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CONSUMER DEBT IN LUXEMBOURG AND THE EURO AREA: EVIDENCE FROM THE HOUSEHOLD FINANCE AND CONSUMPTION SURVEY

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Consumer debt in Luxembourg and the euro area: evidence from the Household Finance and Consumption Survey[*]

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Abstract

On average, consumer debt per household is twice as high in Luxembourg as in the euro area. Among lower-income households, consumer debt is even three times higher in Luxembourg. However, since incomes are also higher in Luxembourg, the ratio of consumer debt to gross income is comparable in Luxembourg and the euro area. This paper uses household survey data to compare the prevalence of consumer debt in Luxembourg and the euro area. It focuses on the two major components of consumer debt, installment loans and credit card debt, linking the probability of contracting these types of debt to individual household socio-economic characteristics. In the euro area, households with mortgage debt are more likely to take out consumer debt, highlighting the need to better understand this behavior and its potential link to financial vulnerability. Credit cards, instead, are more common in Luxembourg than in the euro area, but the share of households holding credit card debt is similar. Many euro area households that hold credit card debt also hold liquid assets, often in amounts sufficient to repay this debt. Credit constraints and differences in individual risk preferences may help to explain this otherwise puzzling behavior.

JEL CODES: G51; D14; D91; E21; G02
KEYWORDS: household finance - consumer debt - installment loans - credit cards

Résumé non technique

En comparant les marchés immobiliers de la zone euro, une récente publication du FMI constate que le Luxembourg est le pays européen où la dette à la consommation est plus répandue parmi les ménages à faible revenu. La vulnérabilité financière est également plus élevée parmi le ménages plus modestes au Luxembourg, ce qui augmente le risque de défaut. Cette étude utilise les données de l'enquête HFCS sur le comportement financier et de consommation des ménages pour comparer la distribution de la dette à la consommation au Luxembourg et dans la zone euro.

Au Luxembourg, la dette à la consommation, détenue par 35 % des ménages, est plus commune que la dette hypothécaire (détenue par 31 % des ménages). Plus de 13 % des ménages détiennent à la fois une dette hypothécaire et une dette à la consommation. La principale composante de la dette à la consommation sont les prêts personnels, détenus par 26 % des ménages au Luxembourg et par 20 % dans la zone euro. Le niveau moyen des prêts personnels est deux fois plus élevé au Luxembourg que dans la zone euro. Parmi les 20 % des ménages les plus modestes, le niveau au Luxembourg est même trois fois plus élevée que dans la zone euro. Cependant, ces différences sont en partie le reflet de la différence des revenus, qui sont plus élevés au Luxembourg, où les intérêts débiteurs liés à des prêts personnels peuvent aussi faire l'objet de déductions fiscales. En moyenne, les prêts personnels représentent seulement 16 % du revenu brut du ménage au Luxembourg, ce qui est comparable à la zone euro (17 %). De plus, au Luxembourg 70 % des ménages avancent l'achat d'un véhicule comme raison principale pour leur prêt personnel, raison citée par seulement 38 % des ménages en zone euro. Cette différence fournit encore une explication pour le niveau plus élevé des prêts personnels au Luxembourg.

Le niveau des prêts personnels est généralement plus élevé parmi les ménages

ayant un niveau d'éducation plus avancé. Cependant, en tenant compte des différentes caractéristiques du ménage, un niveau d'éducation plus avancé diminue la probabilité de détenir un prêt personnel. Par contre, cette probabilité augmente avec le niveau de revenu du ménage. Cela peut s'expliquer par le rôle joué par le revenu du ménage dans les décisions du prêteur (i) si accorder un crédit à ce ménage et (ii) à combien fixer le montant maximal. Donc, il n'est pas étonnant que la probabilité de détenir un prêt personnel est plus élevée parmi les ménages dont la personne de référence est un employé, plutôt qu'un travailleur indépendant ou une personne sans emploi.

Une deuxième composante de la dette à la consommation sont les cartes de crédit. Au Luxembourg, près de 84 % des ménages possèdent des cartes de crédit, presque deux fois plus qu'en zone euro. Cependant, seulement 5 % des ménages utilise ces cartes pour accumuler de la dette, au Luxembourg comme dans la zone euro. En général, la probabilité de posséder une carte de crédit augmente avec le revenu du ménage et son niveau d'éducation. Cette probabilité augmente aussi parmi les ménages qui se considèrent soumis à des contraints de crédit (environ 7 % des ménages, que ce soit au Luxembourg, dans les pays voisins ou dans la zone euro). Les contraintes de crédit sont citées moins souvent par les ménages aux revenus plus élevés ou d'un âge plus avancé.

Selon les données HFCS de 2018, plus de 90 % des ménages avec de la dette accumulée sur leur carte de crédit avaient des soldes positifs sur leurs comptes bancaires. Plus de 70 % de ces ménages avaient suffisamment d'argent pour rembourser leur dette sur carte de crédit. Ce comportement semble irrationnel, si on compare le taux d'intérêt très élevé que les ménages payent quand ils accumulent de la dette sur leurs cartes de crédit aux faibles rendements qu'ils gagnent sur leurs comptes courants et d'épargne. Les résultats indiquent que ce comportement peut s'expliquer par des différences dans l'aversion au risque et par des craintes d'un futur resserrement de leur accès au crédit.

1 Introduction

Since the Global Financial Crisis, household debt has attracted the interest of academics and policymakers, given its importance for the macro economy and for financial stability. Most studies focused on mortgage debt, since it represents the biggest share of household liabilities (see for example Mian & Sufi, 2009, 2011, Demyanyk & Hemert, 2011, Christelis *et al.*, 2013). However, consumer debt can also identify households that are financially vulnerable and serve to evaluate how severe economic conditions could affect bank exposure to the household sector (see for example Giordana & Ziegelmeyer, 2022). This paper uses data from two waves of the Household Finance and Consumption Survey (HFCS) to analyze how consumer debt and credit card ownership are distributed across demographic groups in Luxembourg, its neighboring countries and in the euro area.

According to HFCS data, Luxembourg is one of the EU countries with the highest level of consumer debt among low-income households (Valderrama *et al.*, 2023). Financial vulnerability, which considers not only debt but also income and assets, is also higher among low-income households in Luxembourg, posing a risk of default on mortgage loans (Giordana & Ziegelmeyer, 2023).[1] In 2018, about 43% of households with mortgages in Luxembourg also held consumer debt. This share was 37% in the euro area as a whole. Households with consumer debt accounted for approximately 41% of total mortgage debt in Luxembourg, and about 37% in the euro area. In Luxembourg, as in the euro area as a whole, approximately 80% of mortgage debt is linked to the borrower's primary residence, with the remainder covering other real estate. The analysis of consumer debt is important because households that struggle to service both mortgage and consumer debt are likely to default first on their consumer debt in order to continue making payments on

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[1]See Magri *et al.* (2022) who analyze the risks associated with consumer credit growth in some euro area countries, and Magri *et al.* (2011) who study 2005-08 EU-SILC data for nine European countries.

their mortgage as long as they can.

This paper contributes to this discussion by exploring the demand-side factors that are relevant to the distribution of consumer debt in the euro area. Perhaps the closest reference is Bover *et al.* (2016), which compares the distributions of various debt measures across euro area countries. However, their paper mainly discusses mortgage debt, while I focus on consumer debt.[2]

This study focuses on installment loans and credit card debt. Installment loans are the most common type of consumer debt, and in euro area countries they represent the largest share of non-mortgage debt. After presenting some basic statistics, I model the probability of holding installment loans or credit card debt as a function of household socio-economic and demographic characteristics. This analysis can contribute to improve the imputation of these variables in future waves of the survey.

The main results are as follows. In 2018, approximately 26% of households in Luxembourg held installment loans, a percentage similar to that in the euro area as a whole. However, the average level of these loans in Luxembourg was more than double the level in the euro area, respectively €13,600 and €6,300. In the bottom quintile of the gross income distribution, the average level of installment loans was three times higher in Luxembourg than in the euro area, respectively €8,700 and €3,000 (see Figure 4a). The fact that lower-income households in Luxembourg tend to be more indebted than similar households in the euro area could reflect expectations of higher future income (*Permanent Income Hypothesis*) or a *keeping up with the Joneses* effect (Gali, 1994).[3] Indeed, most Luxembourg households with an installment loan identified a vehicle purchase as its main reason, accounting for 70% of this kind of debt. This share was almost twice as high as in neighboring countries or in the euro area. This contributes to the higher median loan amount

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[2]Bertola *et al.* (2008) provide a comprehensive review of the literature on consumer credit.
[3]See Georgarakos *et al.* (2014) for an analysis of how peer pressure can lead to debt.

in Luxembourg, and is also consistent with the seasonal effect observed in the aggregate stock of consumer credit matching the "*Autofestival*", a ten-day car festival organized yearly.

The probability that a given household carries installment loans depends on several factors. The probability increases with the age of the reference person in the household, before declining after a certain point. Although households with higher education levels tend to carry more consumer debt, once I control for other factors more education actually lowers the probability of holding installment loans. Higher income levels significantly contribute to the likelihood of holding installment loans, even after controlling for other household characteristics. Employees are more likely to have installment loans than self-employed or unemployed individuals. The number of non-working members in the household increases the probability of holding installment loans, reflecting the need for additional funds. Furthermore, euro area households who rent or are still paying a mortgage on their main residence are more likely to hold installment loans. Although this last factor is not statistically significant in Luxembourg or its neighboring countries, it still suggests households with consumer debt may be more financially vulnerable, especially if they also hold mortgage debt.

In Luxembourg, almost 84% of households hold credit cards, almost twice the euro area average (49%). However, the share of households with revolving debt on their credit cards is comparable at about 5%. Overall, credit card ownership is strongly correlated with household income and education, indicating that personal financial circumstances and education level play a significant role. About 7% of households report that they are credit constrained, whether in Luxembourg, neighboring countries or the euro area. This share is lower among households with higher income or age, but in all countries households reporting credit constraints are more likely to hold credit card debt.

Finally, this study documents that most euro area households with credit card debt also accumulate liquid assets. Over 90% of households with revolving credit card debt had positive balances in their bank accounts in 2018, and more than 70% of these households held enough to pay back their credit card debt. This behavior is puzzling given the high interest rates charged by credit card companies and the low returns offered on current and savings accounts. Credit constraints are a significant factor in predicting this puzzling behavior among euro area households. These results align with the precautionary borrowing hypothesis (see Fulford, 2015 and Druedahl & Jorgensen, 2018), and are consistent with empirical findings using US data (see Gorbachev & Luengo-Prado, 2019). Euro area results suggest that simultaneously holding credit card debt and liquid assets may be linked to credit constraints and differences in individual risk preferences. Unfortunately, higher levels of education do not seem to reduce the tendency to adopt this puzzling behavior. Targeted financial education may be necessary to effectively address any associated costs and risks.

Section 2 describes the micro data used for this analysis. Section 3 provides an overview of consumer debt in Luxembourg, its neighboring countries and the euro area as a whole, focusing on installment loans. Section 4 analyzes the prevalence of credit cards and credit card debt in Luxembourg and in the euro area. Section 5 documents the extent of the credit card puzzle among euro area households, while Section 6 concludes.

2   Data

The primary source of information is the Household Finance and Consumption Survey (HFCS), harmonized at the level of the euro area. This survey provides

detailed micro-level information on household assets and liabilities.[4]

The HFCS has been conducted every 3 to 4 years since 2010, and its third wave in Luxembourg consisted of a representative sample of over 1,600 households randomly dawn from Luxembourg's social security register (Inspection Générale de la Sécurité Sociale, IGSS), which included more than 284,000 fiscal households, corresponding to almost 532,000 residents. Sample and replicate weights are applied so that results are representative for the Luxembourg population as a whole. This article focuses on the second and third editions of the survey, conducted in 2014 and 2018, to avoid possible effects related to the COVID-19 pandemic. Fieldwork for the following wave was conducted during or right after the outbreak of the COVID-19 pandemic and only finished end of 2021. Data is scheduled to be released in the second half of 2023.

Eighteen euro area countries were included in the second wave of the survey and nineteen in the third wave.[5] The second and third waves of the survey do not refer to exactly the same data collection period in all countries, but I will refer to them as 2014 and 2018, corresponding to the years of data collection for Luxembourg. To account for the different reference periods, all comparisons between survey waves and countries are adjusted for inflation using the *Harmonised Index of Consumer Prices* (see HFCN, 2020a).

The survey is conducted in each country under the responsibility of the respective national central bank, but all follow common guidelines on the implementation, definition of variables and data preparation. Full details of the sampling methodology are available in HFCN (2016a, 2020a). HFCN (2016b, 2020b) provide an overview of the results of the two editions of the survey, while Girshina

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[4]Further information on the survey can be found at http://www.ecb.int/home/html/researcher_hfcn.en.html and http://www.bcl.lu/en/Research/enquetes/hfcs/index.html

[5]The survey also included non-euro area countries such as Hungary and Poland, as well as Croatia, not in the euro area in 2018. Lithuania did not participate in the 2014 wave.

et al. (2017) and Chen *et al.* (2020) provide detailed information for Luxembourg.

In this study, I will mainly focus on Luxembourg and compare the results with the two following groups:

- Neighboring countries: Belgium, France, and Germany;

- Euro area: includes (when possible) all euro area countries participating in the HFCS as of 2018.

In addition to household assets and liabilities, this survey asks about income and financial behavior, employment, access to banking and credit, housing tenure decision, education, and consumption. Survey respondents are also asked about mortgage and non-mortgage debt, which form the basis of the analysis in this article.

In particular, I will focus on questions related to two components of non-mortgage debt: installment loans and credit card debt. Regarding the first, respondents are asked to provide detailed information on the number, quantity and terms of their (main) installment loans, such as the amount outstanding, the current interest rate and the main reason for taking out the loan. As for credit card debt, the HFCS provides data on participation and value of outstanding credit card debt, and on credit card ownership. Information is not collected on the conditions applied to credit cards or on the interest rate paid on any outstanding balance.

3 Consumer debt and installment loans

Table 1 reports the share of Luxembourg households holding non-mortgage debt and the average outstanding amount in 2014 and 2018. This non-mortgage debt is not secured by residential properties and consists of current account overdrafts,

credit card balances, loans from family or friends, and installment loans. About 35% of Luxembourg residents held some non-mortgage debt in 2014 and 2018. This is a larger share of households than for mortgage debt (31% in 2018), which was the largest debt category in terms of value (see Chen *et al.*, 2020).

Table 1: Outstanding household debt in Luxembourg, 2014 and 2018 survey

Types of debt	Share of all households		Conditional median value		Conditional mean value	
	2014	2018	2014	2018	2014	2018
Mortgage debt	**35**	**31**	**208,600**	**232,800**	**262,700**	**306,500**
Any non-mortgage debt	**34**	**35**	**10,600**	**10,000**	**26,700**	**25,500**
Installment loans	26	26	14,400	13,600	27,100	29,600
Credit card balances	6	5	700	1,300	1,100	2,800
Lines of credit not secured by residential properties	9	7	1,000	1,900	3,000	9,500
Loans from relatives and friends	3	3	9,300	8,900	49,000	18,500

Amounts in 2018 euros (rounded to the nearest 100 euro), unless otherwise indicated.
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

Installment loans are the most common type of non-mortgage debt, of which they are the largest component. In 2018, installment loans represented 84% of all non-mortgage debt held by households resident in Luxembourg, and about 80% in its neighboring countries and the euro area as a whole. Figure 1 (Panel a) compares the median value of outstanding installment loans in Luxembourg to that in neighboring countries and the euro area. In Luxembourg, from 2014 to 2018, there was little change in the share of households holding this type of debt or in the median amount (from €14,400 to €13,600). This was also the case in neighboring countries and the euro area as a whole.

However, Luxembourg residents hold significantly more consumer debt than households in neighboring countries, and more than twice as much as households in the euro area as a whole. However, these differences are less striking if we

first divide the outstanding amount by household gross income before taking the median across households. In 2018, the ratio of installment loans to gross income was about 16% in Luxembourg and its neighboring countries, and about 17% in the euro area (see Figure 1 - Panel b). Thus, using HFCS data the household-level ratio of consumer debt to income is comparable to that in other countries. However, such a comparison using aggregate data would be distorted by the fact that non-residents represent nearly 50% of the workforce and contribute to Gross Domestic Product (GDP) but not to resident debt. For example, the aggregate ratio of consumer debt to GDP is only 3% in Luxembourg, compared to 6% in the euro area. Using Gross National Income (GNI) instead of GDP provides a more valid comparison, but then the ratio for Luxembourg is still only 4% compared to 6% for the euro area.

Figure 1: Outstanding installment loans, conditional median by country of residence
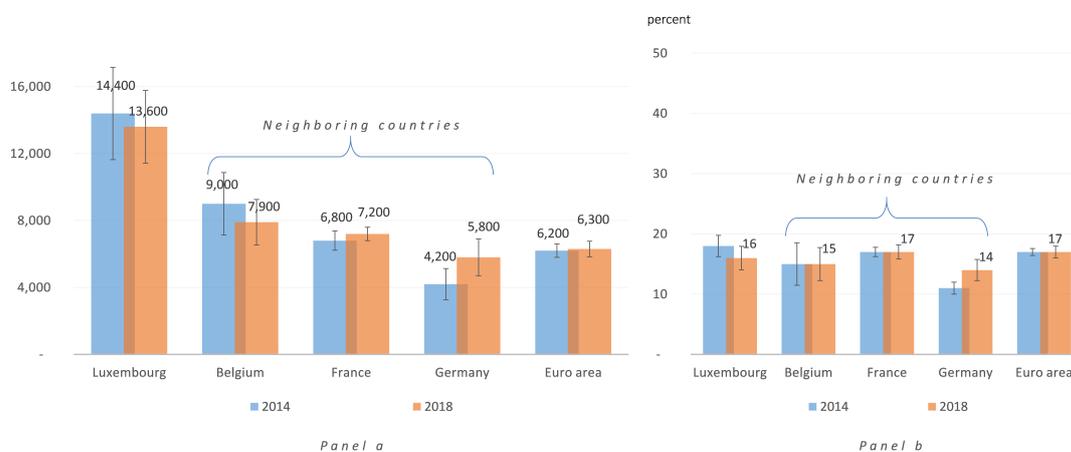
Panel a: Median in 2018 Euros (rounded to the nearest 100 euro).
Panel b: Median ratio of installment loans to gross income.
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. Error bars indicate the 95 percent confidence intervals based on 1,000 replicate weights.

Table 2 breaks down the population of Luxembourg households into subgroups defined by various household characteristics. Note that personal characteristics

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refer to the most financially knowledgeable person (FKP) of the household, who acts as the reference person. Installment loans are more common among households headed by a person of working age, married or living as a couple, and having attained a medium level of education. Outstanding debt of young households (i.e. those whose reference person is under 35 years old) decreased by about 40%, from €17,500 in 2014 to €10,000 in 2018. Among households with reference person between 55 and 64, the share with installment loans declined from 2014 to 2018, but their outstanding debt increased from €9,900 to €17,000. Households that are still re-paying a mortgage on their main residence are more likely to hold installment loans than outright owners or tenants. Results are similar for the euro area or neighboring countries (see Tables 13 and 14 in the appendix).

Table 2: Installment loans, Luxembourg households by characteristic, 2014 and 2018 survey

Characteristic	Share with installment loans		Conditional median value*		Conditional mean value*	
	2014	2018	2014	2018	2014	2018
Sex						
Women	25	27	13,000	12,000	27,700	28,100
Men	27	25	15,400	14,900	26,700	30,700
Age classes						
Less than 35	34	37	17,500	10,000	26,900	27,600
35-44	30	29	14,800	13,500	30,000	32,100
45-54	30	33	13,600	14,600	33,900	29,300
55-64	27	22	9,900	17,000	14,600	24,800
65 or more	9	10	14,800	15,100	26,500	38,100
Marital status						
Single	21	25	12,600	10,000	27,800	31,700
Couple	31	29	16,500	14,000	28,300	26,400
Divorced	27	24	9,800	13,800	25,200	34,000
Widowed	13	11	15,600	22,000	15,100	47,400
Education						
Primary or lower secondary	21	24	14,400	11,200	19,700	27,200
Upper and post secondary	30	30	12,700	14,000	29,100	25,300
First and second stage of tertiary	25	22	18,800	13,900	29,800	37,400
Employment status						
Employee	33	33	15,400	13,700	27,100	30,400
Self-employed	12	32	13,500	11,200	34,000	29,700
Unemployed	15	18	7,700	14,900	25,000	13,200
Retired	16	14	10,100	15,100	19,700	33,300
Other	22	15	19,100	4,000	39,300	9,300
Housing tenure						
Outright owner	20	21	15,600	19,000	41,600	45,600
Owners with mortgage	33	35	15,600	12,500	19,900	19,100
Renter	27	24	12,500	9,500	22,300	23,400
All households	26	26	14,400	13,600	27,100	29,600

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. Characteristics refer to the household reference person, who is the most financially knowledgeable member.
*2018 Euros (rounded to the nearest 100 euro).

For households that hold installment loans, Figure 2 plots the median outstanding amount according to the age of the reference person. The value of outstanding installment loans initially increases and then declines with age. This is consistent with the life cycle hypothesis as young people are more likely to be credit-constrained, since they have not yet accumulated work experience or wealth. Instead, older households usually see their income decline when they retire as does their consumption when their health deteriorates, reducing demand for credit.

Figure 2: Outstanding installment loans, conditional median by age, 2018 survey
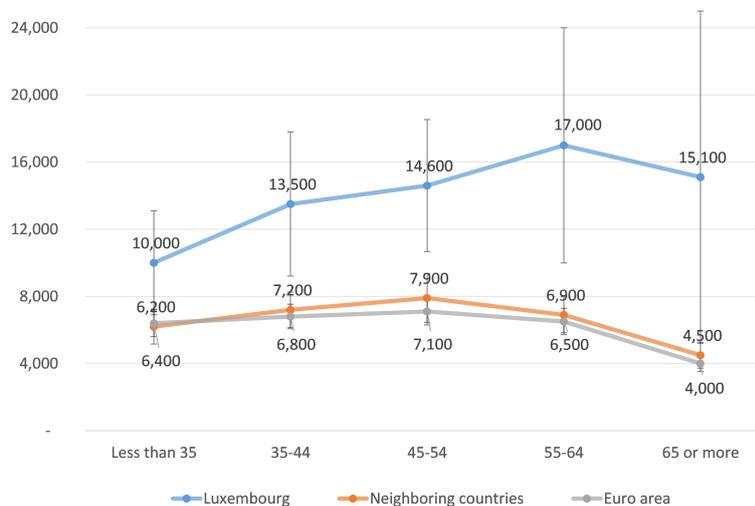
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. Error bars indicate the 95 percent confidence intervals based on 1,000 replicate weights.

Comparing Luxembourg to neighboring countries and the euro area as a whole, the median value of outstanding installment loans varies greatly. The biggest differences are for households older than 64. To better understand whether Luxembourg actually differs from other euro area countries, the following section estimates the impact of age while controlling for other factors.

Figures 3a and 3b turn to the total population, comparing gross income and net wealth by age class in Luxembourg, neighboring countries and the euro area as

a whole. Gross income and net wealth increase initially with age and then decline, except for Luxembourg, where net wealth continues increasing with age.[6] At all ages, income and wealth are much higher in Luxembourg than in other countries. These differences suggest that households in Luxembourg are more likely to obtain credit, as they have more collateral and can more easily service their debt.

Figure 3: Household income and wealth, conditional median by age class, 2018 survey
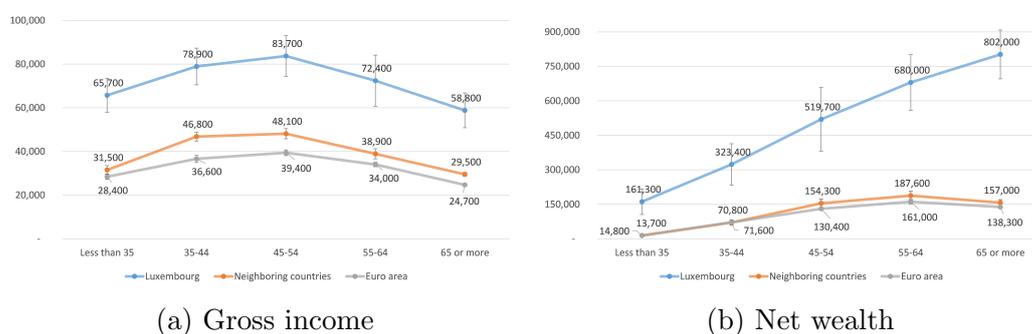
<div align="center">(a) Gross income   (b) Net wealth</div>

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. Error bars indicate the 95 percent confidence intervals based on 1,000 replicate weights.

Figures 4a and 4b show how installment loans are distributed across income and wealth quintiles. Not surprisingly, the value of installment loans increases with income. While in neighboring countries and the euro area, the value of installment loans also increases with net wealth, in Luxembourg it no longer really increases after the middle quintile.

Figure 5 reports the median ratio of installment loans to gross income by income quintiles for 2018. The ratio decreases with income, and is largest for households at the bottom of the distribution. The pattern is remarkably similar across countries, suggesting comparable levels of indebtedness.

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[6]In Luxembourg, the continuous increase in net wealth with age is mainly due to the value of housing.

Figure 4: Installment loans, conditional median by income and wealth quintiles, 2018 survey
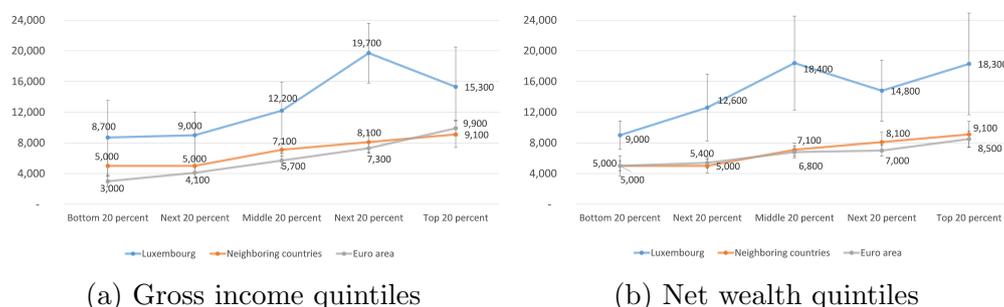

(a) Gross income quintiles

(b) Net wealth quintiles

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. Error bars indicate the 95 percent confidence intervals based on 1,000 replicate weights

Figure 5: Ratio of installment loans to gross income, conditional median by gross income quintiles, 2018 survey
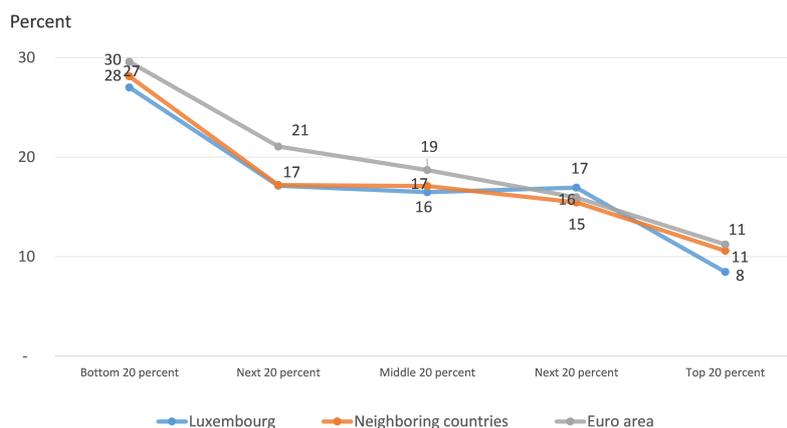
Source: Own calculations based on the 3rd wave of the HFCS, data are multiply imputed and weighted.

Table 3 provides information on the two main installment loans held by households. In Luxembourg, only 5% of all households had more than one such loan in 2018. This is comparable to neighboring countries or the euro area (see Tables 15 and 16). However, while in the euro area the initial amount of the second loan (€5,000) was much lower than that of the main loan (€10,000), in Luxem-

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bourg the initial amounts on the two loans were much closer (€16,200 compared to €23,000). In Luxembourg, the terms on the two loans were also quite similar: both had five years duration and an annual interest rate of about 2%. Although interest rates declined between survey waves, the average monthly repayment did not change. Given that the duration was also unchanged, this may indicate larger initial amounts.[7]

Table 3: Main installment loans among Luxembourg households, 2014 and 2018 survey
Amounts in euros (rounded to the nearest 100 euro)

Loan characteristic	Share of all households		Conditional median value		Conditional mean value	
	2014	2018	2014	2018	2014	2018
Number of installment loans			1	1	1.4	1.2
Main installment loan	26	26				
Initial amount			20,000	23,000	31,800	42,800
Initial duration (years)			5	5	6	6
Annual interest rate (percent)			3.65	2.19	4.12	2.39
Monthly repayment (2018 Euros)			400	400	500	500
Second installment loan	7	5				
Initial amount			18,400	16,200	23,200	30,600
Initial duration (years)			5	5	5	5
Annual interest rate (percent)			3.53	2.36	4.76	2.63
Monthly repayment (2018 Euros)			300	300	400	400
Overall	26	26				
Outstanding (2018 Euros)			14,400	13,600	27,100	29,600
Monthly repayment (2018 Euros)			500	500	600	600

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

Survey respondents were also asked for the main reasons they took out their installment loans. Figure 6 presents the results of the 2018 survey. Among those

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[7]Note that the initial amounts reported in Table 3 are not deflated as the survey does not provide information on when the loans originated.

who held installment loans, most reported the purchase of a vehicle as their main reason. However, while this reason was cited by 70% of households with installment loans in Luxembourg, it was only cited by 40% in neighboring countries and in the euro area as a whole, where the second most reported reason was *covering living expenses and private consumption* (32% in neighboring countries and 27% in the euro area). In Luxembourg, this second reason was cited by only 4% of households with installment loans.

Figure 6: Main reasons for installment loans by country of residence, 2018 survey
Percent
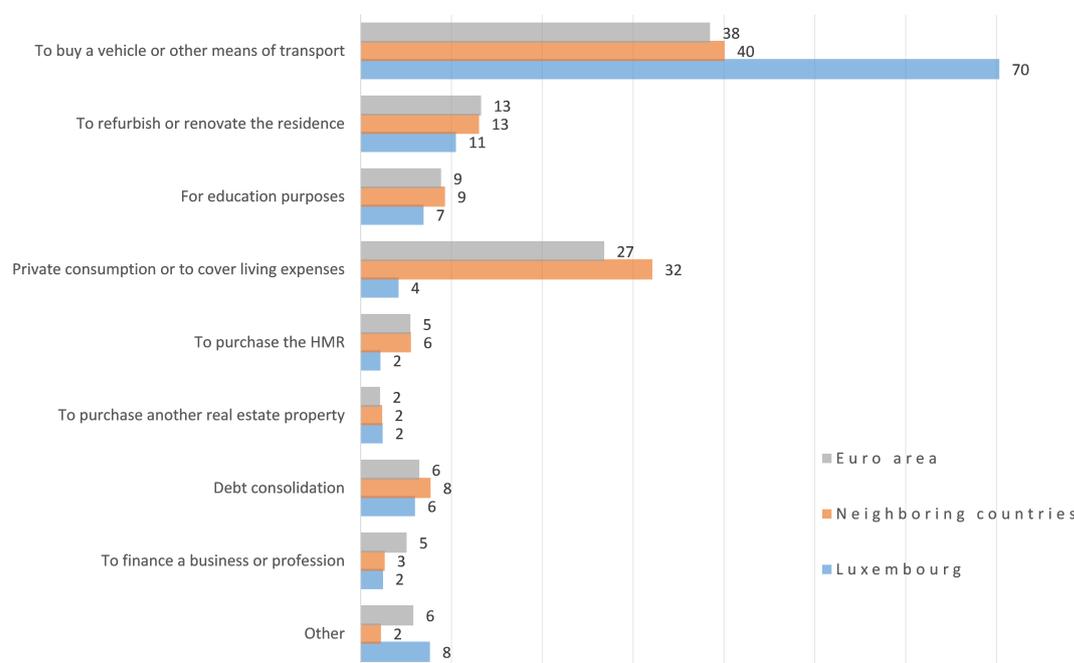
Source: Own calculations based on the 3rd wave of the HFCS, data are multiply imputed and weighted.

3.1 The probability of holding installment loans: a logit regression

This section presents estimation results from an econometric model pooling data from the 2014 and 2018 waves of the HFCS. Results help to distinguish the relative importance of age, education, income, and other factors in determining the probability that a given household will take out installment loans.

I consider a Logit model. Since respondents can only report one of only two possible values, holding or not holding installment loans, the observed response y_i is binary and can be defined as follows,

$$y_i = \begin{cases} 1 & \text{the } i\text{-th household holds installment loans,} \\ 0 & \text{otherwise.} \end{cases}$$

The idea is to consider every observation y_i as a realization of a random variable Y_i that can take value 1 with probability $\lambda_i \in (0,1)$, and 0 with probability $1 - \lambda_i$. Assuming that Y_i follows a *Bernoulli* distribution with parameter λ_i,

$$Pr\{Y_i = y_i\} = \lambda_i^{y_i}(1 - \lambda_i)^{1-y_i}, \qquad for \ y_i \in \{0,1\}. \tag{1}$$

From equation (1) we can easily compute the expected value and variance of Y_i,

$$E(Y_i) = \lambda_i \quad and \quad Var(Y_i) = \lambda_i(1 - \lambda_i) \ .$$

Since both depend on the underlying parameter λ_i, any factor affecting this parameter will change the mean and variance of Y_i. To account for this fact and also to guarantee that the predictions of the model lie within the $(0,1)$ range over which probabilities are defined, a logit model applies the CDF of the logistic distribution to transform the probabilities so that range restrictions become unnecessary, and

models the resulting transformation as a linear function of the covariates,

$$Y_i \sim Bernoulli(\lambda_i), \quad logit(Pr\{y_i = 1\}) = logit(\lambda_i) = ln\left(\frac{\lambda_i}{1 - \lambda_i}\right) = \mathbf{x_i'}\beta \ . \ (2)$$

where $\mathbf{x_i'}$ is a vector of covariates and β is a vector of regression coefficients.[8]

Finally, we want to use the model defined in equation (2) to estimate the probability that household i holds installment loans, λ_i. The regression coefficients β represent the change in the logarithm of the odds, $ln\left(\frac{\lambda_i}{1-\lambda_i}\right)$, associated with a unit change in the corresponding covariate holding all other covariates constant. The tables will present the estimated β_j coefficients, which immediately convey the sign of the effects and their statistical significance. However, in the text, I will often exponentiate a coefficient, e^{β_j}, to obtain the (multiplicative) effect on the odds, $\frac{\lambda_i}{1-\lambda_i}$ of a unit change in the corresponding covariate while holding all other covariates constant.[9]

Table 4 presents results from this logit regression for Luxembourg, for neighboring countries and for the euro area as a whole. The estimated specifications also include a survey year dummy. For the euro area, I pooled the data from all available euro area countries. The regressions for neighboring countries and the euro area include separate country fixed effects. These control for unobserved factors that are shared within each country, such as particular laws and financial institutions.

The estimated coefficients for income are positive and statistically significant, indicating that the probability of holding installment loans increases for higher levels of income, even after controlling for other household characteristics.[10] On

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[8]The $odds_i = \frac{\lambda_i}{1-\lambda_i}$ can be interpreted as the ratio of the probability to its complement. If the probability of an event is a half, the odds are one-to-one or even.

[9]Note that if the logit coefficient is small in value, $100\beta_j$ provides an approximation of the percent change associated with a unit change in the predictor. This is because $e^{\beta_j} \approx 1 + \beta_j$ for small $| \beta_j |$.

[10]The log odds ratio is a monotonic transformation of the probability λ_i, so an increase in the

average, for every 10% of additional income, the odds of holding installment loans increase by approximately 3% in Luxembourg, 1% in neighboring countries and 1% in the euro area as a whole.[11] Although one may expect higher income to reduce the need for credit, this result is not surprising, since household income is an important indicator in the lender's decision whether to grant credit, which may consider the debt-to-income ratio or the debt service-to-income ratio. For similar reasons, in Luxembourg, the odds that a household holds installment loans are 43% lower for "self-employed" households than for "employed" households (60% lower for "unemployed" households).[12] These effects are weaker in neighboring countries and in the euro area as a whole.

The results suggest that the probability of holding installment loans increases sharply with age. Although a specification that assumes linearity of age effects would provide a reasonably parsimonious description of the data, adding higher-order terms on age (such as Age^2) improves the fit. The second row of Table 4 indicates significant curvature, meaning that at higher ages there is a decline in the positive effect of age on the log odds of holding installment loans. In Luxembourg and the euro area, the impact of age increases steadily until approximately the mid-to-late 30s (38 and 36 years old, respectively), but then declines. In neighboring countries, this effect appears to occur earlier, typically in the early 30s.

The level of education of the reference person also plays a significant role. In particular, educational attainment above the secondary level appears to reduce the odds of holding installment loans by 39% in Luxembourg, about 28% in neighbor-

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log odds ratio implies an increase in the probability.

[11] Since some households have zero or negative income, this variable has been transformed using an inverse hyperbolic sine. This allows us to compute the change in the odds associated with a 10% increase in income as 1.1^{β_j}: $1.1^{0.296} = 1.03$ in Luxembourg, $1.1^{0.0937} = 1.01$ in neighboring countries, and $1.1^{0.1457} = 1.01$ in the euro area.

[12] In column 1 of Table 4, the estimated coefficients are -0.5625 for "self-employed" and -0.9189 for "unemployed". Exponentiating these values, the odds of holding installment loans are multiplied by 0.57 and 0.40 respectively, that is, decrease by 43% and 60%.

ing countries and 24% in the euro area respectively.[13]

Housing tenure does not seem to have a statistically significant effect on the odds of holding installment loans in Luxembourg and in neighboring countries. However, in the euro area as a whole, renting the household main residence, or being owner with a mortgage, is associated with greater odds of holding installment loans. This suggests possible concerns about the vulnerability of those households with consumer debt who also hold mortgage debt since they may struggle to service their loans (see also Valderrama *et al.*, 2023 page 29).

To account for household composition, I control for the "*number of non-working members (NWM)*", rather than controlling for the fact that a household is a couple. In fact, the associated indicator dummy (1 if the household members are married or living as a couple) would be naturally correlated with other predictors such as income. This is because the probability that at least two members are employed is higher for these households. In contrast, the "*number of non-working members (NWM)*" is correlated with the dummy *"Married or in couple"*, but not as much as with income. This will provide better identification of the effects of income and household members on the odds of holding installment loans. The positive estimate indicates that the odds of holding installment loans increase by about 8% for every household member who is not working.

Given that households report the purchase of a vehicle as the main reason for holding installment loans, it is reasonable to imagine that a leasing contract may be a good alternative to such loans. Therefore, we expect that having subscribed to a leasing contract reduces the odds of holding installment loans, and this is what we observe for Luxembourg. However, results from the logit regression do not confirm this result for neighboring countries or the euro area as a whole, where

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[13]Estimated coefficients on *Education: tertiary* are -0.4944 for Luxembourg, -0.3291 for neighboring countries and -0.2803 for the euro area. Exponentiating these values, the odds of holding installment loans are multiplied by 0.61, 0.72 and 0.76 respectively, that is, decrease by 39%, 28% and 24%.

leasing may be less widespread than in Luxembourg (see Table 4).

Table 4: Probability of holding installment loans - logit regression results

	Luxembourg	Neighboring countries	Euro area
Age	0.0995***	0.0711***	0.0716***
	(0.0246)	(0.0094)	(0.0065)
Age^2	-0.0013***	-0.0011***	-0.001***
	(0.0003)	(0.0001)	(0.0001)
Female	0.1042	-0.0925*	-0.1021***
	(0.1001)	(0.0501)	(0.0339)
Non working members	0.0802*	0.081***	0.0642***
	(0.046)	(0.021)	(0.0136)
Education : secondary	0.1557	0.0428	0.0511
	(0.1312)	(0.066)	(0.0422)
Education : tertiary	-0.4944***	-0.3291***	-0.2803***
	(0.1579)	(0.0731)	(0.0478)
ihs(income)	0.296***	0.0937***	0.1457***
	(0.1074)	(0.0258)	(0.0211)
$Self-employed$	-0.5625**	-0.0841	0.0344
	(0.263)	(0.0901)	(0.0543)
Unemployed	-0.9189***	-0.6306***	-0.5041***
	(0.3405)	(0.1023)	(0.0624)
Retired	0.0052	0.0486	-0.0259
	(0.2087)	(0.0945)	(0.0634)
Other	-0.3728*	-0.1648*	-0.1597**
	(0.2254)	(0.0987)	(0.063)
Owner with mortgage	0.0649	0.045	0.1394***
	(0.1308)	(0.0682)	(0.0419)
Renter	0.0123	0.0832	0.1737***
	(0.1407)	(0.0577)	(0.0386)
Has a leasing contract	-0.5984**	0.0921	0.1155
	(0.2348)	(0.1529)	(0.1048)
Third wave	0.0059	-0.0297	-0.0439*
	(0.1046)	(0.0378)	(0.0266)
Country fixed effects		yes	yes
Number of observations	$3,217$	$39,315$	$151,531$

Note: logistic regression coefficients with standard errors based on 1,000 bootstrap replicates in parentheses ($***p \leq 0.01$, $**p \leq 0.05$, $*p \leq 0.10$). Dependent variable is holding any installment loan. Omitted categories are "Primary Education", "Employed", "Outright homeowners". $ihs()$ is the inverse hyperbolic sine transformation. Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

4 Credit cards

Credit cards provide the convenience of cashless transactions, but also help customers to smooth consumption over time since they allow them to defer payments to future dates, typically the end of the month. Deferring payment beyond the end of the month usually involves paying high interest rates on the outstanding balance and on any additional charges made on the card. Previous studies analyzed household use of credit cards and credit card debt in the US and the UK (Morrison, 1998, Gross & Souleles, 2002a,b, Gathergood & Weber, 2014, Basnet & Donou-Adonsou, 2016). In the following, we aim to contribute to this discussion with euro area data from the HFCS. France had to be excluded from this analysis due to differences in the collection of data related to credit cards in the second and third waves of the HFCS.

Figure 7 shows the share of households who own at least one credit card in Luxembourg, neighboring countries and in the euro area as a whole. Luxembourg appears to be a special case since the share of resident households who own credit cards is almost twice the euro area average. However, the prevalence of credit card debt is similar to that in the euro area and in neighboring countries (about 5% of the population), suggesting that fewer credit card owners accumulate credit card debt on a persistent basis.

Figure 7: Share of households with credit cards and credit card debt, 2018 survey
Percent of total population
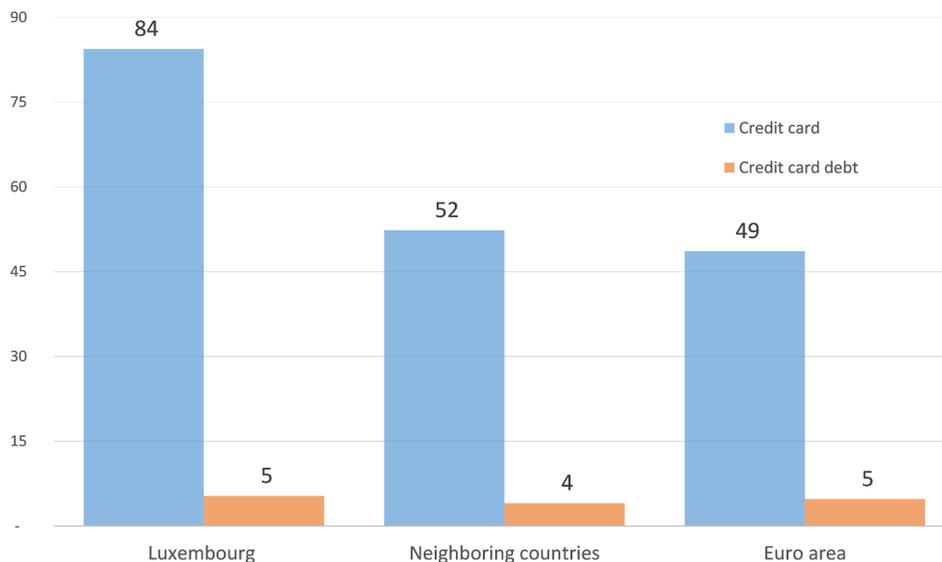
Source: Own calculations based on the 3rd wave of the HFCS, data are multiply imputed and weighted. *France is excluded due to differences in the collection of credit card data.

4.1 Credit card ownership

In this section, we will try to identify the contribution of different household characteristics to the probability of owning a credit card, while controlling for other characteristics. Therefore, we will estimate a logit regression based on equation 2 in the previous section, where, this time, the dependent variable is the log odds of owning a credit card.

This logit regression helps to distinguish the relative importance of age, education, income and other factors.[14]

Table 5 presents results for Luxembourg, neighboring countries and the euro area as a whole, using the pooled sample of the 2014 and 2018 waves of the HFCS.

Credit card ownership in Luxembourg, in neighboring countries and in the euro

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[14]Section 3.1 discusses this choice of specification.

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area is strongly correlated with household income and education. Higher levels of education and income contribute significantly to the odds of owning a credit card, even controlling for other household characteristics. Not surprisingly, a higher level of financial assets also contributes positively, even if the coefficient on this variable is lower than that of income.

Moreover, having a checking account is associated with higher odds of credit card ownership in Luxembourg and neighboring countries. While having a positive balance in savings or checking accounts (the dummy *"Saver"*) negatively affects the odds of credit card ownership in neighboring countries and the euro area as a whole, this dummy does not play a statistically significant role in Luxembourg.

The regression results presented in Table 5 are the joint product of demand and supply considerations. On the demand side, the positive contribution of education to the odds of owning a credit card can be related to an increased awareness of credit instruments. On the supply side, credit card issuers may specifically target the more educated segment of the population. In the euro area, Being "retired" rather than "employed" significantly increases the odds of owning a credit card, which may largely reflect the continued ownership of households who already acquired cards when younger.

In all regressions, age is a significant factor in predicting credit card ownership, even after controlling for income and financial wealth. In principle, younger households should be more interested in credit cards and gaining access to credit lines. This is why the limited diffusion of credit cards among the youth could potentially be attributed to credit constraints rather than demand considerations.

These regressions also include a dummy variable for the survey year 2018, *"Third wave"*. The estimated coefficient indicates a positive and significant year effect in neighboring countries and in the euro area as a whole, which is consistent

with the propagation of credit cards between 2014 and 2018 that is not explained by changes in the included household characteristics. The fact that this coefficient is not significant for Luxembourg may reflect the high prevalence of credit card ownership already in 2014.

Table 5: Probability of owning a credit card - logit regression results

	Luxembourg	Neighboring countries	Euro area
Age	0.0601**	0.0438***	0.081***
	(0.0258)	(0.0141)	(0.0074)
Age^2	−0.0006**	−0.0006***	−0.001***
	(0.0003)	(0.0001)	(0.0001)
Female	−0.1745	−0.2617***	−0.2421***
	(0.1436)	(0.0744)	(0.0367)
Non working members	0.0674	−0.184***	−0.0942***
	(0.0676)	(0.0364)	(0.0165)
Education : secondary	0.5271***	0.5095***	0.7368***
	(0.1591)	(0.1285)	(0.0448)
Education : tertiary	0.9636***	1.4635***	1.5392***
	(0.2064)	(0.1305)	(0.051)
ihs(income)	0.3541***	0.4826***	0.4054***
	(0.1064)	(0.094)	(0.0444)
Self − employed	−0.1288	0.1845	0.1271*
	(0.4052)	(0.1596)	(0.0705)
Unemployed	−0.7989**	−0.448**	−0.1523**
	(0.3495)	(0.1772)	(0.0734)
Retired	0.0506	0.425***	0.3484***
	(0.2731)	(0.1504)	(0.0659)
Other	−0.3766	0.3406**	−0.0201
	(0.2698)	(0.1604)	(0.0732)
Owner with mortgage	0.3577	0.3773***	0.4598***
	(0.2278)	(0.1147)	(0.0531)
Renter	−0.4694***	−0.0161	−0.1209**
	(0.1806)	(0.1007)	(0.0497)
ihs(financial assets)	0.1188***	0.1904***	0.1639***
	(0.0398)	(0.0226)	(0.0107)
Has checking account	0.5483***	0.3664***	0.1367***
	(0.1656)	(0.094)	(0.0436)
Saver	−0.4545	−0.6958***	−0.6303***
	(0.586)	(0.2113)	(0.11)
Third wave	−0.028	0.3178***	0.1787***
	(0.1423)	(0.0577)	(0.0295)
Country fixed effects		*yes*	*yes*
Number of observations	3, 155	13, 822	122, 198

Note: logistic regression coefficients with standard errors based on 1,000 bootstrap replicates in parentheses
(***$p \leq 0.01$, **$p \leq 0.05$,*$p \leq 0.10$). Dependent variable is credit card ownership. Omitted categories are
"Primary Education", "Employed", "Outright homeowners". France is excluded due to differences in the
collection of credit card data. *ihs*() is the inverse hyperbolic sine transformation. Source: Own calculations
based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

4.2 Revolving cards and outstanding debt

Credit cards enable cardholders to make purchases and/or withdraw cash up to a prearranged credit limit. Most credit cards do not allow users to carry debt from month to month. Customers are expected to pay the balance in full every month. However, some credit cards, called revolving cards, give the possibility to carry a balance - that is, roll debt over from one month to the next. With revolving cards, the credit granted may be settled in part by the end of a specified period, with the remaining balance taken as extended credit (on which interest is usually charged). In this section, we will focus on the use of revolving cards by analyzing the outstanding balance they carried when the HFCS was conducted. Table 6 focuses on credit card holders and reports the median card balance of households with revolving credit, differentiating between households resident in Luxembourg, in neighboring countries (excluding France), and in the euro area as a whole (excluding France).

Table 6: Share of card holders with credit card debt and outstanding amount, 2014 and 2018 survey

	Percent holding (card holders)		Conditional median value		Conditional mean value	
	2014	2018	2014	2018	2014	2018
Luxembourg	**7**	**6**	**670**	**1,340**	**1,100**	**2,770**
Neighboring countries*	7	8	510	490	1,220	970
Euro area*	9	10	960	750	1,740	1,460

2018 Euros (rounded to the nearest 10 euro).
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.
* France is excluded due to differences in the collection of credit card data.

Between 2014 and 2018, the share of households holding credit card debt remained fairly stable, but the median value of outstanding credit card debt in-

creased in Luxembourg, although not in neighboring countries or in the euro area as a whole.

The HFCS collects important information on self-reported credit constraints. In particular, a household is considered credit-constrained if within the last three years:

- it did not apply for credit because it expected to be turned down, or

- it was actually refused credit, or

- it was granted less credit than requested.

Households are not considered credit-constrained if they reported successful reapplication for credit. Figures 8 and 9 show that there are no substantial differences in the share of credit-constrained households between Luxembourg, neighboring countries or the euro area as a whole. Overall, credit-constrained households represent about 7% of the population. As expected, this share tends to decrease both with income and age.

Figure 8: Credit-constrained households by income quintiles, 2018 survey
Percent
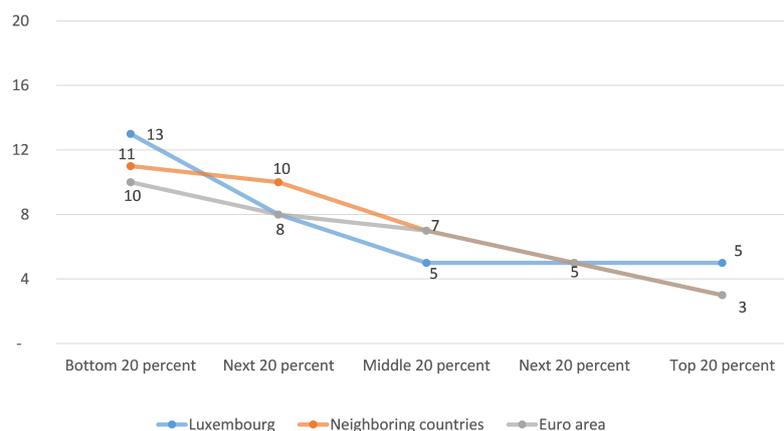
Source: Own calculations based on the 3rd wave of the HFCS, data are multiply imputed and weighted.

Figure 9: Credit-constrained households by age class, 2018 survey
Percent
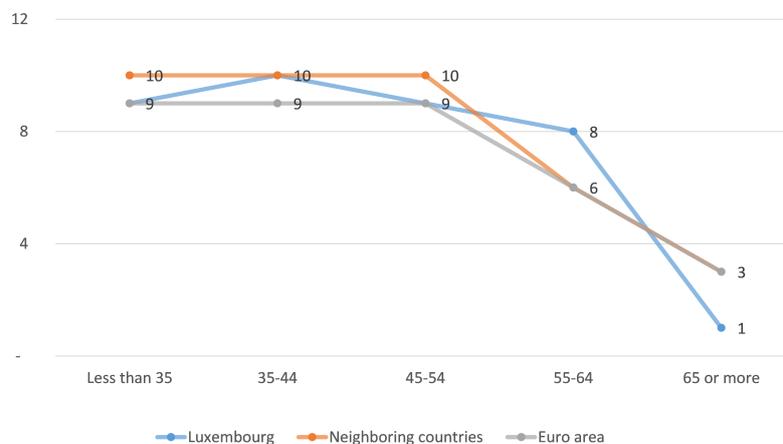
Source: Own calculations based on the 3rd wave of the HFCS, data are multiply imputed and weighted.

In the following, we will test the importance of credit constraints on the probability of holding and using credit cards. Section 5 will also show how credit constraints play a fundamental role in explaining otherwise puzzling behavior.

4.2.1 The probability of holding credit card debt: a logit regression

Table 7 presents the results of a logit regression similar to those discussed above, although the dependent variable is the log odds of holding credit card debt.

In all regressions, credit constraints appear as a significant factor in predicting whether a household holds credit card debt, even after controlling for various household characteristics, such as income and financial wealth. Exponentiating the estimated coefficient for this dummy we obtain 1.87 for Luxembourg, 1.63 for neighboring countries, and 1.76 for the euro area. Thus, for credit-constrained households the odds of holding credit card debt are about 90% higher in Luxembourg, around 60% higher in neighboring countries, and 80% higher in the euro area as a whole. The odds of holding credit card debt are also higher for households who rent or who own with a mortgage (the difference is statistically significant in

Luxembourg and in the euro area as a whole). This suggests that revolving credit cards may be a source of funds for households that lack collateral.

The odds of holding credit card debt also increase with higher levels of education or income (the difference is statistically significant in the euro area and in Luxembourg's neighbors). However, these effects do not seem to be statistically significant in Luxembourg, which may reflect the higher prevalence of credit cards.

Having a checking account or higher levels of financial assets raise the probability of owning a credit card (Table 5) in Luxembourg and the euro area as a whole, but they do not seem to have a statistically significant effect on the probability of holding credit card debt (Table 7). A positive balance in savings or checking accounts (the dummy *"Saver"*) negatively affects the probability of owning a credit card in neighboring countries and the euro area as a whole. However, this dummy variable is not statistically significant in Luxembourg.

Again, it is important to stress that these results reflect both demand and supply considerations. On the supply side, credit card issuers may target different segments of the population in different countries.

For the euro area as a whole, being "retired" rather than "employed" significantly increases the probability of owning a credit card (Table 5) but not the probability of holding credit card debt (Table 7), while being unemployed has a negative effect.

Age significantly raises the probability of holding credit card debt, even after controlling for income and financial wealth. However, this result may be linked to credit constraints rather than demand considerations.

These regressions also include a dummy variable for the survey year 2018, *"Third wave"*. The size of its coefficient indicates a positive and significant effect in the euro area, which is consistent with the increase in the number of revolving credit cards from 2014 to 2018. This coefficient is not significant for Luxembourg,

which may reflect the smaller sample size or may indicate a more stable use of credit card debt.

Table 7: Probability of holding credit card debt - logit regression results

	Luxembourg	Neighboring countries	Euro area
Age	0.193***	0.0465	0.0822***
	(0.0614)	(0.0354)	(0.0141)
Age^2	−0.0019***	−0.0007*	−0.001***
	(0.0006)	(0.0004)	(0.0001)
Female	0.1144	−0.3804**	−0.1495**
	(0.2069)	(0.1557)	(0.0664)
Non-working members	0.1584**	0.0639	0.0144
	(0.0791)	(0.0636)	(0.0256)
Education : secondary	0.1565	0.5271	0.3474***
	(0.2765)	(0.3262)	(0.0848)
Education : tertiary	0.1648	0.9075***	0.4761***
	(0.3436)	(0.3489)	(0.0977)
ihs(income)	0.1215	0.3971***	0.2362***
	(0.1185)	(0.1334)	(0.0537)
Self − employed	0.4237	−0.1781	−0.1092
	(0.4098)	(0.3083)	(0.1087)
Unemployed	−0.4404	−0.1453	−0.3108***
	(0.5866)	(0.3283)	(0.1107)
Retired	0.7414**	−0.0238	−0.084
	(0.3663)	(0.3669)	(0.123)
Other	−0.4537	0.124	−0.1791
	(0.4857)	(0.3033)	(0.1186)
Owner with mortgage	0.8882***	0.1903	0.5204***
	(0.3055)	(0.2014)	(0.0788)
Renter	0.8389**	0.1573	0.1839**
	(0.3306)	(0.2252)	(0.0932)
ihs(financial assets)	−0.1285**	−0.0712	−0.0617***
	(0.0571)	(0.0494)	(0.0183)
Has checking account	−0.2372	0.2684	−0.1207
	(0.2558)	(0.2332)	(0.0793)
Saver	−0.1316	−0.8888***	−0.519***
	(0.6237)	(0.3425)	(0.1626)
Credit constrained	0.6277**	0.4894*	0.5663***
	(0.3025)	(0.2718)	(0.0913)
Third wave	−0.1571	0.2363*	0.1711***
	(0.1967)	(0.1315)	(0.0579)
Country fixed effects		*yes*	*yes*
Number of observations	3, 155	13, 822	122, 198

Note: logistic regression coefficients with standard errors based on 1,000 bootstrap replicates in parentheses (***$p \leq 0.01$, **$p \leq 0.05$,*$p \leq 0.10$). Dependent variable is holding credit card debt. Omitted categories are "Primary Education", "Employed", "Outright homeowners". *ihs()* is the inverse hyperbolic sine transformation. France is excluded due to differences in the collection of credit card data. Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

5 Puzzling behavior and explanations

This section focuses on euro area households who simultaneously accumulate liquid assets and credit card debt.[15] [16] In 2018, about 91% of households with revolving credit card debt held a positive balance on their bank accounts. This group corresponds to about 9% of credit card holders.

This behavior is puzzling given the high interest rates charged by credit card companies on this type of debt, and the usually low returns that financial institutions pay on current accounts.[17] No prudent household should want to pay such high interest rates, especially if it does not need to borrow the money. This behavior seems to violate an arbitrage condition: why do not use liquid assets to pay off debt? Gross & Souleles (2002b) were the first to document that American households combined a debt position on their credit cards with liquid assets in their portfolios. Ninety-five percent of those who borrowed money on their credit cards had positive net worth. More recently, Gathergood & Weber (2014) analyzed household use of credit cards and credit card debt using UK data, and found a similar behavior.

A number of theoretical explanations have been given, starting from the possibility that the liquid assets held by these households were already committed (rejected by Gross & Souleles, 2002b). Other explanations include self-control problems (see Laibson *et al.*, 1998, Haliassos & Reiter, 2005, Bertaut *et al.*, 2009) or strategic preparation for bankruptcy (Lehnert & Maki, 2002, Gross & Souleles, 2002a). Telyukova & Wright (2008) and Telyukova (2013) stress the need for liquidity to pay for cash-only expenditures. More recently, Fulford (2015) and

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[15]An analysis using only Luxembourg data is not feasible due to the limited number of observations available.

[16]Liquid assets are defined as the total amount in checking and savings accounts.

[17]For example, one of the biggest revolving credit card providers in Luxembourg charged more than 17% a year on credit card overdrafts during 2017, and some of the biggest revolving card providers worldwide charged 10% to 20% in 2019.

Druedahl & Jorgensen (2018) stress the insurance value of revolving credit card balances when borrowing limits tighten. This precautionary borrowing hypothesis postulates that individuals with high risk that credit access may be limited or reduced in the future choose to borrow on their credit cards while keeping some savings to insure against this possibility.

More than one of the proposed explanations may be empirically relevant, so additional research is necessary on consumers use of credit cards in order to determine what policy interventions, if any, are in the general interest. For example, Gathergood & Weber (2014) find that "puzzling" individuals exhibit low self-control, but not particularly low financial literacy. Gorbachev & Luengo-Prado (2019) find that individuals in this puzzle have a different perception of credit access risk. Their results support the theory of Fulford (2015) and Druedahl & Jorgensen (2018).

Following Gorbachev & Luengo-Prado (2019), Table 8 classifies euro area households with credit cards based on their level of credit card debt and liquid money assets (savings):[18]

1. **Borrower-Savers (puzzle):** positive credit card debt and liquid assets;

2. **Savers:** no credit card debt but positive liquid assets;

3. **Borrowers:** no liquid assets but positive credit card debt;

4. **Neutrals:** no credit card debt and no liquid assets.

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[18]Luxembourg sample is too small for this kind of analysis.

Table 8: Credit card holders by behavior, euro area[*]

Survey Year	Puzzle	Savers	Borrowers	Neutrals
	Credit card holders			
2014	8	88	1	3
2018	9	87	1	3
Overall	8	88	1	3
	Credit card debt holders			
2014	85	-	15	-
2018	91	-	9	-
Overall	88	-	12	-

Percent.
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. * France is excluded due to differences in the collection of credit card data.

Figure 10 plots the distribution of the difference between liquid assets and credit card debt, representing the amount of funds available after paying off all credit card debt (potential arbitrage). The average arbitrage amount was €11,840, and the median was about €2,190. For both measures, differences between 2014 and 2018 were very limited. Overall, about 70% of households in the puzzle group could pay off their credit card debt completely, a figure that increased from 68% in 2014 to 71% in 2018.

Figure 10: Puzzle group respondents, difference between liquid assets and credit card debt, euro area*

Euros
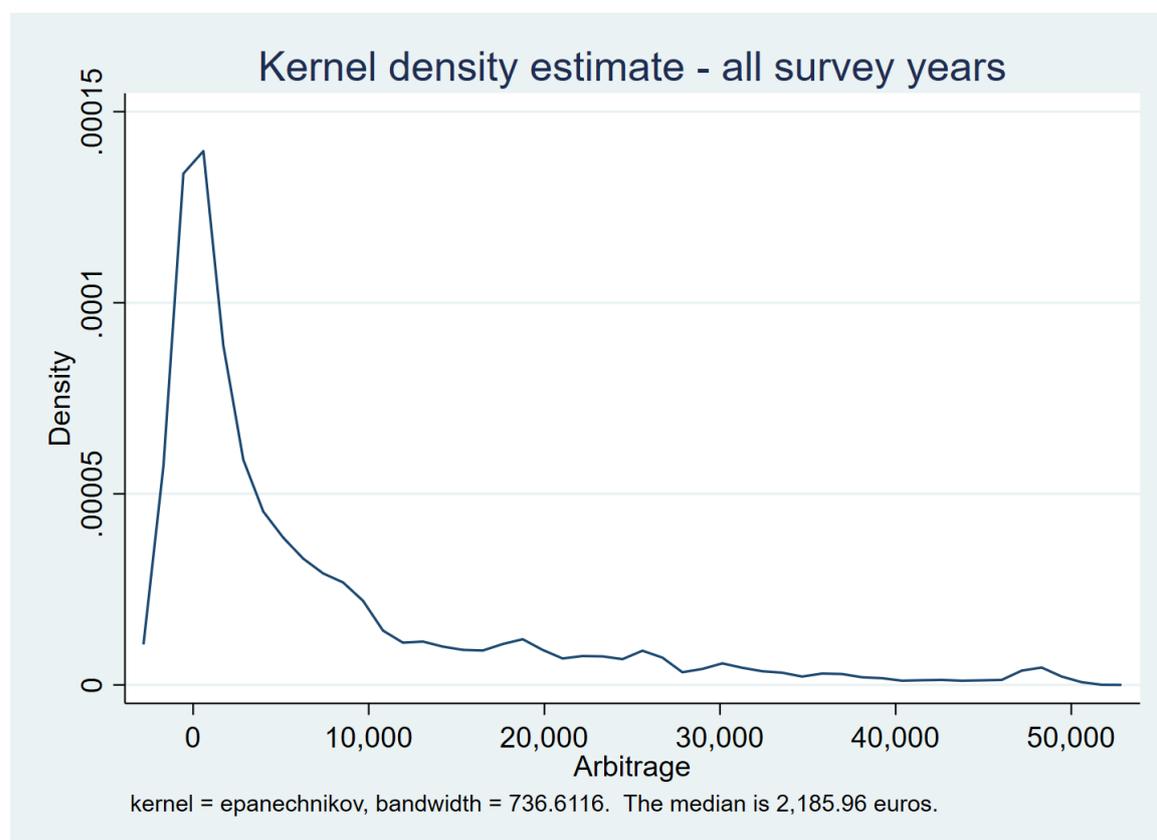
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.
* France is excluded due to differences in the collection of credit card data.

Table 9 breaks down households that hold credit cards (and their subgroups)

according to their personal characteristics. Compared to *Borrowers* and *Neutrals*, households in the puzzle group are more likely to report moderate level of risk aversion, have attained a higher level of education, and have higher income and wealth. Relative to *Savers*, households in the puzzle group are younger, have attained a similar level of education, and are more likely to be employed, have a mortgage, and be credit-constrained. Households in the puzzle group also have lower income, net wealth, and savings.

Below, I estimate a logit regression to assess what factors determine the probability of being in the puzzle group rather than the *savers* group. In particular, I test whether credit constraints and differences in individual risk preferences contribute significantly to this behavior, while controlling for other household characteristics. This could indicate whether euro area data supports the precautionary borrowing hypothesis advanced by Fulford (2015) and by Druedahl & Jorgensen (2018), and confirmed with US data by Gorbachev & Luengo-Prado (2019). According to this hypothesis, credit-constrained individuals should have a significantly higher likelihood of belonging to the puzzle group.

I pool observations from 2014 and 2018 survey waves and consider all euro area countries except France.[19] I will estimate the following logit regression,

$$Y_i \sim Be(\lambda_i), \quad logit(Pr\{y_i = 1\}) = logit(\lambda_i) = ln\left(\frac{\lambda_i}{1 - \lambda_i}\right) = \theta C_i + \gamma R_i + \mathbf{x_i'}\beta \ ,$$
(3)

where the dependent variable is the logit of the probability of being in the puzzle group. C_i denotes credit constraints. This variable can also be interpreted as a measure of credit access risk if we assume that individuals who were denied credit in the past are more likely to expect rejection in the future (see Gorbachev & Luengo-Prado, 2019). R_i is a dummy variable indicating the household reported

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[19]France apparently only collected credit card data for households with credit card debt.

Table 9: Credit card holders by household characteristics, euro area*

percent

	Puzzle	Savers	Borrowers	Neutrals	All credit card holders
Credit constrained	13	5	19	21	6
Moderate risk aversion	31	31	21	22	31
Women	42	41	41	43	41
Age classes					
Less than 35	17	14	20	13	14
35-44	28	21	27	15	21
45-54	26	23	24	28	24
55-64	18	20	18	26	20
65 or more	12	22	11	19	21
Marital status					
Single	25	23	24	25	23
Couple	58	59	57	49	59
Divorced	14	11	15	18	11
Widowed	4	7	4	8	7
Education					
Primary or lower secondary	20	20	32	40	20
Upper and post secondary	40	38	40	39	38
First and second stage of tertiary	40	43	29	21	42
Employment status					
Employee	61	54	59	41	54
Self-employed	10	10	8	16	10
Unemployed	7	5	13	13	6
Retired	13	23	12	18	22
Other	9	8	8	12	8
Housing tenure					
Outright owner	27	41	21	32	39
Owners with mortgage	41	30	31	22	31
Renter	33	29	48	46	30
Financial information - median in 2018 euros					
Gross income	38,600	44,300	28,000	24,200	42,900
Net wealth	86,100	175,000	19,000	53,700	160,200
Arbitrage**	2,200	11,800	-1,400	0	10,000
Savings	3,100	11,800	0	0	10,000

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted. * France is excluded due to differences in the collection of credit card data. ** Arbitrage is the difference between liquid assets and credit card debt.

moderate risk aversion, a personal trait affecting the demand for credit.[20]

Similar to Gorbachev & Luengo-Prado (2019), about 30% of euro area respondents are in the moderate risk aversion group, and respondents in the puzzle group are more likely to report moderate risk aversion than borrowers and neutrals.

The vector x'_i includes demographic variables such as age, gender, education, employment, and the number of non-working members in the household. It also includes gross income and financial assets, and two other dummies indicating whether the household holds mortgage or installment loans. Finally, I include a survey year dummy and country fixed effects, to control for aggregate market changes, any other time trends, for differences in regulations and any other time-invariant differences across euro area countries that may affect the probability of being in the puzzle group.

Table 10 reports the estimation results for equation 3. To test the robustness of the results, the logit estimates reported in the first column are supplemented with OLS estimates in the second column, and the third column reports logit estimates using a more restrictive definition of the puzzle group. In this column, the strict puzzle group only includes households with liquid assets greater than a month of their annual gross income, in addition to credit card debt.[21] These represent about 50% of all households in the original puzzle group.

In all regressions, being credit-constrained has a statistically significant positive coefficient, even after controlling for various household characteristics such as income and financial wealth. Therefore, higher perceived risk that access to credit will be limited or reduced in the future will increase the probability that individuals belong to the puzzle group.

This result is consistent with the precautionary borrowing hypothesis of Ful-

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[20]According to Druedahl & Jorgensen (2018), a significant puzzle group can only be created when households exhibit moderate levels of risk tolerance.

[21]Table 10 compares them to households holding similar savings but without credit card debt.

Table 10: Probability of holding both credit card debt and liquid assets - regression results

	(Logit) Puzzle basic	(OLS) Puzzle basic	(Logit) Puzzle strict
Credit access risk	0.5905***	0.0676***	0.6145***
	(0.1077)	(0.0136)	(0.1888)
Moderate risk aversion	0.2416***	0.0179***	0.2478**
	(0.0857)	(0.0058)	(0.1106)
Age	0.0561***	0.003***	0.0632***
	(0.0172)	(0.001)	(0.0242)
Age^2	−0.0006***	−0.0000***	−0.0007***
	(0.0002)	(0)	(0.0002)
Female	−0.0611	−0.005	−0.0855
	(0.0713)	(0.0048)	(0.0989)
Education : tertiary	−0.0151	0.0006	−0.0291
	(0.0787)	(0.0052)	(0.1038)
Number of non − working members	0.0392	0.0038	0.0838**
	(0.0299)	(0.0023)	(0.0421)
Employed	0.0816	0.0072	−0.0187
	(0.0851)	(0.0059)	(0.1161)
ihs(*income*)	0.0212	0.0028	0.0272
	(0.0347)	(0.0021)	(0.042)
ihs(*financial assets*)	−0.1923***	−0.0159***	−0.1761***
	(0.0178)	(0.0016)	(0.039)
Has HMR mortgage	0.2368***	0.0166***	0.0702
	(0.0721)	(0.0054)	(0.1042)
Has installment loans	0.8873***	0.0758***	0.8096***
	(0.0727)	(0.0073)	(0.112)
Third wave	0.2085***	0.0141***	0.2174**
	(0.0686)	(0.0045)	(0.0995)
Country fixed effects	yes	yes	yes
Number of observations	53,078	53,078	37,479

Note: logit and regression coefficients with standard errors based on 1,000 bootstrap replicates in parentheses (***$p \leq 0.01$, **$p \leq 0.05$,*$p \leq 0.10$). Dependent variable is holding credit card debt and liquid assets for the first and second column, and holding credit card debt and liquid assets $\geq$ one month income for the last column (Puzzle strict). *ihs*() is the inverse hyperbolic sine transformation. France is excluded due to differences in the collection of credit card data. Data are multiply imputed and weighted.

ford (2015) and Druedahl & Jorgensen (2018), and with the empirical finding of Gorbachev & Luengo-Prado (2019) with US data. In fact, the positive coefficient on credit access risk is highly significant for both the baseline and strict puzzle specifications.

Contrary to Gorbachev & Luengo-Prado (2019), who find that a college degree lowers the probability that US households are in the puzzle group, I was not able to find a significant effect of tertiary education for euro area households. This result

is perhaps more similar to Gathergood & Weber (2014), who find no differences in financial literacy scores between respondents in the puzzle and savers group.

Moderate risk aversion has a positive and significant impact on the probability that households belong to the puzzle group.

Unlike income, financial wealth has a negative and significant impact on the probability of being in the puzzle. Not surprisingly, the two dummies, indicating whether the household holds mortgage or installment loans, have positive and significant effects on the probability of being in the puzzle group.

Estimated coefficients on the survey dummy also suggest that the probability of being in the puzzle group changed over time, which might reflect changes in credit card lending.

Finally, these results suggest that in the euro area, as in the US, combining credit card debt with liquid assets seem to reflect credit constraints and differences in individual risk preferences.

6 Conclusions

This paper used data from two waves of the Household Finance and Consumption Survey (HFCS) to analyze how consumer debt and credit card ownership are distributed across demographic groups in Luxembourg and in the euro area as a whole. The paper focuses on installment loans and credit card debt. Installment loans are the largest and most common component of consumer debt among euro area households. Nearly half of euro area households have at least one credit card, but only 5% holds revolving credit card debt. This is the first such analysis using HFCS data for Luxembourg and for the euro area as a whole. For both these components of consumer debt, I modeled the probability of households holding such debt as a function of their socio-economic and demographic characteristics. Logit

regression results could improve the choice of factors to consider when imputing these variables in the data preparation phase of future editions of the survey.

In Luxembourg, about 26% of households held some installment loans in 2018. Although this share was similar to that of the euro area, the level of installment loans per household was almost two times higher in Luxembourg (€13,600) than in the euro area (€6,300). This difference was even greater in the bottom quintile of the gross income distribution, as the level of installment loans among poorer households was three times higher in Luxembourg (€8,700) than in the euro area (€3,000). Considering the *Permanent Income Hypothesis*, Luxembourg households may be more indebted because they expect higher future income than similar households in the euro area. Current income is also higher, resulting in a similar debt-to-income ratio. However, we cannot exclude poorer households in Luxembourg incur more debt to adopt a life-style similar to that of richer households (a sort of *keeping up with the Joneses* effect, see Gali, 1994). Overall, the most common reason households reported for a consumer loan was to purchase a vehicle. In Luxembourg, this share represented 70%, almost twice that in neighboring countries or in the euro area as a whole. This may also explain why the median value of such loans is higher in Luxembourg.

Although households with higher education levels tend to carry more consumer debt, after controlling for other factors more education appears to actually lower the probability of holding installment loans. Given the high correlation between income and education, the latter variable may be capturing the impact of higher income. In fact, higher levels of income also contribute significantly to the probability of holding installment loans, even after controlling for other household characteristics. The intuition is that lenders consider household income in determining both eligibility for credit and the maximum amount a household could be granted. Labor market status is also an important determinant of the probability

of holding installment loans. Employees are more likely to hold installment loans than are the self-employed or the unemployed. In terms of the effect of household composition, the probability of holding installment loans increases with every household member who is not working, reflecting the need for additional funds. In the euro area as a whole, households with a mortgage or renting their main residence are more likely to hold installment loans than households who own their residence. This highlights potential concerns about the vulnerability of households with consumer debt that also hold mortgage debt and may struggle to service their loans.

Credit card ownership among Luxembourg households is nearly twice as prevalent as in the euro area on the whole. However, the share of households with revolving debt on their credit cards is comparable at 5%. In general, credit card ownership is strongly correlated with household income and education. Instead, the probability of holding credit card debt is strongly linked to labor market status and access to credit. Households that reported credit constraints were actually more likely to hold credit card debt.

Finally, this study is the first to provide HFCS evidence of euro area households combining the accumulation of liquid assets with credit card debt in euro area countries. Overall, about 91% of households with revolving credit card debt also had positive liquid assets in 2018, and more than 70% of these households held enough liquid assets to pay back their credit card debt. This behavior is puzzling considering the high interest rates that credit card companies charge for this type of debt, and the low returns that financial institutions pay on current and savings accounts. While differences in individual risk preferences play a fundamental role, credit constraints are also a significant factor in predicting this puzzling behavior. These results are consistent with the precautionary borrowing hypothesis, and with

other empirical findings using US data. This suggests that in the euro area, as in the US, this peculiar behavior of combining credit card debt with liquid assets depends on individual risk preferences and credit constraints. However, contrary to previous findings with US data, higher levels of education do not seem to reduce the tendency to adopt this puzzling behavior in the euro area.

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Appendix

Table 11: Non-mortgage debt in the euro area, 2014 and 2018 survey

Types of debt	Share of all households		Conditional median value*		Conditional mean value*	
	2014	2018	2014	2018	2014	2018
Any non-mortgage debt	**28**	**27**	**5,000**	**5,000**	**14,800**	**13,200**
Installment loans	21	20	6,200	6,300	16,700	14,100
Credit card balances	4	4	1,000	800	1,800	1,500
Lines of credit not secured by residential properties	8	7	1,000	1,200	3,700	4,300
Loans from relatives and friends	3	3	4,600	5,000	12,300	16,000

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.
*2018 Euros (rounded to the nearest 100 euro).

Table 12: Non-mortgage debt in Neighboring countries, 2014 and 2018 survey

Types of debt	Share of all households		Conditional median value*		Conditional mean value*	
	2014	2018	2014	2018	2014	2018
Any non-mortgage debt	**33**	**31**	**4,700**	**5,500**	**13,400**	**13,200**
Installment loans	25	24	5,700	6,500	14,800	13,800
Credit card balances	2	3	600	500	1,400	1,200
Lines of credit not secured by residential properties	10	10	1,000	1,000	2,900	4,000
Loans from relatives and friends	3	2	5,110	5,800	13,300	15,600

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.
*2018 Euros (rounded to the nearest 100 euro).

Table 13: Installment loans, euro area households by characteristic

Characteristic	Share with installment loans		Conditional median value*		Conditional mean value*	
	2014	2018	2014	2018	2014	2018
Sex						
Women	20	19	5,400	6,000	14,000	12,100
Men	22	21	6,900	7,000	18,800	15,900
Age classes						
Less than 35	31	29	5,700	6,400	14,800	12,300
35-44	29	27	7,100	6,800	18,000	15,100
45-54	24	25	7,000	7,100	18,800	16,100
55-64	21	20	6,400	6,500	16,000	14,600
65 or more	8	8	4,500	4,000	14,400	10,900
Marital status						
Single	23	22	5,400	6,100	14,200	13,300
Couple	23	22	7,400	7,000	19,500	15,500
Divorced	22	20	4,300	4,000	11,900	11,000
Widowed	8	8	4,100	3,900	10,700	11,400
Education						
Primary or lower secondary	16	16	5,100	4,900	14,400	10,500
Upper and post secondary	24	22	5,400	6,400	14500	13,800
First and second stage of tertiary	22	21	8,900	7,500	22,400	17,400
Employment status						
Employee	28	27	6,600	7,000	16,300	13,300
Self-employed	25	25	9,900	9,000	32,200	29,400
Unemployed	19	18	4,200	3,500	11,300	11,900
Retired	11	10	5,000	4,500	14,500	10,400
Other	18	17	5,700	5,000	11,300	9,900
Housing tenure						
Outright owner	15	14	8,000	7,000	22,700	17,500
Owners with mortgage	29	27	7,600	7,500	19,300	15,000
Renter	23	22	4,400	5,000	10,800	11,400
All households	21	20	6,200	6,300	16,700	14,100

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.
Characteristics refer to the household reference person, who is the most financially knowledgeable member.
*2018 Euros (rounded to the nearest 100 euro).

Table 14: Installment loans, households in neighboring countries by characteristic

Characteristic	Share with installment loans		Conditional median value*		Conditional mean value*	
	2014	2018	2014	2018	2014	2018
Sex						
Women	24	23	4,700	6,000	13,100	12,100
Men	26	25	6,300	7,000	16,300	15,200
Age classes						
Less than 35	35	35	4,800	6,200	12,000	12,100
35-44	33	34	6,900	7,200	20,000	16,000
45-54	29	29	6,600	7,900	15,800	16,300
55-64	25	23	6,200	6,900	14,300	13,500
65 or more	10	10	3,600	4,500	10,600	8,700
Marital status						
Single	27	26	4,400	6,400	11,100	13,800
Couple	28	27	7,300	7,500	18,500	15,200
Divorced	26	22	3,700	3,100	10,500	9,200
Widowed	9	9	3,500	4,200	9,600	9,400
Education						
Primary or lower secondary	21	21	4,400	4,400	13,300	9,200
Upper and post secondary	28	27	5,000	6,300	12,900	13,200
First and second stage of tertiary	23	23	8,300	7,900	19,700	17,100
Employment status						
Employee	32	32	6,100	7,100	15,000	13,900
Self-employed	29	27	8,800	9,000	28,500	29,900
Unemployed	24	22	2,900	2,300	10,000	7,700
Retired	13	12	4,200	4,800	12,400	9,200
Other	27	27	5,300	5,000	9,600	9,800
Housing tenure						
Outright owner	19	18	9,200	8,000	26,600	16,900
Owners with mortgage	32	30	6,900	8,000	12,900	16,000
Renter	26	26	3,700	5,000	9,700	11,400
All households	25	24	5,700	6,500	14,800	13,800

Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.
Characteristics refer to the household reference person, who is the most financially knowledgeable member.
*2018 Euros (rounded to the nearest 100 euro).

Table 15: Main installment loans among euro area households, 2014 and 2018 survey

Loan characteristic	Share of all households		Conditional median value		Conditional mean value	
	2014	2018	2014	2018	2014	2018
Number of installment loans			1	1	1.3	1.3
Main installment loan	21	20				
Initial amount			10,000	10,000	20,900	16,200
Initial duration (years)			4	4	5	5
Annual interest rate (percent)			3.2	3	3.78	3.88
Monthly repayment (2018 Euros)			200	200	300	300
Second installment loan	5	5				
Initial amount			4,600	5,000	9,800	9,500
Initial duration (years)			3	3	4	4
Annual interest rate (percent)			2.09	2.54	3.47	3.75
Monthly repayment (2018 Euros)			100	100	200	200
Overall	21	20				
Outstanding (2018 Euros)			6,200	6,300	16,700	14,100
Monthly repayment (2018 Euros)			200	200	300	300

Amounts in euros (rounded to the nearest 100 euro)
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

Table 16: Main installment loans among neighboring countries households, 2014 and 2018 survey

Loan characteristic	Share of all households		Conditional median value		Conditional mean value	
	2014	2018	2014	2018	2014	2018
Number of installment loans			1	1	1.3	1.3
Main installment loan	25	24				
Initial amount			9,100	10,000	18,000	16,800
Initial duration (years)			4	5	5	5
Annual interest rate (percent)			2.51	2.4	2.94	2.83
Monthly repayment (2018 Euros)			200	200	200	300
Second installment loan	6	6				
Initial amount			4,600	5,000	9,100	9,200
Initial duration (years)			4	4	4	4
Annual interest rate (percent)			1.51	2.1	2.51	2.73
Monthly repayment (2018 Euros)			100	100	200	200
Overall	25	24				
Outstanding (2018 Euros)			5,700	6,500	14,800	13,800
Monthly repayment (2018 Euros)			200	200	300	400

Amounts in euros (rounded to the nearest 100 euro)
Source: Own calculations based on the 2nd and 3rd wave of the HFCS, data are multiply imputed and weighted.

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