the variables can be found in Table 1. The bottom three rows of the table feature the actual probability of each loan type (calculated from Table 3), the mean of the predicted probabilities when taking the household characteristics actually observed, and the mean of the predicted probabilities for a household that is risk loving, living close to the border, in the top 5% wealth bracket and married, but with otherwise mean characteristics. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Model	I. Multinomial Logit				Ib. Logit	II. Multinomial Logit			
Dependent Variable	No Loan	Other Loan	Housing L. in Euros	Housing L. in Forex	Housing L. in Forex vs Euro	No Loan	Other Loan	Housing L. in Euros	Housing L. in Forex
d(Indifferent)	8.15 ***	-0.54	-7.50 ***	-0.12	0.82	7.69 ***	-0.35	-7.19 ***	-0.16
d(Ignorant)	-2.05	0.89	1.15	0.01	-0.64				
d(Negligent)	-0.60	-0.15	0.90	-0.15	-1.51				
d(Passive)	-0.16	-0.31	0.72	-0.25	-1.75				
d(Risk Aversion)	5.60 **	-3.61 **	-1.21	-0.78 **	-5.65 **	6.31 **	-3.90 **	-1.44	-0.97 **
d(Bank Risk Aversion)	7.69 ***	-4.59 ***	-2.69	-0.40	-2.89				
d(Stock Risk Aversion)	2.73	1.04	-3.48	-0.29	-0.34				
Distance to Swiss Border	1.91 **	1.22 **	-2.75 ***	-0.39 ***	-2.45 ***	1.68 *	1.37 **	-2.64 ***	-0.41 ***
Log(Income)	-12.01 ***	1.27	10.30 ***	0.44 **	0.14	-11.94 ***	1.21	10.24 ***	0.49 ***
d(Top Wealth Class)	18.88 ***	-6.88 ***	-12.69 ***	0.68	16.90 **	18.90 ***	-7.02 ***	-12.64 ***	0.76
Age	-2.57 ***	0.87 **	1.59 ***	0.11 *	0.78	-2.55 ***	0.89 ***	1.54 ***	0.11 *
Age^2	0.03 ***	-0.01 ***	-0.02 ***	0.00 **	-0.01	0.03 ***	-0.01 ***	-0.02 ***	0.00 **
d(Married)	3.19	0.02	-4.02	0.81 **	6.75 ***	3.43	-0.09	-4.19 *	0.84 ***
Number of Children	-2.57 *	-0.90	3.33 ***	0.14	0.09	-2.53 *	-0.90	3.30 ***	0.13
Number of Adults	-2.85 **	0.23	2.68 **	-0.06	-1.46	-2.85 **	0.24	2.68 **	-0.07
d(Civil Servant)	1.42	-0.29	-1.09	-0.04	-0.61	1.64	-0.43	-1.16	-0.05
d(Self-Employed)	3.24	0.33	-3.86	0.30	3.73	3.02	0.23	-3.65	0.40
Education	0.14	-0.70	0.41	0.15	1.12	0.55	-0.93	0.21	0.17
Log Likelihood	-2'294.05				-199.46	-2'307.06			
Wald Chi2	469.62 ***				78.52 ***	461.85 ***			
Pseudo R2	0.12				0.19	0.11			
Number of observations	2'699				744	2'699			
Actual Probability	0.63	0.13	0.26	0.03	0.12	0.63	0.13	0.26	0.03
Predicted Probability	0.63	0.11	0.23	0.03	0.11	0.63	0.11	0.23	0.03
Predicted Probability for Subset	0.41	0.02	0.09	0.48	0.81	0.51	0.02	0.10	0.37

FIGURE 1: LOANS TO AUSTRIAN HOUSEHOLDS IN FOREIGN CURRENCY, 1987-2007

The top panel displays the amount of loans made to Austrian households in foreign currency, in millions of euros, and as a share of the total amount of loans to Austrian households, in percent. The middle panel displays (nominal) annual growth rates, in percent. The lower panel displays the total amount of loans made to households in Swiss franc, Japanese yen, and other foreign currency, in millions of euros. The series are adjusted for a definitional break in June 2004. The figure updates Figure 1 in Tzanninis (2005). Sources: *OeNB* and the authors' calculations.




140
130
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Percent
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Jan 97
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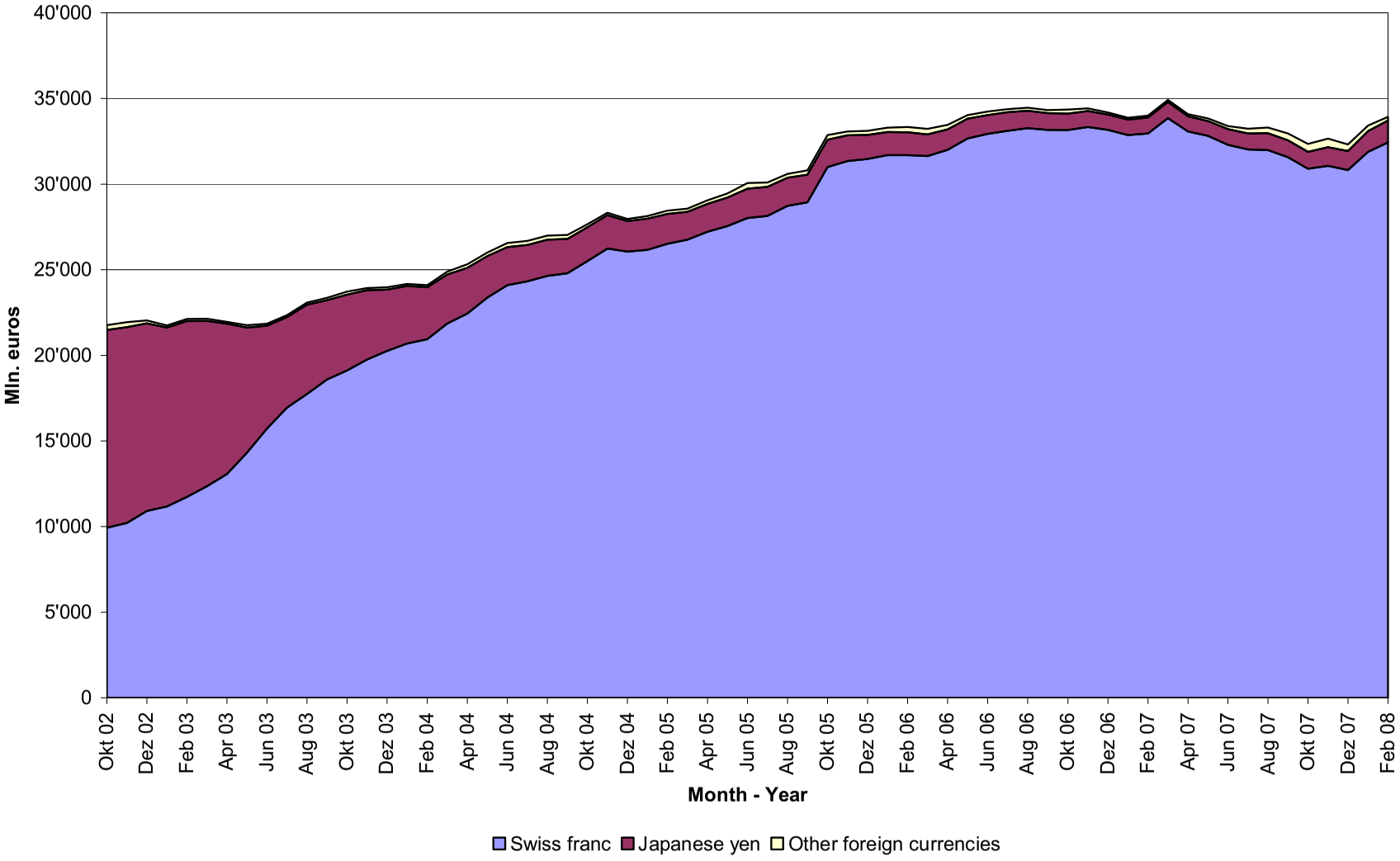
Jan 08
Month - Year
In all currencies
In domestic currency
In foreign currency


40'000
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Mln. euros
Okt 02
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Aug 03
Okt 03
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Jun 04
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Dez 04
Feb 05
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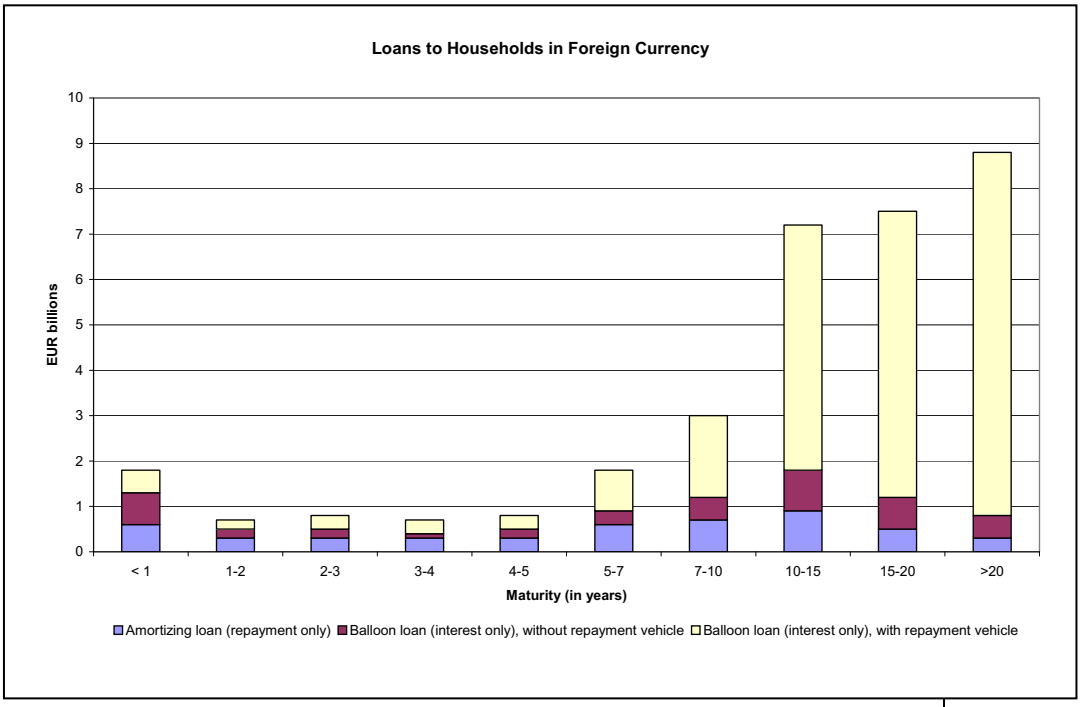
Dez 05
Feb 06
Apr 06
Jun 06
Aug 06
Okt 06
Dez 06
Feb 07
Apr 07
Jun 07
Aug 07
Okt 07
Dez 07
Feb 08
Month - Year
Swiss franc
Japanese yen
Other foreign currencies

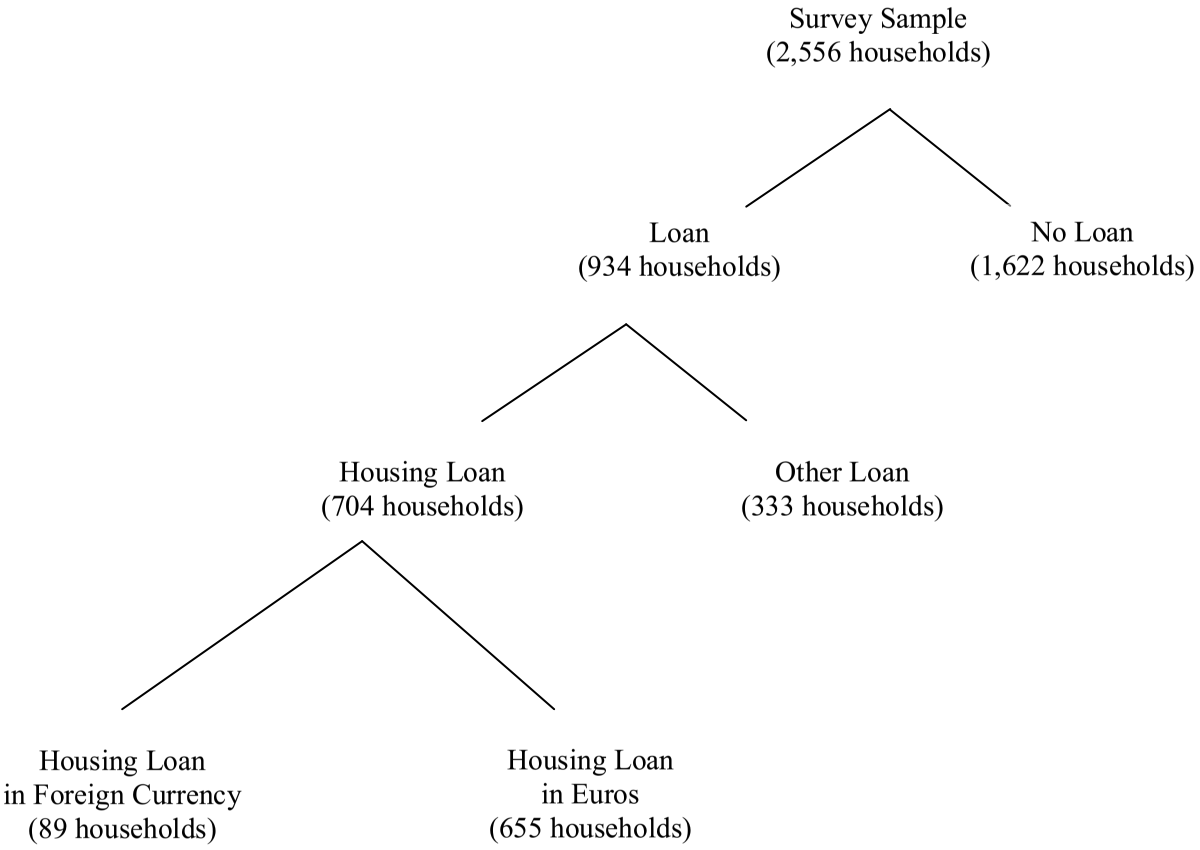
FIGURE 2: LOANS TO HOUSEHOLDS IN FOREIGN CURRENCY: MATURITY AND TYPE OF AMORTIZATION, END-JUNE 2007 (EUR BILLIONS)



Remaining maturity (in years)	Type of amortization: Amortizing loan	Balloon loan, without repayment vehicle	Balloon loan, with repayment vehicle	Total
< 1	0.6	0.7	0.5	1.8
1-2	0.3	0.2	0.2	0.7
2-3	0.3	0.2	0.3	0.8
3-4	0.3	0.1	0.3	0.7
4-5	0.3	0.2	0.3	0.8
5-7	0.6	0.3	0.9	1.8
7-10	0.7	0.5	1.8	3
10-15	0.9	0.9	5.4	7.2
15-20	0.5	0.7	6.3	7.5
>20	0.3	0.5	8	8.8
Total	4.8	4.3	24.0	33.1

Source: Oesterreichische Nationalbank

FIGURE 3: CATEGORIZATION OF HOUSEHOLDS ACCORDING TO LOAN TYPE CHOSEN



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