

# The Austrian Carry Trade: What Are the Characteristics of Households Borrowing in Foreign Currency?

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*12% of all Austrian households reporting a housing loan in a 2004 financial wealth survey had borrowed in foreign currency. Given the importance of such “household carry trades,” their peculiar character, and immediate policy concerns, too little is known about the attitudes and characteristics of the households involved.*

*We use the 2004 survey (covering 2,556 Austrian households) to sketch a comprehensive profile of the attitudes and characteristics of the households involved. For this purpose, we employ both univariate tests and multivariate multinomial logit models.*

*Our analysis suggests that risk-loving, high-income, and married households are more likely to take out a housing loan in a foreign currency than other households. Housing loans as such are, moreover, most likely taken out by high-income households. These findings may partially assuage policy concerns about household default risk on foreign currency housing loans.*

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## 1 Introduction

Carry traders – i.e., investors borrowing in a low-yielding currency and investing in a high-yielding one – have become a widespread phenomenon. While carry trades have typically been conducted by large financial institutions and leveraged institutions, such as hedge funds, carry trade activity is now also widespread among households in Austria. 12% of all Austrian households reporting a housing loan in a 2004 financial wealth survey had borrowed in foreign currency, mostly in Swiss francs. This widespread borrowing in Swiss francs is further noteworthy because Austrian households – otherwise known to be conservative investors – are thus willingly taking the risks of a variable interest rate and of equity-

backed repayment vehicles on top of foreign exchange risk.

The concern about “household carry traders” being less sophisticated than institutional carry traders is 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.

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Given the widespread presence of household carry trades, their peculiar character, and related policy concerns, very little is known about the main agents involved. 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 a uniquely detailed financial wealth survey of 2,556 Austrian households, carried out in 2004, to determine how financially literate, risk averse and wealthy the household carry traders are.

We organize the rest of the paper as follows. Section 2 first describes the main features of foreign currency household loans in Austria and recent developments<sup>2</sup>; it then discusses the role of the banks and financial advisers in this household carry trade; and finally explores what makes foreign currency loans attractive for Austrian households. Section 3 describes the

data and our empirical methodology. Section 4 discusses the results and section 5 concludes.

## 2 Evidence on Austrian Household Carry Trades

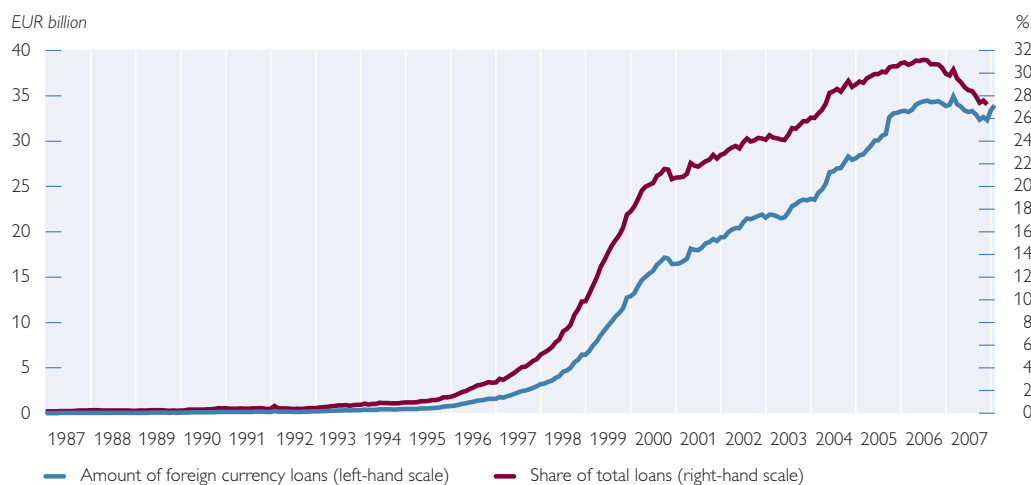
### 2.1 The “Average” Foreign Currency Loan to Households

Foreign currency lending to households has been growing rapidly in Austria since the late 1990s and is now a widespread phenomenon. By the end of 2007, the euro equivalent of foreign currency loans exceeded EUR 32 billion, which corresponds to almost 30% of the total volume of loans granted (chart 1).

From the late 1980s to late 2006, annual growth rates of household loans in foreign currency clearly exceeded growth rates of household loans in domestic currency, except during a few months in the late 1980s and early 1990s. Since late 2006, loans in foreign currency have been somewhat less popular. The denomination of choice is the

Chart 1

#### Loans to Austrian Households in Foreign Currency (1987–2007)



Source: OeNB and authors' calculations.

Note: The graph displays the amount of loans made to Austrian households in foreign currency, in billions of euro, and the share of such loans in total lending to Austrian households, in percent.

<sup>2</sup> The constraints of the study did not allow us to cover financial market developments in 2008, though.

Swiss franc, which accounts for more than 95% of all household loans in foreign currency.<sup>3</sup>

Besides many standard features, these household loans have a few rather peculiar characteristics (Würz and Hubmer, 2006; Tzanninis, 2005). Households taking out a foreign currency loan will typically do so to finance the purchase of a home and borrow about EUR 100,000 for 15 to 25 years against real estate collateral. Moreover, foreign currency loans typically carry 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; foreign currency loans are structured as *balloon loans* (involving monthly payments of interest only, with full principal repaid at maturity); offer the borrower a fee-paying *option to switch to another currency* (including the euro) at contractually specified rollover dates (usually the repricing dates); and have *forced conversion clauses*, allowing the bank to convert the loan into a euro loan at any time without the borrower's consent. Finally, foreign currency loans are usually coupled with a *repayment vehicle* (usually a life insurance contract or a mutual fund) which requires monthly payments and serves to repay the principal at maturity.

## 2.2 Role of Banks and Financial Advisers in the Supply of Foreign Currency Loans, Swiss Loans in Particular

Foreign currency loans are usually supplied by Austrian banks, but the decision to take out a loan is often prompted by independent financial advisers.

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<sup>4</sup> 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).

In supplying foreign currency loans, banks have to worry about legal and reputational risks if these loans turn out to be a bad investment (Boss, 2003). Additionally they face a potential *currency mismatch* between these loans and their deposits, which are mainly in euro. Furthermore banks need to deal with the currency-risk-induced *credit risk* embedded in (Swiss franc) housing loans.

In contrast to banks, independent financial advisers and financial advisory firms seemingly market Swiss franc loans more actively to bolster and sustain household demand (Boss, 2003; Tzanninis, 2005). For example, data from the 2004 financial wealth survey of Austrian households (see section 3) suggest that independent financial advisers are an important source of information on financial matters for households that have taken out foreign currency loans. In the survey, 27% of households with a foreign currency loan mentioned independent financial advisers as one of their information sources, compared to only 13% of households with a loan in euro. Households with

<sup>3</sup> See for example recent issues of the OeNB Financial Stability Report.

<sup>4</sup> The intermediation spread is defined as the difference between the average interest rate charged on lending to nonbanks and the average rate charged on interest-bearing liabilities (interbank deposits, customer deposits, own securities issued).

foreign currency loans consult their bank only slightly less often (86%) than households with a euro loan (88%).

Why are independent financial advisers apparently less apprehensive about pushing Swiss franc loans? After all, they are liable for their advice, just like banks.<sup>5</sup> The sales commissions involved may provide an explanation. Indeed, independent financial advisers receive sales commissions also on the repayment vehicles that underpin most 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 these loans are obtained through independent financial advisers, as a study commissioned by the Federal Ministry of Social Affairs and Consumer Protection (2007) suggests.

### 2.3 What Makes Foreign Currency Loans Attractive for Households

#### 2.3.1 Interest Rate and Exchange 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. 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 francs rational arbitrage, at least ex post. Even the (credit) spread over the reference interest rate payable by borrowers may be lower on

Swiss franc loans than on domestic currency loans (Abele and Schäfer, 2003, pp. 23–24 and p. 45).<sup>6</sup>

In addition, the exchange rate of the Swiss 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 Swiss 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).

Furthermore, the conversion option also alleviates the exchange rate risk. It is not entirely clear, however, how common this option is. In the above-mentioned study commissioned by the Federal Ministry of Social Affairs and Consumer Protection (2007), for example, the currency switching option is reported to be available in only 14 out of the 25 analyzed contracts, and in 5 out of these contracts conversion itself is actually dependent on the bank's consent and hence potentially less valuable.

At the same time, Dlaska (2006), 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, switching fees do not seem excessive, and switching seems almost tax neutral.

#### 2.3.2 Repayment Vehicle

Households may have been injudiciously attracted by the combination of the Swiss franc loan and the underlying repayment vehicle. Observers reckon

<sup>5</sup> As it is eventually the banks which extend the loans, it seems, admittedly, not easy to separate the banks entirely from the independent financial advisers in this "game."

<sup>6</sup> Though numbers released by the Oesterreichische Nationalbank seem not to confirm this spread differential (OeNB Press Release of October 16, 2003).

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 (i.e., interest-only, with a balloon repayment of principal at maturity) coupled with a repayment vehicle (Lamatsch, 2007). And foreign currency loans with a remaining maturity of more than ten years indeed almost always feature an underlying repayment vehicle (Zöllner and Schubert, 2007, p. 17).

Though repayment vehicles are also possible on euro loans, they are rarely used for euro loans, as households would need to invest directly in riskier equity to achieve comparable returns. Somewhat inconsistently, households seem reluctant to do so in the context of domestic loans, again possibly due to a worrying lack of financial sophistication.

### 2.3.3 Fees

Fees may impact, if not the choice of the loan currency, then at least the amount borrowed in foreign currency. Regular bank fees do not seem higher on Swiss franc loans than on euro loans for comparable services, as implied by various surveys run by the Vienna Chamber of Labor.<sup>7</sup> 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 for maintaining a foreign currency bank account in addition to the regular euro account, or the fee for switching currencies. Additional fees occur for the repayment vehicle. Back-of-the-envelope calculations suggest these additional fees may make it unprofitable for borrowers to obtain loans of less than EUR 73,000 and 20 years duration in Swiss francs (Prantner, 2005).

### 2.3.4 Herding

One explanation 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, where many households have an income in Swiss francs (Waschiczek, 2002, p. 85). From around 1995 on, the phenomenon started to spread eastwards within Austria (Tzanninis, 2005) and this pattern of geographical diffusion is not necessarily inconsistent with herding, exacerbating potential concerns one may have about the positions Austrian households are taking.

It is not clear, however, whether 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%) as an information source than households with a traditional euro housing loan (46%), as implied by a market-Institut study (2003).

In addition, household borrowing in Swiss francs in other countries – in

<sup>7</sup> See Prantner (2005) and Kollmann and Prantner (2006) for example.

Germany and France,<sup>8</sup> 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.<sup>9</sup> In the case of the Central and Eastern European countries, some Austrian banks may actually have played a role in spreading loans in Swiss francs.

### 2.3.5 Neutral Taxation

Since deduction of interest payment is not possible if a house was bought for private purposes and the notional rent value is not taxed, taxation seems to play a basically 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.

Housing *subsidies* are important in Austria, but are often granted irrespective of the choice of loan currency. In some federal states though, housing subsidies may be given through low interest rate loans in euro. 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 euro is available. It must also be taken into account that there are income limits for these subsidies. Therefore they are not relevant for high-income households in our sample.

## 3 Data and Empirical Model

### 3.1 Data

Our sample is drawn from an existing survey about Austrian households' financial wealth that was commissioned by the OeNB and conducted by the market research institute FESSEL-GfK during the summer and fall of 2004.<sup>10</sup> Hence our analysis is based on the secondary use of existing data on outstanding loans. For our purpose, we categorize the 2,556 sample households into six groups according to the type of loan they had chosen: First, we differentiate households that have taken out a loan from those that did not. Among the borrowers, we differentiate between those that have chosen a housing loan from those that have taken out other types of loans. Finally, among those reporting a housing loan, we differentiate those with a housing loan denominated in euro and those that have chosen a housing loan denominated in foreign currency.<sup>11</sup>

### 3.2 Household Characteristics as Explanatory Variables

The household characteristics we retain for this study can be grouped into sets of *subjective* and *objective* variables. The definition of the variables is described in the appendix.

#### 3.2.1 Subjective Variables

The subjective variables are binary (dummy) variables based on answers to questions about the financial literacy and risk aversion of the interviewed main decision-maker in the household.

<sup>8</sup> Total loans denominated in Swiss francs to domestic nonmonetary financial institutions for end-2007, in CHF billion: Austria: 68.9, Germany: 35.3, France: 22.7 (Source: central bank websites).

<sup>9</sup> During the 1980s mortgages in Swiss francs (and Japanese yen) were also common in the U.K., but the depreciation of the sterling ended their popularity, painfully for some households (Saunders, 2007).

<sup>10</sup> For more details about this survey, see Beer et al. (2006).

<sup>11</sup> Observations for households that have taken out more than one loan are appropriately downweighted. Consequently to improve readability we do not continuously allow for multiple loan possibility.

If households act rationally and in accordance with their own self-assessment on this account, we expect less financially literate households to avoid carry trades and hence housing loans in foreign currency. Therefore we include financial saviness variables that capture various aspects of the household's literacy and attitude regarding financial products and decisions. The first variable *d(Indifferent)* captures whether a household takes an interest in financial issues or not. The second variable *d(Ignorant)* reflects whether the surveyee is informed about financial issues or not. The third variable *d(Negligent)* indicates whether the surveyee agrees with the statement that "I don't want to have to care about an investment product once I have made up my mind – that's the bank's job" or whether he/she does not. Finally, the fourth saviness variable *d(Passive)* reflects whether the surveyee shops around or not.

These four variables measure quite different aspects of financial literacy. Thus, individual household heads surveyed did not answer uniformly the corresponding questions. For example, 69% of those that take an interest in 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) don't want to have to care about an investment product once they have made up their minds (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 have to care after the initial decision (i.e., are negligent) take an interest in financial issues (i.e., are *not* indifferent).

To capture the households' aversion to risk we constructed three measures.

The first measure *d(Risk aversion)* regards households as risk averse if they do not agree with the statement "A high return on investment is more important to me than a lot of security." A second measure of risk aversion uses the answer to the question whether banks often grant loans too light-heartedly *d(Bank risk aversion)*. Finally, households are said to have an aversion to stock exchange risk *d(Stock risk aversion)* if the surveyee thinks that stock investment is too risky.

As with the financial literacy variables, the risk aversion variables measure different dimensions of risk aversion. For example, 75% of household heads that do not think that investment in stocks is too risky (i.e., are not stock risk averse) do not find that high return is more important than a lot of security (i.e. are risk averse). *d(Bank risk aversion)* is only weakly correlated with the two other risk aversion variables.

### 3.2.2 Objective Variables

The objective variables on the other hand are the answers to questions about location, income, wealth, age, marital status, household size, employment, and education. Most of the objective variables are commonly featured in studies estimating household demand for debt (Crook, 2006) and are most likely to also influence the choice of loan type.<sup>12</sup>

The variable *Distance to Swiss border* assigns a value to each province that increases with the distance to Switzerland. People living close to the border may have income in Swiss francs (e.g., because they work in Switzerland),

<sup>12</sup> 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).

making a loan in francs a natural hedge and not a carry trade *stricto sensu*. More banks may also offer loans in Swiss francs in the border region.

We further include the natural logarithm of monthly *Income* and financial *Wealth*, both in euro. 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, may also be more likely to engage in carry trades when doing so. In a robustness check, we also introduce a variable that equals one if the financial wealth of the household is in the top 5 percentile and equals zero otherwise,  $d(\text{Top wealth class})$ .

As control variables we also include *Age*, in years,  $\text{Age}^2$  to capture life-cycle savings dynamics, the marital status  $d(\text{Married})$ , the *Number of children* up to 14 years old, and the *Number of adults* in the household. We also take into consideration whether the household head (or his or her partner) is a civil servant,  $d(\text{Civil Servant})$ , or whether one of them is self-employed,  $d(\text{Self-employed})$ . 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 have been neatly captured by the three subjective risk aversion variables. Finally, the *Education* of the household head is also included in our analysis.

## 4 Results and Discussion

### 4.1 Univariate Tests

Table 1 lists the means of the explanatory variables for all surveyed households as well as for the following three

category pairs: Households with a loan and without a loan; households with a housing loan and with loans other than housing loans; and households with a housing loan in euro and households with a housing loan in foreign currency. The differences between the means of each category pair are also indicated, together with the significance levels of a t-test of differences assuming unequal variances.

Though only univariate, the results are interesting *per se*. Households with a loan seem more financially literate and less risk averse than those households who do not borrow. Borrowers further live somewhat closer to the Swiss border and receive EUR 528 more in monthly income.<sup>13</sup> The difference in financial wealth is however not statistically significant. Furthermore, households with a loan 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. These households are also larger with 0.3 more children and 0.4 more adults.

Among those households that borrow, there seems to be no difference in financial literacy and risk-aversion between households with a housing loan and households with loans other than housing loans. Households taking out a housing loan live somewhat closer to the Swiss border, have EUR 25,094 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

<sup>13</sup> 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.



Table 1

## Descriptive Statistics

Mean	All households	Households with a loan	Households without a loan	Difference		Households with a housing loan	Households with loans other than housing loans	Difference		Households with a housing loan in euro	Households with a housing loan in foreign currency	Difference	
d(Indifferent)	0.382	0.321	0.420	-0.099	***	0.298	0.369	-0.071	**	0.297	<b>0.259</b>	0.038	
d(Ignorant)	0.559	0.533	0.575	-0.043	**	0.533	0.552	-0.019		0.543	<b>0.429</b>	0.114	**
d(Negligent)	0.724	0.733	0.718	0.015		0.729	0.754	-0.025		0.740	<b>0.618</b>	0.122	**
d(Passive)	0.514	0.462	0.548	-0.086	***	0.470	0.469	0.001		0.481	<b>0.446</b>	0.035	
d(Risk aversion)	0.820	0.788	0.841	-0.053	***	0.803	0.757	0.046	*	0.812	<b>0.702</b>	0.110	**
d(Bank risk aversion)	0.778	0.736	0.805	-0.069	***	0.750	0.688	0.062	**	0.754	<b>0.698</b>	0.056	
d(Stock risk aversion)	0.829	0.809	0.841	-0.033	**	0.794	0.862	-0.068	***	0.799	<b>0.737</b>	0.062	
Distance to Swiss border	4.114	4.025	4.171	-0.147	***	3.915	4.283	-0.368	***	3.941	<b>3.186</b>	0.755	***
Income (in EUR)	2.470	2.793	2.265	528	***	2,862	2,682	180	**	2,834	<b>3,377</b>	-543	***
Wealth (in EUR)	54,666	51,841	56,461	-4,620		57,820	32,726	25,094	***	55,448	<b>75,126</b>	-19,678	
d(Top wealth class)	0.050	0.033	0.061	-0.027	***	0.038	0.014	0.024	**	0.027	<b>0.124</b>	-0.097	***
Age	50.7	44.9	54.3	-9.380	***	45.2	44.4	0.799		45.5	<b>40.9</b>	4.603	***
d(Married)	0.595	0.685	0.538	0.147	***	0.713	0.640	0.073	**	0.700	<b>0.895</b>	-0.196	***
Number of children	0.412	0.611	0.286	0.325	***	0.671	0.443	0.228	***	0.663	<b>0.973</b>	-0.310	***
Number of adults	2.008	2.273	1.840	0.434	***	2.326	2.190	0.135	*	2.321	<b>2.370</b>	-0.049	
d(Civil servant)	0.233	0.314	0.182	0.132	***	0.314	0.312	0.002		0.312	<b>0.366</b>	-0.055	
d(Self-employed)	0.108	0.123	0.098	0.025	**	0.116	0.142	-0.026		0.110	<b>0.192</b>	-0.082	**
Education	1.988	2.045	1.952	0.093	***	2.057	2.005	0.052	*	2.045	<b>2.136</b>	-0.091	**
<i>Memo items:</i>													
Loan amount (in EUR)	18,646	47,985	0	47,985	***	59,437	27,035	32,402	***	55,577	<b>120,948</b>	-65,371	***
Debt/income	0.492	1.267	0.000	1.267	***	1.566	0.669	0.897	***	1.491	<b>2.818</b>	-1.327	***
Wealth – life insurance and funds (in EUR)	42,753	37,920	45,824	-7,904		42,764	21,634	21,130	**	41,267	<b>52,130</b>	-10,863	
Wealth – debt (in EUR)	36,020	3,856	56,461	-52,605	***	-1,617	5,691	-7,308		-129	<b>-45,822</b>	45,693	***
Number of households	2,556	934	1,622			704	333			655	<b>89</b>		

Source: Authors' calculations.

Note: This table lists the means of all variables for all surveyed households and for the six categories: households with a loan and without a loan with a housing loan and with loans other than housing loans, and with a housing loan in euro and with a housing loan in foreign currency. 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.

with a housing loan in euro and households with a housing loan in foreign currency (see column marked in bold, table 1). Foreign currency borrowers seem less financially illiterate (less ignorant and less negligent) than euro borrowers. Households with housing loans in foreign currency are somewhat less risk-averse. However, the difference is only statistically significant with respect to the indicator *Risk aversion*. Foreign currency borrowers live significantly closer to the Swiss border, receive EUR 543 more in monthly income, and are 10 percentage points

more likely to be in the top wealth class. The household with a foreign currency loan is 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 more financially literate and less risk averse than any other category we consider. They also live closer to Switzerland, have a higher in-

come, are more likely to be among the wealthiest households; they are younger, more likely to be married, more likely to be self-employed, and 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.”

#### 4.2 Multivariate Tests

We also investigate whether these univariate findings hold up in a multivariate setting, focusing on the category of households that have chosen a housing loan in foreign currency. For this purpose, we use both a multinomial logit model for the four final choices underlying the categorization of households in table 1 (i.e., no loan, housing loan in euro, housing loan in foreign currency, loans other than housing loans) and a logit model for the choice between a housing loan in euro and a housing loan in foreign currency.

The multinomial logit model allows us to determine the impact of the households’ characteristics on the loan choice<sup>14</sup> and to look at the marginal effects, i.e., the effect of a small change in one of the independent variables (or a change from 0 to 1 in case of binary variables) on the probability of observing a given loan choice.

Overall, our results suggest that households having a higher income, lower wealth, an older household head, more children and more adults are more likely to take out a loan than other households. 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 insignifi-

cant in other studies, wealth sometimes also has a negative sign.

Regarding the households that have chosen a housing loan in foreign currency, the results from these simple multivariate exercises are consistent with the univariate tests, with a few qualifications. In a multivariate context, only risk aversion, proximity to Switzerland, income, age, and marital status are significantly linked to the choice of a housing loan in foreign currency. Households with low risk aversion, who live closer to the Swiss border, have higher income and age, and are married, are more likely to take out a housing loan in foreign currency than other households (table 2).

Using the variable that indicates whether a household belongs to the top 5 percentile of wealth  $d(\text{Top wealth class})$  leaves the results mostly unaffected. The only significant difference occurs in the simple logit regression (not shown) where households with a housing loan in foreign currency are compared to households with a housing loan in euro. Here, we find that very wealthy households with a loan are 17 percentage points more likely to have a housing loan in foreign currency than a housing loan in euro.<sup>15</sup> We can also predict the probability of taking out a foreign currency loan for households with different socio-economic characteristics. For example, for a household that is risk loving, lives in Vorarlberg, is in the top 5% wealth bracket and married but with otherwise mean characteristics, the baseline multinomial logit model predicts a probability of taking a housing loan in foreign currency of 48%, compared to a probability of only 3%

<sup>14</sup> For multinomial logit models see e.g. Greene (1997, p. 857). In Beer et al. (2008) the models used are explained in more detail and the estimation results are presented.

<sup>15</sup> 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 15 years.

Table 2

### Marginal Effects after Multinomial Logit Estimation

Choice category: Households with a housing loan in foreign currency

d(Indifferent)	0	0
d(Ignorant)	0	0
d(Negligent)	0	0
d(Passive)	0	0
d(Risk aversion)	---	---
d(Bank risk aversion)	-	0
d(Stock risk aversion)	0	0
Distance to Swiss border	---	---
Log(Income)	++	++
Log(Wealth)	0	
d(Top wealth class)		0
Age	0	+
Age^2	++	++
d(Married)	++	++
Number of children	0	0
Number of adults	0	0
d(Civil servant)	0	0
d(Self-employed)	0	0
Education	0	0

Source: Authors' calculations.

Note: The table displays the signs of the marginal effects from (i) the baseline multinomial logit model for the category "households with a housing loan in foreign currency" (first column) and (ii) the multinomial logit model for the same household category but replacing Log(Wealth) with d(Top wealth class) (second column). +++, ++, + (---, --, -) represent positive (negative) effects that are statistically significant at the 1%, 5%, and 10% level, respectively. 0 Indicates that the coefficient is not significant.

for a household for which all characteristics equal the mean. The corresponding probabilities predicted by the simple logit model are 81% and 11%.

## 5 Conclusion

12% of all Austrian households reporting a housing loan in a financial wealth survey had borrowed in foreign currency, mostly in Swiss francs. Given the importance of such "household carry trades," their peculiar character, and immediate policy concerns, we know too little about the attitudes and characteristics of the main agents involved.

We draw upon existing sources and analyze a uniquely detailed financial wealth survey of 2,556 Austrian house-

holds, interviewed in 2004, 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.

Our analysis suggests that risk-loving, married households with high income are more likely to take a housing loan in a foreign currency than other households. Financially literate 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. But risks to financial stability remain. First of all, not all borrowers belong to the group of high-income households that should be able to cope with the risks involved in borrowing in foreign currency. Second, income streams are subject to some risk, and assets may become less valuable. With regard to banks, lending in foreign currency has led to concentration risks.

Though seemingly robust as such, our results are subject to a number of obvious caveats. The data clearly do 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 borrow is followed by a loan type decision and then a loan currency decision – does not alter our main findings.

We leave to future research the investigation of a number of other potential drivers of foreign currency borrowing by households. First, we cannot

take into account differences in interest rates and exchange rates at the time of loan origination because we know only that a household has taken out a loan but not when it did so. Second, the characteristics of the household may have changed since the loan was obtained. However, we can argue that loan decisions are to some extent reversible, or loans are convertible such that current household attributes may also matter. Third, the somewhat murky role financial advisers played in the promotion of foreign currency loans may warrant further investigation. Finally, the question remains open as to whether households possess the necessary financial literacy to understand the various risks attached to the typical foreign currency loan contract.

### Appendix: Definition of Variables

This appendix describes in detail the construction of the subjective variables and lists the definition of the objective variables. All data were obtained from the OeNB's 2004 survey on Austrian households' financial wealth.

#### 1 Subjective Variables

The two sets of subjective variables on financial literacy and risk aversion are dummy variables based on the answer categories

- 1 = I fully agree,
- 2 = I partially agree,
- 3 = I rather disagree,
- 4 = I totally disagree

that respondents could choose in response to the following survey questions (original German version in parentheses):

#### Financial Literacy

- $d(\text{Indifferent}) = 0$  if respondent chose answer categories 1 or 2 to question “I take an interest in financial issues” (Ich beschäftige mich gerne

mit Finanzfragen); 1 if respondent chose answer categories 3 or 4;

- $d(\text{Ignorant}) = 0$  if respondent chose answer categories 3 or 4 to question “I am not well informed about financial issues; I fully rely on advice from my bank” (In Finanzfragen kenne ich mich nicht so gut aus, ich vertraue da ganz auf den Berater meiner Bank); 1 if respondent chose categories 1 or 2;
- $d(\text{Negligent}) = 0$  if respondent chose answer categories 3 or 4 to question “I don't want to have to care about an investment product once I have made up my mind – that's the bank's job” (Ich möchte mich nach dem Abschluss eines Anlageprodukts möglichst wenig darum kümmern müssen; das ist die Aufgabe der Bank); 1 if respondent chose categories 1 or 2;
- $d(\text{Passive}) = 0$  if respondent chose answer categories 1 or 2 to question “I always shop around to find the best product” (Ich hole prinzipiell mehrere Angebote von verschiedenen Geldinstituten ein); 1 if respondent chose categories 3 or 4.

#### Risk Aversion

- $d(\text{Risk aversion}) = 0$  if respondent chose answer categories 1 or 2 to question “A high return on investment is more important to me than a lot of security” (Ein hoher Ertrag ist mir bei Veranlagungen wichtiger als hohe Sicherheit); 1 if respondent chose answer categories 3 or 4;
- $d(\text{Bank risk aversion}) = 0$  if respondent chose answer categories 3 or 4 to question “Banks often grant loans too light-heartedly” (Kredite werden von Banken oft zu leichtfertig vergeben); 1 if respondent chose answer categories 1 or 2;
- $d(\text{Stock risk aversion}) = 0$  if respondent chose answer categories 3 or 4

to question “I think that stock investment is too risky” (Das Anlegen in Aktien halte ich für zu riskant); 1 if respondent chose answer categories 1 or 2.

## 2 Objective Variables

**Distance to Swiss border:** 1 = Vorarlberg, 2 = Tirol, 3 = Salzburg and Carinthia, 4 = Upper Austria and Styria, 5 = Lower Austria, Vienna, Burgenland

**Income:** Income in euro (midpoint of each of 20 income brackets)

**Wealth:** Gross financial assets, in euro (= 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, real estate funds, hedge funds, money market funds) + value of holdings in enterprises + accumulated payment of life insurance premia).

**d(Top wealth class):** 1 = wealth > 95<sup>th</sup> percentile; 0 = otherwise.

**Age:** Age in years.

**d(Married):** 1 = married (or in partnership); 0 = otherwise.

**Number of children:** Number of children up to 14 years.

**Number of adults:** Number of adults in household.

**d(Civil servant):** 1 = civil servant; 0 = not a civil servant.

**d(Self-employed):** 1 = self-employed; 0 = not self-employed.

**Education:** 1 = at most compulsory school, 2 = at most high school, 3 = University or other tertiary education.

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