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THE CROSS-BORDER HOUSEHOLD FINANCE AND CONSUMPTION SURVEY: RESULTS FROM THE SECOND WAVE

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The Cross-border Household Finance and Consumption Survey:
Results from the second wave♣

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Abstract:

This report presents the methodology and main descriptive results of the second wave of the Cross-border Household Finance and Consumption Survey (XB-HFCS) conducted in 2014. The survey provides novel information on the economic and financial situation of households employed in Luxembourg but living in neighbouring countries (cross-border commuters), who contribute substantially to Luxembourg's economy. We present results on the composition of their assets and liabilities, net wealth, income and consumption. Household net wealth of cross-border commuters is more equally distributed compared to that of employed households resident in Luxembourg. In addition, cross-border commuters have a higher median net wealth and gross income compared to those of the employed population in their country of residence. About 26% of their financial assets and 19% of their liabilities are located in Luxembourg. While the majority of the non-durable expenditures are done in the country of residence, cross-border commuters consume about 20% of their household income in Luxembourg.

Keywords: cross-border commuters, households, survey, assets, liabilities, wealth, income, consumption

JEL-Codes: D31, D14, C81, C83, J61

♣ This report uses data from the Cross-border Household Finance and Consumption Survey. This report should not be reported as representing the views of the BCL or the Eurosystem. The views expressed are those of the authors and may not be shared by other research staff or policymakers in the BCL, the Eurosystem or the Eurosystem Household Finance and Consumption Network.

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Résumé non-technique

Les travailleurs frontaliers, qui sont employés au Luxembourg et résidents dans un pays limitrophe, sont très importants pour l'économie luxembourgeoise. Ils représentaient par exemple près de 45 % des emplois au Luxembourg, en 2017, et contribuent à la demande de produits et services luxembourgeois.

Afin de mieux connaître cette population, la Banque centrale du Luxembourg (BCL), en coopération avec le Luxembourg Institute of Socio-Economic Research (LISER), mène une enquête sur le comportement financier et de consommation des ménages comprenant des travailleurs frontaliers (XB-HFCS). Cette étude doit permettre d'améliorer la compréhension du marché du travail dans la Grande Région et l'analyse des effets de la politique monétaire unique. Les données recueillies fournissent des informations sur la situation économique des travailleurs frontaliers et de leurs familles. Elles détaillent en particulier leurs actifs et passifs, leurs revenus, la nature de leur emploi, leur niveau d'éducation, leur comportement financier (par exemple l'accès au système bancaire et au crédit) et leurs choix de consommation.

Ce cahier présente les principaux résultats de la deuxième vague de cette enquête, menée en 2014, ainsi qu'une comparaison avec les résultats de l'enquête sur le comportement financier et de consommation des ménages résidant au Luxembourg (LU-HFCS) conduite simultanément. Ces deux enquêtes sont les seules sources de données détaillées sur la situation des ménages résidant au Luxembourg et des travailleurs frontaliers. La deuxième vague de l'enquête XB-HFCS est basée sur un échantillon représentatif comportant plus de 2 400 ménages de travailleurs frontaliers, identifiés à partir du registre de l'Inspection Générale de la Sécurité Sociale (IGSS).

Les résultats indiquent que les frontaliers habitent généralement dans leur pays de naissance, sont mariés (ou en partenariat) et ont un niveau d'éducation élevé. Ils sont en majorité employés en contrat à durée indéterminée et travaillent au Luxembourg depuis en moyenne dix ans. Par rapport aux ménages résidant au Luxembourg, les frontaliers sont plus susceptibles d'être employés dans les secteurs du commerce de gros et de détail et le secteur financier. La voiture constitue leur principal moyen de transport et ils ont à parcourir un trajet d'une durée moyenne de 46 minutes pour se rendre sur leur lieu de travail. C'est deux fois plus que le temps de transport nécessaire pour les travailleurs résidents au Luxembourg, qui est de 23 minutes.

Concernant leur situation financière, le patrimoine net moyen des frontaliers a augmenté d'environ 9 % en termes nominaux par rapport à 2010 (de 239 900 euros à 261 900 euros). Par ailleurs, la médiane a augmenté de presque 20 % par rapport à 2010 (de 167 000 euros à 239 900 euros). En moyenne, le patrimoine net des ménages frontaliers ne représente que la moitié de

celui des ménages employés résidant au Luxembourg. Cette différence s'explique principalement par la valeur plus élevée des biens immobiliers au Luxembourg par rapport aux régions voisines.

Les résultats indiquent également que les inégalités de patrimoine sont moindres parmi les ménages frontaliers étudiés par cette enquête, par comparaison avec les ménages employés résidant au Luxembourg. Le patrimoine net de ces ménages frontaliers les plus fortunés (quintile supérieur) est environ deux fois plus élevé que celui du quatrième quintile et entre trois et quatre fois plus élevé que celui du troisième quintile. Les 20 % des ménages frontaliers les moins fortunés disposent d'un patrimoine net similaire à celui des ménages employés résidant au Luxembourg du premier quintile, soit environ 6 000 euros.

En dépit de ces différences, la composition du patrimoine de ces ménages frontaliers est similaire à celle des ménages employés résidant au Luxembourg. Les actifs réels représentent plus de 80 % du patrimoine moyen et la dette hypothécaire représente environ 80 % de la dette totale moyenne. Le niveau d'exposition aux actifs risqués est limité : les investissements en actions et fonds communs de placement représentent moins de 20 % des actifs financiers des ménages.

La résidence principale est l'actif le plus important détenu par ces ménages frontaliers : 71 % d'entre eux en sont propriétaires. Le taux de propriété le plus élevé se trouve en Belgique (79 %) et le plus bas en Allemagne (60 %). En conséquence, les actifs réels sont majoritairement détenus dans le pays de résidence, mais plus de 20 % des actifs financiers et des passifs totaux de ces ménages frontaliers sont détenus au Luxembourg.

De plus, les valeurs médianes du patrimoine net et du revenu brut des frontaliers sont beaucoup plus élevées que les valeurs nationales correspondantes. En comparaison, le revenu brut médian des ménages employés résidant au Luxembourg est 30 % plus élevé que celui des frontaliers. Une partie de cette différence s'explique par la provenance des revenus des frontaliers, dont environ 20 % sont issus de leur pays de résidence.

Les résultats de cette enquête montrent que les ménages frontaliers ont souvent une certaine aversion au risque. En termes de placements financiers, les ménages les plus adverses au risque ont habituellement des comptes à vue et d'épargne, ainsi que des plans d'assurance-vie ou épargne-pension. Les ménages les plus éduqués ont tendance à prendre plus de risques et les ménages ayant une aversion au risque moins prononcée sont aussi plus susceptibles de gagner un revenu brut élevé. Ces ménages sont plus susceptibles d'investir dans des actions et des fonds communs de placement.

Enfin, les frontaliers consomment des produits et utilisent des services tant au Luxembourg que dans leur pays de résidence. En particulier, si leurs dépenses en biens non-durables sont

principalement effectuées dans leur pays de résidence, les frontaliers dépensent presque 20 % du revenu du ménage au Luxembourg.

1. Introduction

Luxembourg's labour market is highly reliant on foreign workers from neighbouring regions, who commute to Luxembourg every day (cross-border commuters).[1] These regions are part of the "Grande Région" (Greater Region) of Luxembourg which consists of Luxembourg, Wallonia and the German-speaking community of Belgium (Belgium), Saarland and Rhineland-Palatinate (Germany) and Lorraine (France), presenting a total area of 65,401 km^2. It is estimated that in 2014, at the time of the data collection for this report, approximately 161,000 individuals were cross-border commuters to Luxembourg, accounting for 43.5% of Luxembourg labour force (Statec, 2014). In gross terms (excluding employers' contributions), they earned more than €8 billion in Luxembourg in 2014 and paid around €900 million in tax (Michaux, 2015). However, they do not only contribute to economic output and tax revenues, but also support the demand of products and services through their consumption. In terms of household consumption, the cross-border commuters spent on average €9,300 per year in Luxembourg, amounting in total to an estimated €1 billion in 2010. This represented about 20% of the gross annual income they earned in Luxembourg (Mathä, Porpiglia and Ziegelmeyer, 2012, 2017).

In order to assess the financial and economic situation of cross-border commuters, the Banque centrale du Luxembourg (BCL), in cooperation with the Luxembourg Institute of Socio-Economic Research (LISER), conducts the Cross-border Household Finance and Consumption survey (XB-HFCS). The first wave of this survey was launched in 2010 together with a survey of private households resident in Luxembourg, the Luxembourg Household Finance and Consumption Survey (LU-HFCS). While the LU-HFCS is part of a wider European Project, the Eurosystem Household Finance and Consumption Survey (HFCS) (HFCN, 2013, 2016) coordinated by the European Central Bank (ECB), the XB-HFCS is specifically designed to complement the LU-HFCS with information on cross-border commuters and their households. The information contained in these surveys contribute to the understanding of households' economic decisions, which is important to guide economic policy.

The XB-HFCS collects information on the financial situation and behaviour of cross-border commuters, including their employment, access to banking and credit, housing decisions, education as well as consumption. It is one of the few sources that collects detailed data about cross-border commuters (and their households) and the only source that collects detailed household level information on assets and liabilities (BCL, 2012a, 2012b; Mathä, Porpiglia and Ziegelmeyer, 2012). The XB-HFCS (similar to the LU-HFCS) is a cross-sectional survey, which does

[1] In what follows, we use the term "cross-border commuter" to refer to the household member employed in Luxembourg or the whole household.

not follow respondents over time. It aims however at being representative of the household population in the reference year of the data collection.

This report presents results from the second wave of the XB-HFCS, which was conducted in 2014. Preliminary results were presented in BCL bulletin 2017-01. This report presents comparative results from the XB-HFCS and the LU-HFCS, which was also conducted in 2014. To increase comparability of results, this paper focuses on cross-border commuters, which by definition are employed, and *employed* households residing in Luxembourg. Where pertinent, we also provide results from the corresponding Eurosystem HFCSs conducted in neighbouring countries (regarding employed households only).

The survey shows that, overall, cross-border commuters reside in their country of birth, are married or in couple and have attained a high level of education. The majority of cross-border commuters are employed with a permanent contract and, on average, have been working in Luxembourg for a decade. Compared to employed Luxembourg resident households, cross-border commuters are more likely to be employed in the private sector and sectors such as "Wholesale and Retail trade" and "Financial Sector". They generally use the car as main mean of transport (86%) and commute to work an average of 46 minutes one way.

Respondents to the survey were asked a range of questions related to their financial situation. In 2014, average household net wealth of cross-border commuters was about 9% higher in nominal terms compared to 2010 (from €239,900 to €261,900). The median increased by almost 20% in nominal terms from €167,000 to €199,300. Cross-border commuters reported about half the net wealth of employed Luxembourg residents, given the lower average value of the household main residence in neighbouring regions than in Luxembourg. The median net wealth of cross-border commuters from France and Germany was significantly higher than that of the total employed population in the respective countries. Considering the distribution of the net wealth of cross-border commuters, we observe a marked difference between bottom and top quintiles, which was nevertheless less pronounced than for employed households resident in Luxembourg. Households in the top quintile owned about twice as much as the second highest quintile, and about three to four times as much as the middle quintile. Moreover, while household net wealth of employed Luxembourg residents and cross-border commuters was comparable if we consider the bottom 20% of the distribution (both around €6,000), there existed a considerable gap at the top of the distribution. In fact, median household net wealth in the richest quintile was around €1,400,000 for employed Luxembourg residents and €540,000 for cross-border commuters. Despite the differences in the level of net wealth, the composition of household wealth between these two groups does not differ by much. For both, real assets represent more than 80% of mean total assets, while mortgage debt represents about 80% of mean total debt. Both cross-border

commuters and employed Luxembourg residents invested in risky assets (stocks + mutual funds) about 16% of household financial assets. While the majority of real assets are held in the country of residence, more than 20% of financial assets and total liabilities of cross-border commuters are held in Luxembourg.

Compared with corresponding information from the Eurosystem HFCS, the median gross income of cross-border commuters were higher than those of total employed households in their respective country of residence, i.e. Belgium, France and Germany. Relative to employed Luxembourg residents, median household gross income was about 30% lower. Part of this income gap can be explained by the fact that, on average, a sizeable share of household gross income of cross-border commuters (about 20%) was not earned in Luxembourg.

Survey respondents were also asked about their attitude towards risk. The majority of cross-border commuters and employed Luxembourg residents tend to be risk averse (around 71%). Nevertheless, highly educated households tend to be more risk-loving. Moreover, households with higher gross income are less risk-averse. Overall, risk-averse households typically own sight and savings accounts, as well as voluntary pension or life insurance plans. Conversely, risk-neutral and risk-loving households are more likely to invest in mutual funds and stocks.

Finally, cross-border commuters consume products and use services in both Luxembourg and their respective country of residence. Although the majority of non-durable expenditures remained in the respective country of residence, they still consumed nearly 20% of their gross household income in Luxembourg in 2014.

This report is structured as follows: Section 2 describes the survey preparation and fieldwork. Section 3 presents the data treatment, which consists of editing, imputation and weighting of the collected information. Section 4 presents the main final sample characteristics. The main results are presented in sections 5 to 9. Section 5 presents the assets and liabilities and section 6 the income of cross-border commuters. Section 7 compares the results on income from this survey with aggregate income data from the "Inspection Générale de la Sécurité Sociale" (IGSS). Section 8 explores the risk aversion of cross-border commuters and its correlation with education, income and financial assets. Section 9 presents the consumption of cross-border commuters while section 10 concludes.

2. Survey preparation and fieldwork

This section describes the stratified random sampling, explains the reasons for the selected survey mode, outlines the content of the questionnaire and describes the development of the field phase.

2.1 Sampling

The target population of the XB-HFCS is the entire population of households residing in Luxembourg neighbouring countries within the "Grande Région", with at least one household member working in Luxembourg.[2] We use an indirect sampling technique since registers with information on households of cross-border commuters do not exist. The sampling frame contains all cross-border commuters at the end of December 2012, and it is based on the social security register of Luxembourg (Inspection Générale de la Sécurité Sociale, IGSS). Thus, the target unit (the household) can contain more than one sampling unit since more than one cross-border commuter can belong to the same household. The weighting procedure described below accounts for the fact that the link between the sampling and the target population can be either one-to-one or many-to-one.

A stratified random sampling procedure was used to draw 80% of the gross sample (Table 1). The sampling frame of 137,451 individuals was divided into 60 strata based on the combination of three auxiliary variables: country of residence, gender and individual monthly gross income, i.e. labour and self-employed income. Cross-border commuters in the highest two income strata (more than €6,450 per month) were randomly oversampled at a rate of 20%, resulting in individuals from these income brackets representing 28% of the final gross sample. Since certain asset categories are only held by wealthier households, oversampling is necessary to increase the number of households owning uncommon asset categories in the sample. This increases the reliability of the estimates for these categories. The gross sample consisted of 15,000 cross-border commuters, and the objective was to collect information from at least 1,500 respondents.

[2] A household is defined as people living together and sharing their financial resources and/or expenses.

Table 1. Sample design by stratum and distribution of the reference population								
Strata	Country	Gender	Income	Population	in %	First allocation	Oversampling	Gross sample
1	Belgium	Male	less than 1000	182	0.1	35	0	35
2			1000 - 1999	941	0.7	82	0	82
3			2000 - 2499	2,989	2.2	260	0	260
4			2500 - 2999	4,255	3.1	371	0	371
5			3000 - 3499	3,493	2.5	304	0	304
6			3500 - 3999	2,221	1.6	193	0	193
7			4000 - 4999	2,793	2.0	243	0	243
8			5000 - 6450	2,648	1.9	231	0	231
9			6451 -7999	1,643	1.2	143	357	500
10			8000 and more	2,192	1.6	191	477	668
11		Female	less than 1000	367	0.3	40	0	40
12			1000 - 1999	1,896	1.4	165	0	165
13			2000 - 2499	2,020	1.5	176	0	176
14			2500 - 2999	1,342	1.0	117	0	117
15			3000 - 3499	1,064	0.8	92	0	92
16			3500 - 3999	891	0.6	77	0	77
17			4000 - 4999	1,519	1.1	132	0	132
18			5000 - 6450	1,248	0.9	108	0	108
19			6451 -7999	558	0.4	48	121	169
20			8000 and more	456	0.3	39	100	139
21	Germany	Male	less than 1000	293	0.2	35	0	35
22			1000 - 1999	880	0.6	76	0	76
23			2000 - 2499	3,111	2.3	271	0	271
24			2500 - 2999	4,483	3.3	391	0	391
25			3000 - 3499	3,239	2.4	282	0	282
26			3500 - 3999	2,101	1.5	183	0	183
27			4000 - 4999	2,673	1.9	233	0	233
28			5000 - 6450	2,284	1.7	199	0	199
29			6451 -7999	1,422	1.0	124	309	433
30			8000 and more	1,672	1.2	145	364	509
31		Female	less than 1000	536	0.4	40	0	40
32			1000 - 1999	1,811	1.3	158	0	158
33			2000 - 2499	1,903	1.4	166	0	166
34			2500 - 2999	1,545	1.1	134	0	134
35			3000 - 3499	1,237	0.9	107	0	107
36			3500 - 3999	1,055	0.8	92	0	92
37			4000 - 4999	1,548	1.1	135	0	135
38			5000 - 6450	1,196	0.9	104	0	104
39			6451 -7999	475	0.3	41	103	144
40			8000 and more	348	0.3	30	78	108
41	France	Male	less than 1000	413	0.3	36	0	36
42			1000 - 1999	2,183	1.6	190	0	190
43			2000 - 2499	6,410	4.7	559	0	559
44			2500 - 2999	8,703	6.3	759	0	759
45			3000 - 3499	7,005	5.1	611	0	611
46			3500 - 3999	4,370	3.2	381	0	381
47			4000 - 4999	4,915	3.6	429	0	429
48			5000 - 6450	3,979	2.9	347	0	347
49			6451 -7999	1,936	1.4	169	421	590
50			8000 and more	1,748	1.3	152	380	532
51		Female	less than 1000	1,255	0.9	109	0	109
52			1000 - 1999	5,574	4.1	486	0	486
53			2000 - 2499	5,154	3.7	449	0	449
54			2500 - 2999	3,475	2.5	303	0	303
55			3000 - 3499	2,637	1.9	230	0	230
56			3500 - 3999	2,217	1.6	193	0	193
57			4000 - 4999	3,330	2.4	290	0	290
58			5000 - 6450	2,287	1.7	199	0	199
59			6451 -7999	829	0.6	72	180	252
60			8000 and more	501	0.4	43	110	153
	Overall			**137,451**	**100**	**12,000**	**3,000**	**15,000**

Source: Bienvenue et al. (2014)

2.2. Survey mode and questionnaire

In contrast to the LU-HFCS, which is a face-to-face computer-assisted personal interview (CAPI), the second wave of the XB-HFCS was conducted as a computer-assisted web interview (CAWI). Web-based surveys offer a wide range of advantages, such as different interface designs to support the understanding of questions, automatic management of filters and the implementation of consistency checks. One disadvantage of this type of survey is the possibility of a survey mode bias. If a person does not regularly use the Internet, it may be more likely that (s)he does not participate in the survey. However, internet use is widespread in all three neighbouring countries. According to Eurostat figures for 2012, 86% of the total population in France and 88% of the population in both Belgium and Germany use the internet at least once per week. Internet usage is even higher among individuals in working age (25-64 years). We are therefore confident that using a web-based survey introduces no bias, or in the worst case only a limited one. To alleviate any remaining concerns, the construction of weights, described below, corrects for under-coverage of internet use across various groups. In addition, each selected household had the possibility to request a paper version of the questionnaire.

The questionnaire contains the following nine main sections. To ensure comparability they correspond closely to those in the LU-HFCS:

Section 1: Socio-demographic characteristics of the cross-border commuting worker
Section 2: Professional characteristics of the cross-border commuting worker
Section 3: Real assets and their financing
Section 4: Other liabilities
Section 5: Private businesses and financial assets
Section 6: Pensions and insurance policies
Section 7: Income
Section 8: Intergenerational transfers and gifts
Section 9: Consumption

Compared to the first wave, which was conducted by means of paper and pencil interviews (PAPI), the web-based survey mode allowed assessing assets (mainly financial assets) and liabilities (mainly non-mortgage debt) in much more detail, as more complex filtering rules could be applied. Since the second wave of the LU-HFCS contained a number of country-specific questions with respect to real assets and their financing, section 3 of the XB-HFCS was extended correspondingly.

The online questionnaire was available in two languages: French and German. Households in Belgium and France received a cover letter in French and households in Germany one in German. The online program allowed switching from one language to the other while answering the questionnaire. Although the online survey asked for a precise answer to each question, options

such as “Don’t know” or “No answer” were available for each question. When questions asked for a value in euro, then the options “Don’t know” and “No answer” were followed by an optional question asking to provide upper and lower bounds or to select a range of values from various intervals shown on the screen.

A novelty of the second wave was to ask for the geographical breakdown of various asset and liability categories. The following three answer categories were available: country of residence, Luxembourg and other countries. If one of the three geographical areas was left unanswered, the household was asked to provide the total amount across all countries.

2.3 Fieldwork

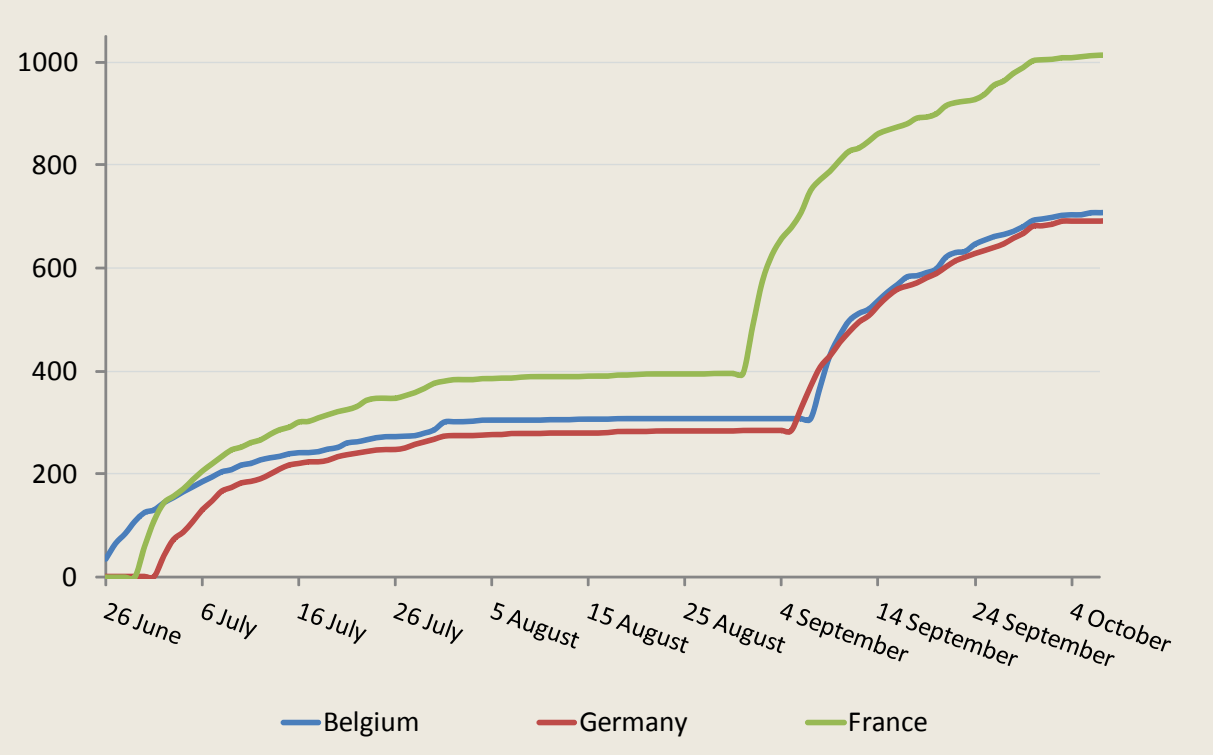
The data collection started at the end of June 2014 and lasted until the beginning of October 2014. BCL and LISER announced the start of the fieldwork by a common press release on 27 March 2014. Several newspapers reported the start of the second wave of the XB-HFCS. Information about the survey was provided to the interested public on a dedicated webpage of the BCL. At the end of June 2014, cover letters and leaflets were mailed to sampled cross-border commuters. The leaflet described the survey, presented some relevant results from the first wave, explained the use of the data and the confidentiality aspects, stressed the importance to participate and provided the contact details of BCL and LISER. Households were asked to connect to a secured website, to provide the indicated person-specific login name and password, and then to follow the instructions of the online questionnaire. Paper questionnaires could be downloaded online or received by mail if requested. A prize draw was used to encourage households to participate. Participating households could win an iPad or one of 10 numismatic products of the BCL with a sales price of €130 each. In total, 14,778 cross-border commuters were contacted. Of those, 222 cross-border commuters were identified as “out of scope”, either because they had moved outside the “Grande Région” or because their addresses from the IGSS register were invalid. In the first letter, sampled households were invited to respond until the end of June 2014. By that time, only 900 households had participated (Figure 1). A reminder was thus sent to all non-participants after the summer holidays (between the end of August and the beginning of September) with a new deadline requesting completion of the survey before the end of September 2014. As completed interviews were still being received at the beginning of October, the fieldwork was slightly extended. The fieldwork was finally closed on the 10 October 2014.

Table 2. Sample and fieldwork		
	Wave 2010	**Wave 2014**
Sample frame	Luxembourg Social Security Register	
Sampling unit	Cross-border commuting fiscal households	
Target population	Households with at least one cross-border commuting worker in the "Grande Région" as of	
	… 31 December 2010	… 31 December 2013
Gross sample	5,000 XB commuters,	15,000 XB commuters,
	3.9% of target population	10.9% of target population
Oversampling of wealthy	Yes: 20%	Yes: 20%
Sample size	715 households	2,414 households
	(planned 500)	(planned 1,500)
Representative of	99,181 households	121,757 households
	294,772 individuals	341,933 individuals
Number of strata	42 (country, gender, income)	60 (country, gender, income)
Interview mode	PAPI	CAWI
Field phase	11/2010 – 01/2011	06/2014 – 10/2014
Response rate	14.4%	16.3%

In total 2,392 completed interviews were received, 7% of which used a paper questionnaire (Table 3). An additional 1,777 households started answering the questionnaire but did not complete it, either because they paused the survey and did not return to it or because they reached the timeout (30 minutes without any activity). An additional nine households were deleted from the net sample since they were considered "out of scope". They had reported that the cross-border commuter had retired, was unemployed or inactive. Despite not having completed the questionnaire, several households had nonetheless almost reached its end. Therefore, we chose to include in the net sample an additional 73 households that had at least completed the section on income (Section 7). In fact, sections 8 and 9 are not at the core of this survey, and therefore are fully imputed for these respondents. For 42 households, the item non-response rate exceeded 35% and did not contain any reliable information on income and the household main residence

(HMR). These households were subsequently dropped from the net sample. As a result, the final net sample contains 2,414 households. This is substantially above the initial target of 1,500 households and more than three times the size of the net sample of 715 households obtained in the first wave in 2010. The response rate, defined as the final net sample size divided by the gross sample adjusted for the "out of scope" cross-border commuting workers (=222+9), increased from 14.4% in 2010 to 16.3% in 2014.

Figure 1. Number of completed interviews - 2014



Source: XB-HFCS 2014.

Table 3. Interview outcome as at 10 October 2014

	absolute numbers				in % of gross sample			
	FR	BE	DE	TOTAL	FR	BE	DE	TOTAL
Completed	**1,002**	**703**	**687**	**2,392**	**14.1**	**17.2**	**18.1**	**15.9**
thereof paper questionnaires	78	48	44	170	1.1	1.2	1.2	1.1
Paused and Timeout	**771**	**477**	**529**	**1,777**	**10.8**	**11.7**	**13.9**	**11.8**
Unit non-response	**5,333**	**2,914**	**2,584**	**10,831**	**75.0**	**71.2**	**68.0**	**72.2**
thereof out of scope	102	83	37	222	1.4	2.0	1.0	1.5
Overall	**7,106**	**4,094**	**3,800**	**15,000**	**100**	**100**	**100**	**100**

Source: Bienvenue et al. (2014).

3. Data treatment

This section discusses the data treatment, which consists of four separate parts: analysis of unit non-response, editing, imputation and weighting.

3.1 Unit non-response

Response rates varied considerably across strata and stratum variables (Table 4). The lowest response rate was around 6%; it was obtained for male cross-border commuters residing in France with a monthly gross income lower than €1,000 or in the range €1,000-1,999. The highest response rate of 32.4% was obtained for male cross-border commuters from Germany with a gross monthly income of at least €8,000. Cross-border commuters from Germany had the highest response rate (18.3%), while those from France had the lowest (14.2%). In addition, the response rate in 2014 was slightly higher for male than for female cross-border commuters (17.2% versus 14.0%). As was the case in 2010, response rates varied substantially across income strata (Mathä, Porpiglia and Ziegelmeyer, 2012). The lowest response rate was for commuters in low income strata (~10%). It increased to almost 25% for respondents with a gross monthly income greater than €8,000.

Table 4. Response rate

Wave 1		Wave 2	
Criteria	Response rate (%)	Criteria	Response rate (%)
Country of residence		**Country of residence**	
France	15.0	France	14.2
Belgium	16.0	Belgium	17.6
Germany	14.2	Germany	18.3
Gender		**Gender**	
Male	15.0	Male	17.2
Female	15.1	Female	14.0
Income		**Income**	
less than 1500	9.3	less than 1000	10.5
1500-1999	11.2	1000 - 1999	9.2
2000-2499	12.7	2000 - 2499	10.1
2500-2999	12.7	2500 - 2999	10.7
3000-3999	13.8	3000 - 3499	13.6
4000-5999	15.5	3500 - 3999	15.4
6000€ or more	19.6	4000 - 4999	17.3
		5000 - 6450	21.7
		6451 -7999	21.6
		8000 and more	24.6

Source: Berger (2011) and Bienvenue et al. (2014).
Note: The sample size of wave 2 refers to the net sample of 2392 prior to validation (see Table 3).

3.2 Editing

The software program contained several automatic checks, which mainly focused on checking continuous variables. These include "informative bounds", "consistency checks", and "critical checks". Based on answers by other respondents in the sample or past experience, "informative bounds" alerted respondents that the answer provided may be incorrect. Before moving to the subsequent question, a pop-up screen asked respondents to either confirm or correct their response. For example, if a cross-border commuter stated an average working time per week of 75 hours, then the program subsequently asked: "Are you sure that you work more than 60 hours a week on average?". "Informative bounds" try to rule out typos but do not enforce a specific answer. Similarly, "consistency checks" do not enforce a correction but inform respondents when their answers are inconsistent with responses previously provided. For example, if the date of birth plus 15 years exceeded the starting year in the current job, a pop-up screen showed the following message: "Your starting year in the current job seems to be too early compared to your year of birth." and asked to confirm or to correct the provided value. "Critical checks", on the contrary, enforce the provision of an answer within a specific range. The number of years living in the country of residence, for example, is not allowed to be larger than the age of the respondent.

Although automatic checks were carefully implemented for various questions, they do not guarantee the consistency and reliability of all answers by respondents. For this reason, we additionally implemented a manual editing process that checked the consistency of answers in relation to continuous variables. As a result, 805 observations (0.02% relative to all answers) were set to missing and 705 observations (0.02%) were set to a modified value (Table 5). As respondents could answer some questions in ranges, those ranges were also validated and if needed set to missing or a modified value. Finally, boundary values for the geographical breakdown of asset and liability categories were updated with information on the sum over all categories provided.

3.3 Imputation

Missing values occur when respondents select options such as "Don't know" or "No answer", which were available for almost every question. In line with data treatment in the LU-HFCS, missing values in the XB-HFCS were imputed by using the ECB Multiple Imputation Routine "EMIR 2.2" (Biancotti et al., 2014). Girshina, Mathä and Ziegelmeyer (2017) provide a detailed description of this process (see section 2.6.3.).

Across all variables, the structure of the answers provided to the survey resulted in 53% non-applicable cases, which is the share of responses correctly skipped due to routing (Table 5). The

answers of 40.6% of respondents were recorded as collected (applicable cases), while 3.9% were missing values that reflect either "Don't know" or "No answer". Out of those missing, 23.1% were subsequently provided in brackets. 0.1% were missing, either due to pausing the survey or due to survey timeout, while 2.4% were missing as the original value of the mother variable was not collected (undetermined cases).

Table 5. Missing and editing rates

Description	Wave 2010		Wave 2014	
	In %	Values	In %	Values
Applicable in % of total	36.6	32,209	44.6	334,721
Inapplicable in % of total	62.8	55,241	53.0	397,984
Undetermined in % of total	0.6	495	2.4	18,059
Min missings in % of applicable	5.4	1,739	8.8	29,603
Max missings in % of applicable	6.9	2,234	14.2	47,662
Bracket values in % of min missing values	n.a.	n.a.	23.1	6,828
Bracket values in % of max missing values	n.a.	n.a.	14.3	6,828
Editing: corrected values in % of applicable	0.4	128	0.2	705
Editing: set to missing in % of applicable	0.2	59	0.2	805
Editing: total in % of applicable	0.0	187	0.5	1,510

Source: Own calculations based on XB-HFCS, wave 1&2; data are non-imputed and unweighted.
Note: 'Applicable' = Number of respondents who should reply to the question; 'Inapplicable' = Number of respondents who should skip the question due to routing; 'Undetermined' = Number of undetermined responses due to a missing value in a mother variable or a CAWI failure; 'Min missings' = 'Minimum number of values to be imputed' = Number of "Don't know", "No answer", "Collected from brackets" and "Collected value deleted"; 'Max missings' = 'Maximum number of values to be imputed' = Adds to the minimum number of values to be imputed "Not collected due to missing answer to a previous question" and "Not collected due to a CAWI or interviewer failure"; 'Edited' = Number of "Modified values" and "Collected value deleted".

3.4 Weighting

The weighting process takes into account i) the construction of design weights based on the selection probability, ii) the non-contact/non-response adjustment and iii) the construction of analytic weights. The XB-HFCS is representative of 121,757 households and 341,933 individuals (based on an average household size of 2.81) residing outside Luxembourg and within the "Grande Région" where at least one household member worked in Luxembourg at the time of the data collection. All statistics reported below, such as personal characteristics of cross-border commuters, income, wealth and consumption, are weighted at the household level. For some estimates, thes report also provides confidence bands, which indicate the precision of the estimates. The confidence we attach to a specific value using 1000 replicate weights depends, among other factors, on the sampling variability of the outcome and the sample size.

4. Sample characteristics

As the underlying data are multiply imputed, the figures provided below, such as shares, mean and median values, are always calculated across the 5 implicates by using 1,000 replicate weights to properly account for the sampling design and its features. The median, its standard error and confidence interval is calculated using the STATA command MEDIANIZE version 0.4.[3]

Where judged useful, corresponding results for the first wave of the cross-border survey in 2010 are reported. However, this report does not provide a systematic comparison of changes between the waves in 2010 and 2014. This is mainly done for two reasons. First, the data collection methodology changed from a Paper and Pencil Interview (PAPI) to a Computer Assisted Web-based Interview (CAWI). Second, comparing results in real terms between waves requires adjusting figures for inflation, which is not a straightforward undertaking given the unavailability of region-specific inflation rates for Belgium, France and Germany. Simply using national inflation rates may be misleading, as the inflation in the regions surrounding Luxembourg may be very different to the inflation development in the rest of the respective country.

Table 6 presents some general household characteristics by country of residence. In addition to cross-border commuters, it also provides, for comparison, characteristics of households residing in Luxembourg with at least one employed or self-employed member (employed Luxembourg residents). Employed Luxembourg residents are further divided into "National" (i.e. born in Luxembourg) and "Foreign" (i.e. foreign-born) residents. Note that the subsequently reported individual characteristics relate to the reference person in the household. In the XB-HFCS, the reference person is the cross-border commuter,[4] while in the LU-HFCS it is the most financially knowledgeable person in the household.

Overall, cross-border commuters typically reside in their country of birth, are in couple and have attained a high level of education. It should also be noted that some household reference persons, who were born in Luxembourg, moved to a neighbouring country and commute to work to Luxembourg. They represent about 2% of cross-border commuters. Moreover, a substantial share (23%) of foreigners living in Luxembourg was born outside Europe. The educational attainment of cross-border commuters is significantly above that of the resident population. The share of households with high educational attainment is significantly higher, while the share with low educational attainment is significantly lower.

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3 We would like to thank Sébastien Perez-Duarte from the ECB for sharing his program with us.

4 When several cross-border workers live in the same household, the reference person is the person that received the introductory letter. To the extent possible, the sampling design tried to avoid sampling several cross-border workers within the same household. In case one household received multiple invitations to participate in the survey, the financially most knowledgeable person is asked to answer on behalf of the whole household.

Table 6. General household characteristics by country of residence Percent	Cross-border workers				Employed Luxembourg residents			
Characteristic	Belgium	France	Germany	**Overall**	National	Foreign	**Overall**	
Country of birth								
Belgium	84	2	1	22	0	7	3	*
France	6	91	1	47	0	18	9	*
Germany	1	0	89	23	0	6	3	*
Luxembourg	4	1	4	2	100	0	52	*
Rest of EU	2	3	3	3	0	46	22	*
Rest of the world	3	2	3	3	0	23	11	*
Gender								
Female	30	38	34	35	44	42	43	*
Marital Status								
Single	24	30	35	30	35	27	31	
Couple	68	61	56	61	51	59	54	*
Divorced	8	8	9	8	12	13	13	*
Widowed	0	1	0	1	3	2	2	*
Education								
Primary or lower secondary	11	5	17	9	19	29	24	*
Upper and post secondary	28	43	50	41	47	29	38	
First and second stage of tertiary	61	53	33	50	34	41	38	*
Overall	**25**	**50**	**25**	**100**	**52**	**48**	**100**	

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
*Note: Answers may not sum 100% due to rounding. The characteristics in the XB-HFCS refer to the cross-border commuter in the household (reference person). The characteristics of households in Luxembourg refer to the household reference person, and not all household reference persons are necessarily employed (at least one member needs to be employed for the resident household to be included in this comparison sample). * denotes that values reported in the two "Overall" columns are significantly different from each other at the 5% level of significance.*

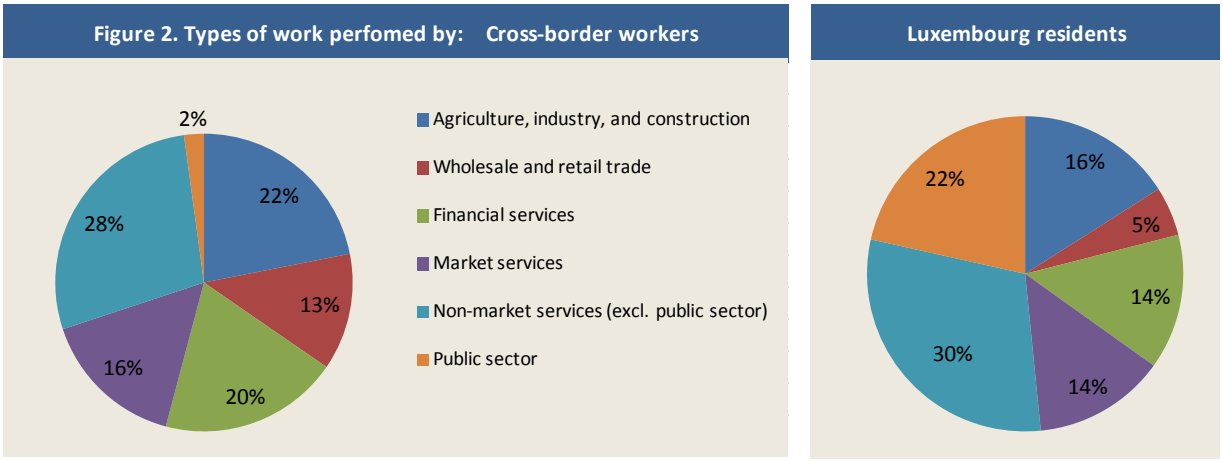
The survey contains information regarding the employment status of cross-border commuters. Table 7 distinguishes between the type of contract, seniority, main means of transport and provides the average commuting time. In the survey, 98% of respondents reported being employed, most of whom with a permanent contract (98%), while only 2% of cross-border commuters are self-employed. In contrast, employed Luxembourg residents are significantly less likely to have a permanent contract (94%) and more likely to be self-employed (6%). The representative cross-border commuter has been working for a total of 19 years, 10 of which in Luxembourg. The latter figure is substantially lower than the average of 16 years reported by employed Luxembourg residents. Overall, employed Luxembourg residents have been working an average of 21 years. The difference between the 16 years of work in Luxembourg and the 21 years of work in total is related to the high share of immigrants in Luxembourg. Employees in Luxembourg work an average of 40 hour per week, regardless of whether or not they commute from abroad. Cross-border commuters travel on average 46 minutes to reach their work place.

That is twice as much as the average time needed by employed Luxembourg residents (i.e. 23 minutes). Most cross-border commuters use the car as main mean of transport (86%) while only 14% use public transport. Cross-border commuters use the car significantly more often than employed resident households who more often use the public transport, the bicycle or walk.

Table 7. Employment characteristics by country of residence	Cross-border workers				Employed Luxembourg residents			
Characteristic	Belgium	France	Germany	**Overall**	National	Foreign	**Overall**	
Employment Status (percent)								
Employee	97	98	98	98	80	83	82	
Self-employed	3	2	2	2	8	5	6	*
Type of contract (percent)								
Permanent contract	100	98	98	98	96	91	94	*
Seniority (mean)								
Total number of years worked	18	18	21	19	21	20	21	*
Years of full time work in Luxembourg	11	10	9	10	19	12	16	*
Working hours per week								
Mean	40	40	39	40	40	40	40	
Median	40	40	40	40	40	40	40	
Main means of transport (percent)								
Car or private vehicle	88	83	89	86	74	65	70	*
Public transport	12	17	11	14	16	20	18	
By bike or on foot	0	0.2	0	0	11	15	13	*
Commuting time (minutes)								
Mean	45	48	46	46	22	23	23	*
Median	45	45	45	45	20	20	20	*

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
*Note: Answers may not sum 100% due to rounding. The characteristics in the XB-HFCS refer to the cross-border commuter in the household (reference person). The characteristics of households in Luxembourg refer to the household reference person, and not all household reference persons are necessarily employed (at least one member needs to be employed for the resident household to be included in this comparison sample). * denotes that values reported in the two "Overall" columns are significantly different from each other at the 5% level of significance.*

Considering the sectors of employment, Figure 2 shows that, compared to employed Luxembourg resident households, cross-border commuters are statistically more likely to be employed in sectors such as "Wholesale and retail trade" (13% versus 5%) and "Financial services" (20% versus 14%). Among employed Luxembourg residents, foreign-born households are statistically more likely to be employed in the financial sector (18% versus 10%). Moreover, about 22% of employed Luxembourg residents work in the public sector, which includes "Public administration" and "Education", while this is the case for only 2% of cross-border commuters. The contribution of cross-border commuters to other sectors is comparable to that of Luxembourg resident households.



Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

5. Assets and liabilities of cross-border commuting households

Net wealth is an important indicator of economic well-being. Various distributional measures use wealth and its components to better understand the economic wellbeing of households. The XB-HFCS collects detailed information on assets and liabilities of cross-border households. In the following, we first discuss household net wealth, which is the sum of the total value of real and financial assets minus the total value of outstanding liabilities. Thereafter, we focus on assets, liabilities and their main components.

Figure 3 shows median net wealth by country of residence and compares it to the corresponding national medians, which are computed from the respective HFCS (considering employed households only). Employed households residing in Luxembourg reported almost twice the median net wealth of cross-border commuter households (€375,000 compared to €199,300). This is partly explained by the higher value of the household main residence (HMR) in Luxembourg than in neighbouring countries (Table 10).[5]

Cross-border commuters from different countries differ in their household net wealth. Cross-border commuters from Belgium reported about €55,000 higher median net wealth than those from France, and €104,400 more net wealth than those from Germany. This difference reflects the higher rate of home ownership of cross-border commuters from Belgium (Table 10). Furthermore, in 2014 mean household net wealth of cross-border commuters was comparable to their respective national average, i.e. the national average for employed households (Figure 3a in Appendix A). In contrast, the median net wealth of cross-border commuters was significantly higher than the respective national medians in France and Germany (Figure 3). This was not the

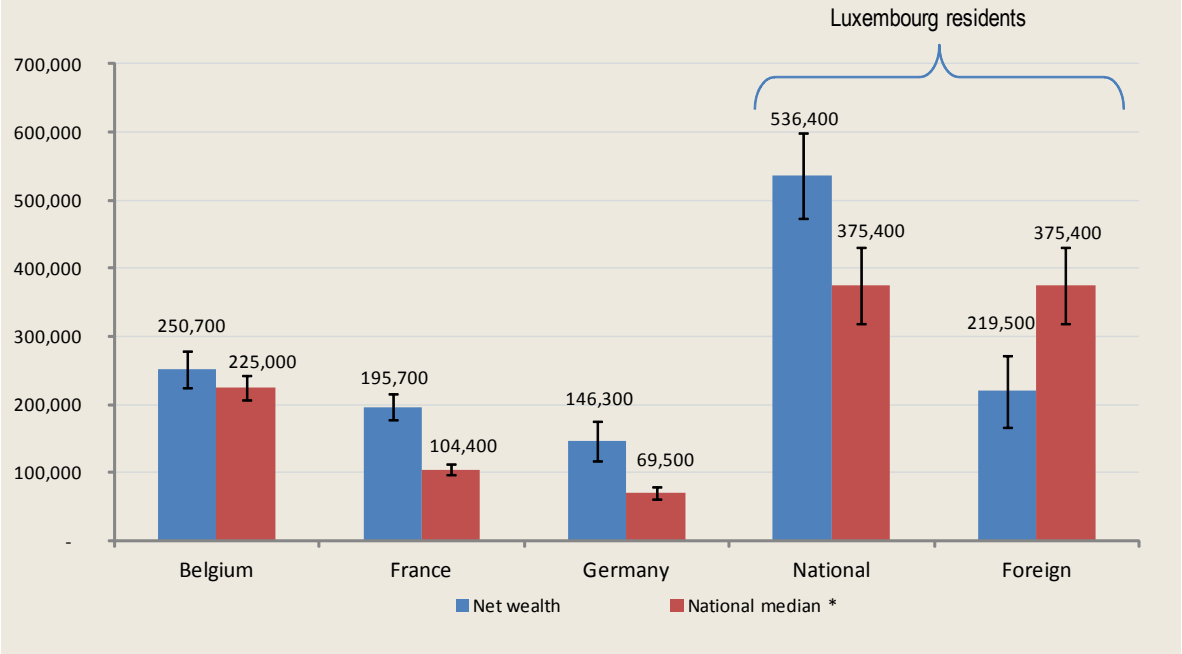
[5] Real assets make up the lion's share of household asset portfolio. Thus, households' reported net wealth can be substantially affected by any misperception of the market value of such assets. Available evidence suggest that, while households tended to overestimate the value of their homes slightly, they generally have a good understanding of its value. On this point, see also the discussion in Mathä, Porpiglia and Ziegelmeyer (2014, 2017).

case in Belgium. A possible explanation is that wealthier households from neighbouring countries prefer and can afford to move their residency to Luxembourg to avoid commuting. Therefore, they are less likely to be part of the cross-border sample. Such behaviour has a larger impact on the mean of the net wealth figures, as mean net wealth is highly influenced by the right tail of the distribution. The median, which in contrast is more robust to changes in the upper tail of the distribution, stays above the national medians. This result is supported by the fact that foreign-born households in Luxembourg with a financially knowledgeable person born in Germany, France or Belgium have higher mean net wealth than other foreign-born households (Girshina, Mathä and Ziegelmeyer, 2017, Figure 12).

Finally, mean household net wealth of cross-border commuters was by about 9% higher in nominal terms compared to 2010 (€239,900 in 2010 and €261,900 in 2014). This increase mainly reflects higher mean net wealth of cross-border commuters from France. In fact, their mean net wealth increased by about 25% to €246,300. Mean net wealth of cross-border commuters from Belgium and Germany remained roughly stable at €326,900 and €229,500 in nominal terms, respectively. Considering that between 2010 and 2014 the average annual inflation rate of the Harmonised Index of Consumer Prices (HICP) was 2.4% in Luxembourg, 2% Belgium, and 1.6% in France and Germany, this means that the 9% nominal increase of net wealth is in line with the accumulated inflation between the two waves in 2010 and 2014.

Figure 3. Net wealth by country of residence

Median (rounded to the nearest 100 euro)



Source: Own calculations based on XB-HFCS, LU-HFCS and Eurosystem HFCS, wave II; data are multiply imputed and weighted.
*Note: Brackets indicate the 95% confidence interval. * The respective national value is calculated from HFCS dataset for Belgium, France, Germany and Luxembourg for employed households only.*

Wealth accumulation over the life cycle is usually hump-shaped. While young people starting their working life have not had enough time to accumulate much wealth, older households may dis-save and run down their wealth. However, as households in our sample are still employed or self-employed, we do not expect to see such development. This is indeed what is shown in Table 8; household net wealth tends to increase with increasing working age.

Table 8. Net wealth by age classes
Median (rounded to the nearest 100 euro)

Age range	Cross-border workers	Employed Luxembourg residents	
Less than 35	102,100	123,300	
35-44	206,600	292,200	*
45-54	255,200	571,200	*
55 or more	272,500	762,000	*

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
*Note: The age characteristics refer to the cross-border commuter in the household (reference person). The age of the households in Luxembourg refers to the household reference person. * denotes that values reported in the two columns are significantly different from each other at the 5% level of significance.*

The difference in net wealth between cross-border commuter and Luxembourg resident households also increased with age. The median wealth of households younger than 35 years of age was around €102,000 for cross-border commuters and €123,000 for employed Luxembourg residents. This difference is not statistically significant. However, in the next age category (age 35-44 years) the difference in the median net wealth increased to around €85,000. This gap is statistically significant. The median for those older than 55 years of age was €272,500 for cross-border commuters and over €760,000 for Luxembourg resident households. One possible explanation for the increasing wealth gap in age may be related to differences in the development of the Luxembourg real estate market. Due to the past trend of the real estate market, households in Luxembourg benefited from higher HMR appreciations than cross-border commuters (Mathä, Porpiglia and Ziegelmeyer, 2014).

Wealth accumulation also positively correlates with education. In fact, higher educated households reported higher net wealth in 2014. The median net wealth of households not having attained upper secondary education was €158,700 for cross-border commuter and €194,292 for employed Luxembourg households. The difference is not statistically significant. The respective figures for households having completed tertiary education are €220,000 and €496,000. Thus, the gap increased to around €275,000, which is highly statistically significant.

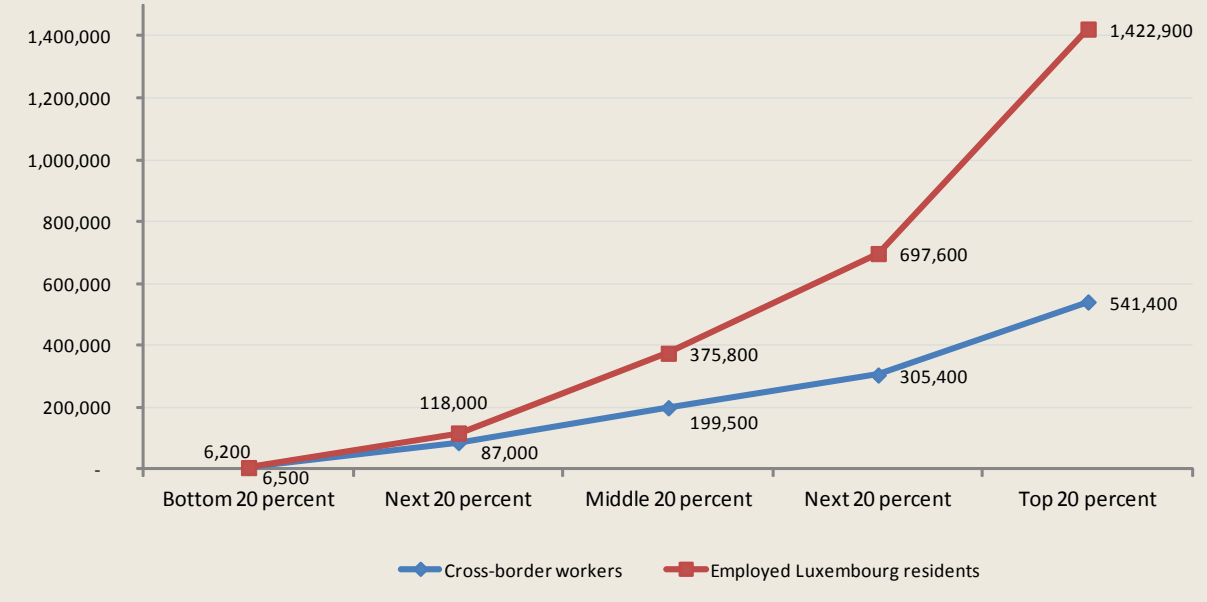
To obtain a more detailed view on how wealth is distributed among cross-border commuters and employed Luxembourg residents households, we report median net wealth by quintile (Figure 4). The bottom wealth quintile represents the poorest 20% of households. Correspondingly, the top quintile represents the wealthiest 20% of households. Respondents in the bottom quintile are predominantly younger households and those with low educational attainment. The top quintile mainly includes older households and those with the high educational attainment.

There was a marked difference in net wealth between the bottom and top quintile. Also, the difference between cross-border commuter and employed Luxembourg resident households increases, as we move from lower to higher wealth quintiles. In 2014, the median net wealth of the bottom quintile was around €6,000 for both employed resident and cross border commuter households. Although this amount can be considered as low, it is still above the median net wealth of the bottom 20% of households in the euro area (about €1,000) (HFCN, 2017). Moreover, the HFCN (2016) also reports that in some euro area countries, the median net wealth of the bottom 20% was negative in 2014. This was the case for Germany (-€100), Ireland (-€4,300) and the Netherlands (-€7,900). This means that if these households sold everything they owned to pay off their debt, they would still owe some money.

The median net wealth in the top quintile was €541,400 for cross-border commuters and almost three times as much for employed Luxembourg resident households (€1,422,900). Their net wealth was about twice as much as that of the second highest quintile and about three to four times as much as the net wealth of the middle quintile.

Figure 4. Net wealth quintiles

Median (rounded to the nearest 100 euro)



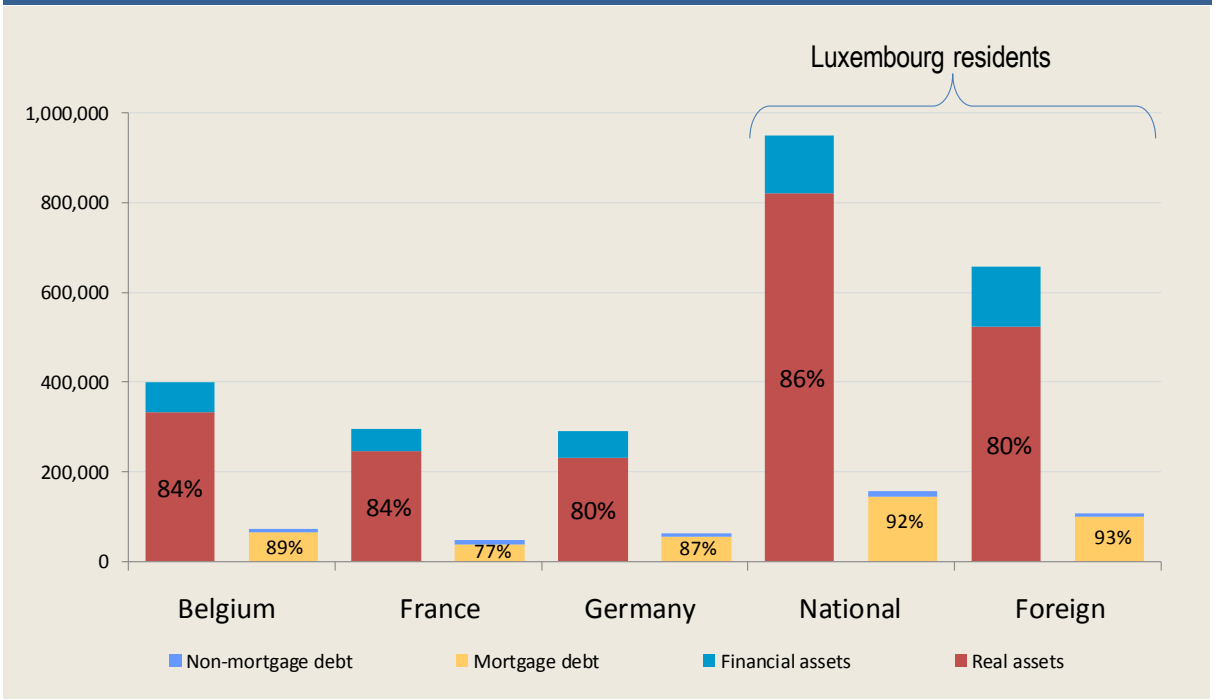
Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Wealth composition

The wealth composition shown in Figure 5 describes how the total (aggregate) amount of net wealth by all cross-border commuters is distributed across different categories. Total assets are divided into real and financial assets while total liabilities are divided into mortgage and non-mortgage debt. Overall, differences in the composition of wealth between cross-border commuters and employed Luxembourg resident households are limited. In fact, real assets represent more than 80% of mean total assets while mortgage debt represents about 80%-90% of mean total debt, regardless of the country of residence.

Figure 5. Assets and liabilities by country of residence

Mean (rounded to the nearest 100 euro)



Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Table 9 shows the structure of household asset and liability ownership rates in 2014, as well as the mean and median values for those households who held the respective asset or debt category. Since almost every household reported real assets, they were the most common type of asset held in 2014. Cross-border commuters reported a median total value of real assets that was less than half that of employed Luxembourg resident households (€228,900 versus €488,600). In addition, 86% of cross border commuter households held at least one asset at a financial institution. The median total value of financial assets by cross-border commuters was €22,000 in 2014. This value was comparable to that of foreign-born employed households in Luxembourg (€23,300). However, their participation rate was higher: 96% of foreign-born employed households in

Luxembourg reported financial assets. The corresponding share for employed Luxembourg-born households was 99%.

The main component of household total liabilities is mortgage debt. The prevalence of debt varies by country of residence and origin because of differences in the institutional setup of countries and cultural attitudes towards debt. For example, while participation rates of mortgage debt differed across countries (from 27% for cross-border commuters from France to 48% for Belgium), conditional median values were surprisingly similar for cross-border commuters from Belgium, France and Germany (ranging between €112,000 and €115,000). This extends to the conditional mean values of mortgages, which varied moderately between €132,000 and €137,000. Given the differences in the mean and median values of the HMR, mean and median values of mortgage debt for employed resident households in Luxembourg are higher than for cross-border commuters. Of the former, 47% had median mortgage debt amounting to €212,200. The corresponding conditional median amount of debt for cross-border commuters was €112,500.

Table 9 also shows results for non-mortgage debt, which can be used for various purposes and is not secured by real estate or backed by other assets. In terms of participation rates, the highest prevalence of non-mortgage debt was observed for cross-border commuters from Belgium (48%) and the lowest for cross-border commuters from Germany (37%). For cross-border commuters, the median outstanding non-mortgage debt was almost €11,000. Foreign-born employed households in Luxembourg had a similar outstanding amount, while the median non-mortgage debt was higher for employed national households (€14,500).

Table 9. Assets and liabilities by country of residence
Mean/median (rounded to the nearest 100 euro)

Characteristic	Belgium	France	Germany	Overall	Employed Luxembourg residents: National	Foreign	Overall	
Real assets (percent)	**99**	**99**	**99**	**99**	**99**	**92**	**96**	*
mean	338,000	249,100	234,400	267,200	829,400	569,600	708,900	*
median	296,100	221,000	202,100	228,900	565,000	356,600	488,600	*
Financial assets (percent)	**91**	**80**	**91**	**86**	**99**	**96**	**98**	*
mean	71,900	60,400	65,100	64,700	129,200	138,100	133,400	*
median	25,200	17,600	27,700	22,000	42,500	23,300	32,300	*
Mortgage debt (percent)	**48**	**27**	**39**	**36**	**49**	**44**	**47**	*
mean	132,200	134,100	137,000	134,300	291,800	224,800	261,300	*
median	112,000	114,200	115,000	112,500	241,100	158,000	212,200	*
Non mortgage debt (percent)	**48**	**46**	**37**	**44**	**44**	**36**	**40**	
mean	16,300	24,500	21,500	21,700	28,900	20,700	25,400	
median	10,300	11,600	10,200	10,600	14,500	9,900	11,400	

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
*Note: * denotes that values reported in the two "Overall" columns are significantly different from each other at the 5% level of significance.*

Real and financial asset composition

The XB-HFCS classifies real assets into the following categories: the household main residence (HMR), other real estate properties (OREP), business wealth (from self-employment and silent investments),[6] vehicles and valuables such as jewellery, pieces of art or antiques (Table 10). The overall participation rate for real assets reaches almost 100%. Vehicles are the most commonly owned real asset (96% for cross-border commuters and 92% for employed households in Luxembourg) followed by the HMR (70% for cross-border commuters and 65% for employed households in Luxembourg). The participation rate in OREP varied between 15% for cross-border commuters from Germany and 27% for foreign-born employed households in Luxembourg. Interestingly, while the median value of the HMR was roughly comparable for national and foreign–born employed households in Luxembourg (€600,000 vs. €548,000 respectively), this was not the case for OREP. The median value of OREP was almost twice as high for national than for foreign–born employed households in Luxembourg (€437,200 vs. €274,600). This difference is likely to reflect that foreign-born employed households in Luxembourg tend to own OREP abroad, which is likely to be located in their respective country of birth where real estate prices tend to be lower. Using data of the first wave of the LU-HFCS, Ziegelmeyer (2015) shows that 88% of OREP held by Portuguese-born resident in Luxembourg is located in Portugal. The corresponding shares for Belgium, French and German households were 51%, 50% and 29%, respectively.

For cross-border commuters, the conditional median value of OREP (€150,400) was substantially lower than for employed households in Luxembourg. Moreover, they owned valuables only half as often as employed households in Luxembourg (12% versus 24%). In addition, the conditional median value in this asset category was 30% lower. Finally, households of both cross-border commuters and employed residents in Luxembourg have similar ownership rates of business assets (6% and 5%). The conditional mean and median of business wealth, however, were far higher for employed Luxembourg residents than for cross-border commuters.

[6] The XB-HFCS asked for total business wealth that includes both self-employment and silent investments (i.e. partnerships that entail involvements limited to providing capital to the business). On the contrary, since the LU-HFCS separates the two categories, it allows classifying business wealth from self-employment as real assets and silent investments as financial assets.

Table 10. Real Assets by country of residence Mean/median conditional on participation (rounded to the nearest 100 euro)					Employed Luxembourg residents		
Characteristic	Belgium	France	Germany	**Overall**	National	Foreign	**Overall**
Household main residence (participation rate)	**79**	**72**	**60**	**71**	**80**	**50**	**65**
mean	306,700	250,200	280,000	272,200	679,700	592,400	647,500
median	298,900	232,300	251,000	250,000	600,000	548,400	554,200
Other real estate (participation rate)	**25**	**16**	**15**	**18**	**25**	**27**	**26**
mean	238,800	191,700	219,600	213,300	748,800	613,100	680,200
median	176,000	146,100	128,800	150,400	437,200	274,600	325,600
Business wealth (participation rate)	**8**	**4**	**7**	**6**	**5**	**6**	**5**
mean	157,200	442,200	184,200	262,500	1,158,500	639,900	889,100
median	39,000	23,500	9,900	23,000	76,400	186,500	161,700
Vehicles (participation rate)	**93**	**96**	**96**	**96**	**95**	**89**	**92**
mean	16,900	15,500	17,500	16,400	29,500	20,700	25,400
median	12,800	12,000	12,700	12,000	25,000	14,000	18,000
Valuables (participation rate)	**12**	**13**	**12**	**12**	**29**	**20**	**24**
mean	20,400	17,600	13,000	17,200	26,000	30,400	27,700
median	10,000	5,100	6,400	7,000	10,000	10,000	10,000

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Table 11 shows the share of cross-border commuters owning sight and saving accounts, mutual funds, bonds, stocks, other investments and voluntary pensions or life insurances. The share of households holding bonds ranged between 1% and 6% for cross-border commuters from France and Belgium; the share of households holding stocks ranged between 9% and 16%, where the lowest rate was observed for Luxembourg nationals and the highest rate for cross-border commuter households from Germany. The participation rates were similar for mutual funds (13% for cross-border commuters and 14% for employed Luxembourg residents), while voluntary pensions/life insurance plans were more common among cross-border commuters from Germany and Belgium. In these two groups, respectively 63% and 51% of cross-border commuters owned such a plan. The mix between risky (direct and indirect holding of stocks) and relatively safe assets (sight and saving accounts, bonds) signals the low riskiness of the average household portfolio. Overall, the ratio of mean total risky assets (stocks + mutual funds) to mean total financial assets was 16% for cross-border commuters and 17% for employed Luxembourg residents. Moreover, foreign-born households employed in Luxembourg on average invested in risky assets more than 21% of their financial wealth.

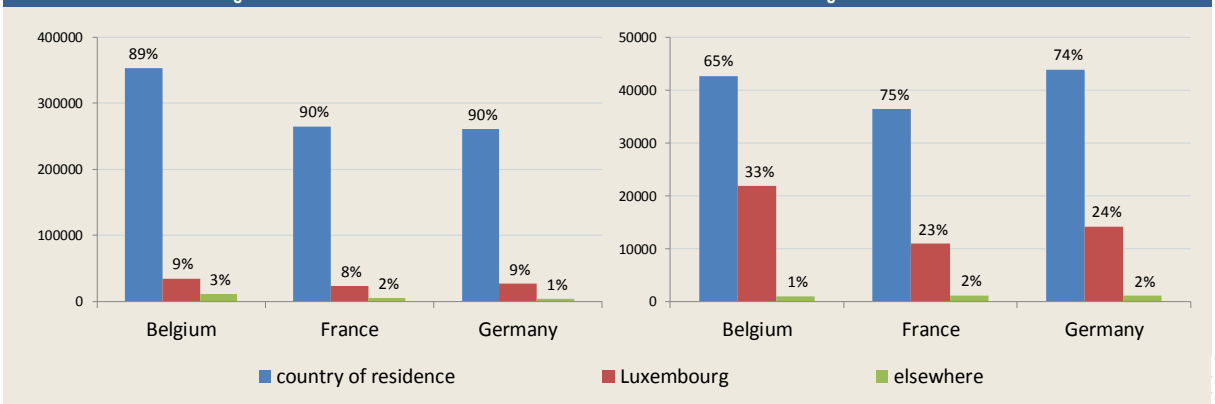
Table 11. Financial Assets by country of residence average conditional on participation (rounded to the nearest 100 euro)					Employed Luxembourg residents		
Characteristic	Belgium	France	Germany	**Overall**	National	Foreign	**Overall**
Sight and savings account (participation rate)	**88**	**75**	**80**	**79**	**99**	**96**	**97**
mean	43,300	37,000	29,700	36,900	73,200	40,600	57,800
median	13,900	11,100	9,300	11,100	17,000	11,600	14,700
Mutual funds (participation rate)	**17**	**9**	**16**	**13**	**16**	**12**	**14**
mean	45,400	52,500	38,800	45,900	81,600	203,000	131,700
median	17,600	18,700	10,000	16,400	25,100	47,600	32,100
Bonds (participation rate)	**6**	**1**	**2**	**3**	**3**	**3**	**3**
mean	29,700	31,000	45,100	32,900	84,000	49,700	68,000
median	10,800	6,500	26,300	12,100	30,400	30,000	30,000
Stocks (participation rate)	**15**	**10**	**16**	**13**	**9**	**10**	**9**
mean	22,900	19,400	25,300	22,300	50,700	45,100	47,900
median	8,000	6,000	8,700	7,500	10,500	12,500	10,500
Other investments (participation rate)	**2**	**2**	**5**	**3**	**11**	**13**	**12**
mean	85,000	379,200	68,000	167,700	80,300	217,100	151,200
median	37,000	25,000	33,400	30,000	14,500	10,000	11,400
Voluntary pension / life insurance (participation rate)	**51**	**30**	**63**	**43**	**46**	**36**	**41**
mean	25,100	25,600	33,300	28,300	59,300	101,500	77,000
median	9,400	10,000	13,100	10,100	26,700	21,400	24,500

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Wealth location

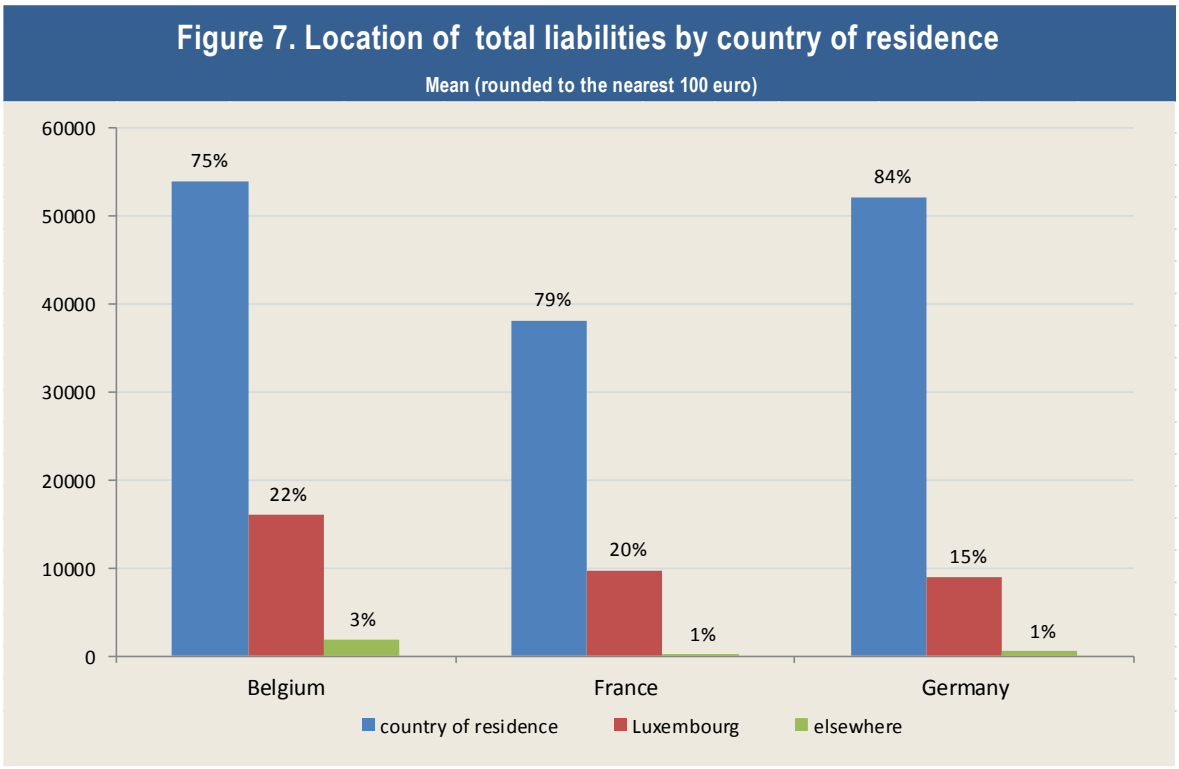
The XB-HFCS provides novel information on the geographic location of assets and debts. Not surprisingly, the majority of the assets are held in the country of residence since real assets represent more than 80% of total assets and the HMR, by definition, is located there. However, while real assets are mostly located in the country of residence, between 23% (France) and 33% (Belgium) of financial assets are held in Luxembourg (Figure 6). These financial assets are primarily sight and saving accounts, mainly used for work reasons, but also include voluntary pensions, which households can use to reduce their taxable income.

Figure 6. Location of assets by country of residence
Mean (rounded to the nearest 100 euro)



Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Commuting to Luxembourg changes households' economic and financial behaviour. In addition to banking relationships in their country of residence, cross-border commuters also use banking services and financial products in Luxembourg. Around 20% of total liabilities of all cross-border commuters are indeed located in Luxembourg (Figure 7).



Source: Own calculations based on XB-HFCS, wave II; data are multiply imputed and weighted.

Household main residence (HMR)

Next, we focus on the HMR and its financing (Table 12). The majority of households of cross-border commuters own their HMR. This is the case for 79%, 72% and 60% of cross-border commuters from Belgium, France and Germany. Thus, the share of homeowners among commuters from Germany is noticeably lower than the share for commuters from Belgium or France. Still, for cross-border commuters from all three countries, the HMR ownership rate is higher than their respective national figure (see HFCN, 2016 for details),[7] likely reflecting higher mean and median income compared to the respective national figures. Using data of the second wave of the Eurosystem HFCS shows that 76%, 57% and 45% of employed households in Belgium, France and Germany respectively owned their HMR. Thus, the HMR ownership rates of cross-border commuters from Belgium and employed households in Belgium were not very different. In contrast, the ownership rate was substantially higher for cross-border commuters from France

[7] The HFCN 2016 reports the following home ownership rates in 2014: 70.3% for Belgium, 58.7% for France, 44.3% for Germany and 67.6% for Luxembourg.

and Germany (both 15 ppt change) than for employed households in the respective national sample.

Table 12. Mortgage debt on household main residence by country of residence
Percent of total population

Characteristic	Belgium	France	Germany	**Overall**
Fraction of home owners	79	72	60	**71**
Fraction of households with mortgage debt	45	23	36	**32**
Country in which mortgage debt is financed *				
Country of residence	36	19	33	**27**
Luxembourg	8	5	5	**5**
Other	1	0	0	**0**

*Source: Own calculations based on XB-HFCS, wave II; data are multiply imputed and weighted. *Note that these alternatives are not mutually exclusive: households may finance their HMR with mortgages from different countries.*

While most homeowners among the cross-border commuters financed their mortgage in their respective country of residence (Table 12), a sizeable minority of households did take out a HMR mortgage in Luxembourg (16% of all mortgage holding households).

The survey asked households about the main reasons considered when deciding where to finance the HMR. Among those households having taken out their HMR mortgage in the country of residence, 84% reported the banking relationship to be the main reason (Table 13). The very same reason was reported by only 70% of households with their HMR mortgage in Luxembourg. In contrast, for households with a mortgage in Luxembourg, "lower interest rates" was the most frequently reported (77%) reason. This was only the case for 50% of households having financed their HMR in their country of residence.

Table 13. Main reasons for mortgage debt on household main residence
Percent

Reasons	Mortgage in country of residence	Mortgage in Luxembourg
Banking relationship	84	70
Availability of preferred mortgage type (fixed or variable rate)	59	34
Lower interest rate	50	77
Better mortgage conditions	49	62

Source: Own calculations based on XB-HFCS, wave II; data are multiply imputed and weighted.

Location of consumer loans

The XB-HFCS asked respondents to report all loans other than mortgage debt. These other loans include loans to individuals or households, such as personal loans, student loans, car loans and other instalment loans but exclude revolving credit plans and loans secured by real estate. Typically, cross-border commuters were slightly more likely to have consumer loans (37%) than mortgage debt (32%). As shown in Table 12a, the location of other loans was similar to that of mortgage debt. About 16% of respondents took out a mortgage or a consumer loan in Luxembourg.

Table 12a. Other loans by country of residence

Percent

Characteristic	Belgium	France	Germany	**Overall**
Fraction of households with other loans	42	40	27	**37**
Country in which loans are financed *				
Country of residence	36	35	24	**33**
Luxembourg	7	6	5	**6**
Other	1	1	0	**1**

Source: Own calculations based on XB-HFCS, wave II; data are multiply imputed and weighted.

When analysing the main reasons for deciding where to finance consumption, again the banking relationship was reported as the main reason (Table 13a) to take out a loan. Again, a higher share of respondents declared a "lower interest rate" as a reason to take out a loan in Luxembourg than in the country of residence.

Table 13a. Main reasons for other loans

Percent

Reasons	Loans in country of residence	Loans in Luxembourg
Banking relationship	84	71
Availability of preferred loan type (fixed or variable rate)	38	29
Lower interest rate	33	62
Better loan conditions	29	52

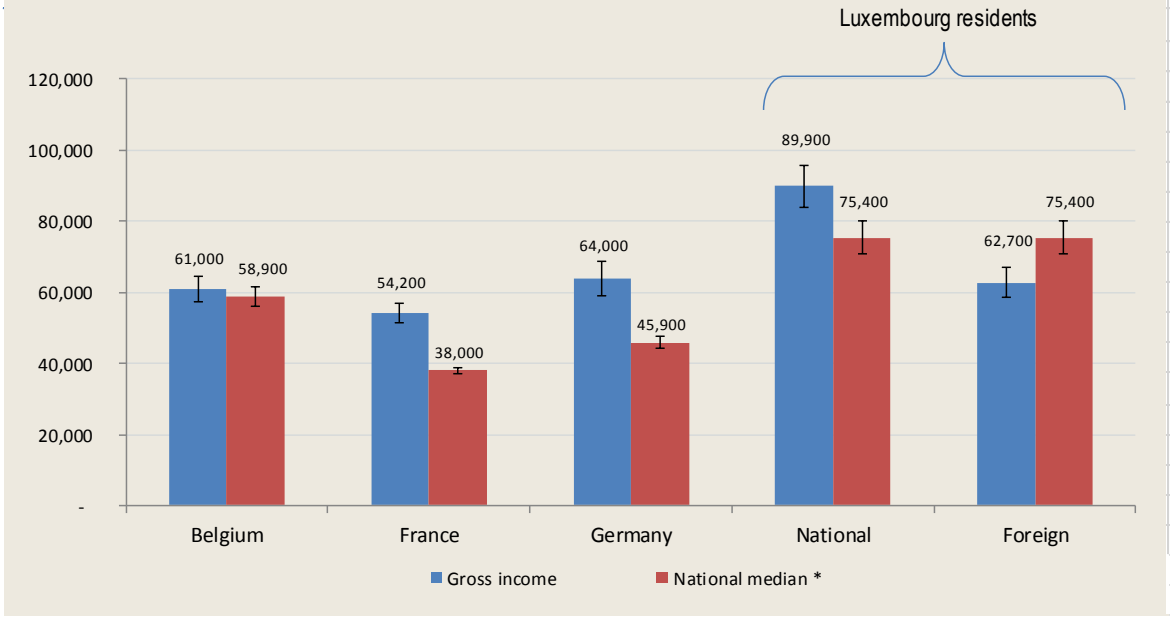
Source: Own calculations based on XB-HFCS, wave II; data are multiply imputed and weighted.

6. Income of cross-border commuting households

Survey respondents were asked about the total income that they and other household members received in the previous year. This includes employee and self-employment income, income from financial assets, income from real estate properties, and income from pensions (public or private). Figure 8 shows the median annual gross income by country of residence, and compares it to the corresponding national medians. National medians are computed from the corresponding national HFCS considering only employed households.

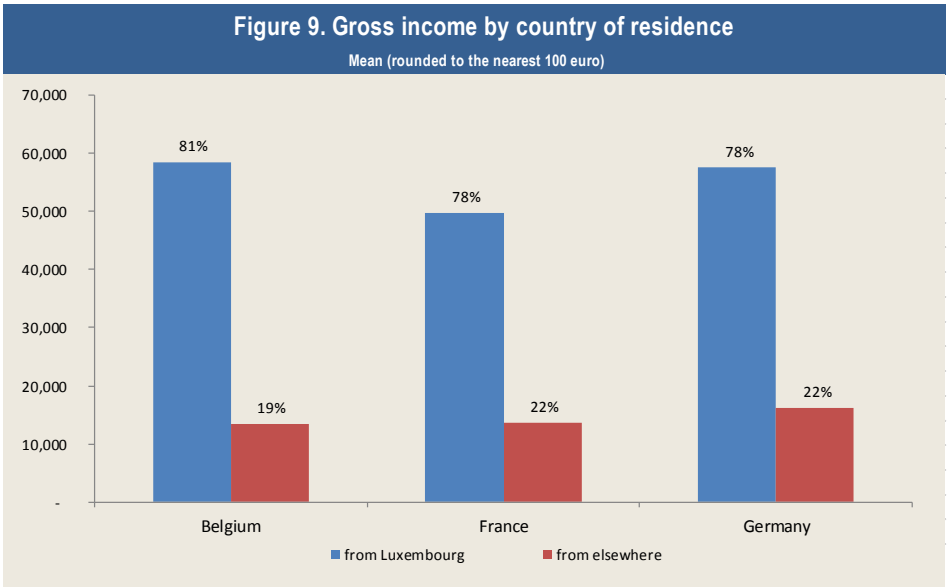
Figure 8. Gross income by country of residence

Median (rounded to the nearest 100 euro)



Source: Own calculations based on XB-HFCS, LU-HFCS and Eurosystem HFCS, wave II; data are multiply imputed and weighted.
*Note: Brackets indicate the 95% confidence interval. * The respective national value is calculated from HFCS dataset for Belgium, France, Germany and Luxembourg for employed households only.*

Cross-border commuters tend to have higher median gross income than employed households in their country of residence. This is particularly the case for France and Germany. Cross-border commuters from these countries reported a median gross income that was 43% and 39% higher than their respective national median income. In comparison, employed households in Luxembourg reported about 30% higher median gross income and 45% higher mean gross income than cross-border commuters (Figure 8a in Appendix A). Part of this income gap can be explained by the fact that, on average, a sizeable share of total gross income of cross-border commuters (about 20%) was not earned in Luxembourg (Figure 9).



Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Table 14 compares gross and net income by country of residence. Among all households, cross-border commuters from France reported the lowest mean and median gross income, €63,400 and €54,200 respectively. Since their mean and median income from elsewhere was comparable to the overall cross-border household population, this income gap results from lower income earned in Luxembourg. In particular, the ratio of net to gross income was lower for cross-border commuter than for employed households in Luxembourg, reflecting the generally higher rates of taxes and social security contributions in the neighbouring countries of Belgium, France and Germany.

Table 14. Gross and net Income by country of residence
mean/median (rounded to the nearest 100 euro)

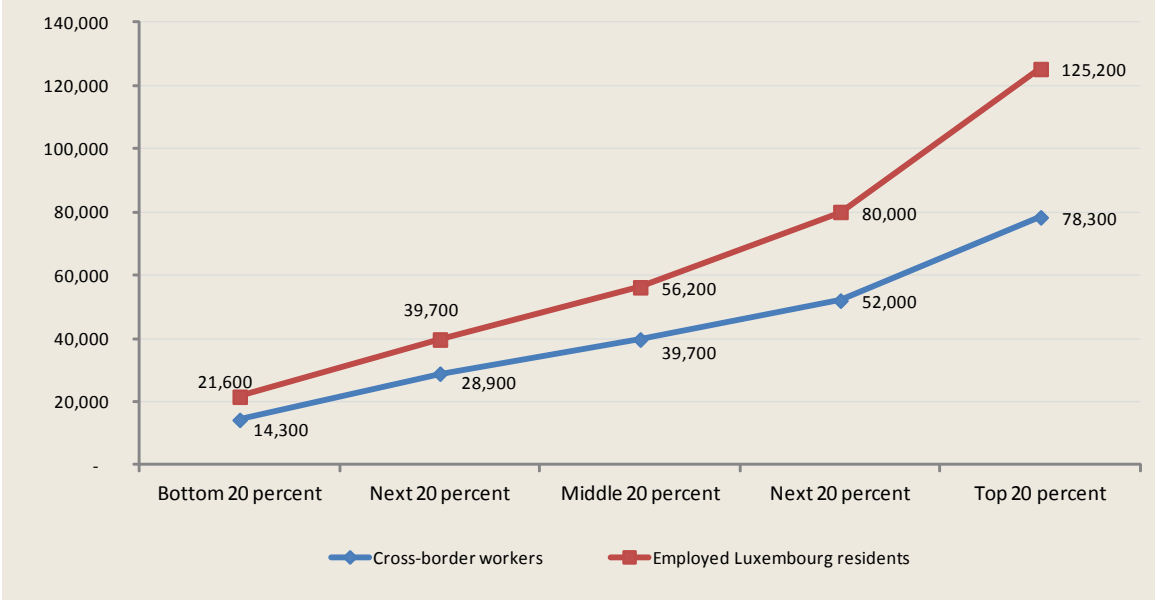
Characteristic	Belgium	France	Germany	**Overall**	Employed Luxembourg residents: National	Foreign	**Overall**
Gross Income (mean)							
from Luxembourg	58,500	49,700	57,500	53,800	106,400	90,000	98,500
from elsewhere	13,500	13,700	16,200	14,300	-	-	-
Mean Gross Income	**72,000**	**63,400**	**73,700**	**68,100**	**106,400**	**90,000**	**98,500**
Gross Income (median)							
from Luxembourg	45,400	40,200	44,600	43,200	89,900	62,700	75,400
from elsewhere	4,500	6,100	8,200	6,000	-	-	-
Median Gross Income	**61,000**	**54,200**	**64,000**	**58,000**	**89,900**	**62,700**	**75,400**
Total Net Income							
mean	46,700	42,200	45,000	44,000	74,400	62,300	68,600
median	41,600	37,400	40,200	39,400	64,600	49,500	55,900
Ratio Net/Gross Income							
mean	65	67	61	65	70	69	70
median	68	69	63	68	72	79	74
median over individual ratios	71	75	68	72	74	76	74

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

The net income gap between employed households in Luxembourg and cross-border commuters persisted across the whole net income distribution, as is revealed by looking at the median income for different income quintiles (Figure 10). This income gap is already statistically significant at the lowest quintile and widens both in absolute and in relative terms as we move up in the income distribution. In fact, employed households in Luxembourg in the bottom income quintile earned about 50% more net income than cross-border commuters, while those in the top income quintile earned 60% more.

Figure 10. Net income quintiles

Median (rounded to the nearest 100 euro)



Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

Table 15 provides further insights on how income varies with educational attainment and country of origin. While more than 50% of French and Belgian cross-border commuters have completed tertiary education, this is only the case for 33% of cross-border commuters from Germany. One half of cross-border commuters from Germany have completed upper and post secondary education (Table 15). In Luxembourg, 47% of national (heads of) households have attained upper and post secondary and 34% have attained tertiary education. Foreign-born residents in Luxembourg are relatively more prominent in the primary and lower secondary (29%), as well as in the tertiary educational attainment category (41%). Table 15 reveals a positive correlation between income and education. Overall, cross-border commuters with tertiary degree reported over €15,000 higher median gross household income than those with secondary education. This effect is even more evident among employed households in Luxembourg. For them, the median gross household income was over €37,000 higher for households with tertiary education than those with secondary education. The median net income differences between cross-border

commuter and employed households in Luxembourg are statistically significant for both tertiary and upper and post secondary education.

Table 15. Gross income by country of residence and education Median (rounded to the nearest 100 euro)					Employed Luxembourg residents			
Characteristic	Belgium	France	Germany	**Overall**	National	Foreign	**Overall**	
Primary or lower secondary								
Percent	11	5	17	9	19	29	24	*
Gross income	50,100	33,700	51,500	47,200	64,400	50,300	55,100	
Upper and post secondary								
Percent	28	43	50	41	47	29	38	
Gross income	51,600	46,500	58,600	50,600	79,700	57,200	67,000	*
First and second stage of tertiary								
Percent	61	53	33	50	34	41	38	*
Gross income	67,800	61,600	77,700	65,700	106,400	101,300	104,700	*

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
*Note: Answers may not sum 100% due to rounding. The characteristics refer to the cross-border commuter in the household (reference person). The educational attainment of households in Luxembourg refers to the household reference person. * denotes that values reported in the two "Overall" columns are significantly different from each other at the 5% level of significance.*

7. Comparison between HFCS and IGSS data on average income

The XB-HFCS was conducted using a sample of households from the Social Security Register of Luxembourg (IGSS) that included more than 137,000 cross-border commuters in 2012. The IGSS collects administrative data on labour status, employer and employee characteristics, including (un-)employment income and pensions from anyone registered in the social security system of Luxembourg. Aggregate income figures from the IGSS allow a comparison with gross income from the XB-HFCS data. Clearly, a direct comparison is flawed given that, contrary to the IGSS register, the primary unit of observation of the XB-HFCS is the household. The survey collects income on a household level (summing up income of the cross-border commuter and of other household members). Moreover, the XB-HFCS asks about total household gross income, which includes not only employment income but also income from other sources such as real and financial assets. Hence, to enhance the comparability between the IGSS and XB-HFCS figures, we focus on (i) gross income earned in Luxembourg only, (iia) adjust the XB-HFCS figures by the number of household members employed in Luxembourg or (iib) restrict the sample to households with one employed member.

As expected average gross income reported by cross-border commuters is higher than what administrative data indicate (Table 16). Adjusting for the number of household members with employment income substantially narrows the gap to the IGSS figures (from €6,900 to €300). Similarly, restricting the comparison to households with one employed member only, the

reported average gross income of the XB-HFCS drops to €48,000 and renders it closer to the IGSS figure of €46,900. This suggests that the collected information on income can be regarded as reliable.

Table 16. Gross income by country of residence mean (rounded to the nearest 100 euro)					Employed Luxembourg residents
Characteristic	Belgium	France	Germany	**Overall**	**Overall**
HFCS					
Number of households	708	1,014	692	2,414	1,223
Gross income from Luxembourg	58,500	49,700	57,500	53,800	98,500
Members working in Luxembourg	1.2	1.2	1.1	1.2	1.5
Gross income per working member in Luxembourg	49,900	43,600	51,800	47,200	67,600
HFCS - households with only 1 employed member					
Number of households	256	376	276	908	520
Gross income from Luxembourg	49,500	44,300	54,000	48,000	78,200
IGSS data 2013					
Number of individuals	40,400	79,000	40,200	159,600	200,400
Gross employment income	52,200	43,300	48,600	46,900	54,100

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
Note: The IGSS data 2013 contains 159.600 individuals. Our sampling frame from the IGSS had just 137,000 individuals. This difference is explained by the restriction of our sampling frame to the Grande Région and drawing the sample using the IGSS data from 2012.

8. Risk aversion

A key determinant of people's financial behaviour is their attitude towards risk. In order to understand households' financial behaviour when exposed to uncertainty, the survey asks respondents to self-assess their risk aversion in financial matters. A majority of cross-border commuters indicated to be risk-averse (>70%; response category 4).[8] Twenty-five percent of households indicated to be risk-neutral (response category 3), while a mere 4% indicated to be risk-loving (response category 1 and 2). Employed households in Luxembourg report a similar distribution of risk attitudes.

Since the future conditions of the labour market and returns on education are uncertain, education is generally considered an investment decision. [9] In this context, Table 17 shows how risk aversion is related to educational decisions, which in turn may be a source for future wage differentials. In fact, section 6 already showed that gross income is positively correlated with

[8] Based on question 5.13 in the questionnaire: *"Which of the following statements comes closest to describing the amount of financial risk that you (and your husband/wife/partner, if applicable) are willing to take when you save or make investments? 1 – Take substantial financial risks expecting to earn substantial returns; 2 – Take above average financial risks expecting to earn above average returns; 3 – Take average financial risks expecting to earn average returns; 4 – Not willing to take any financial risk".*

[9] Levhari and Weiss (1994) found that uncertainty on future income correlates with lower levels of education.

education (Table 15). The relation between education and risk aversion, shown in Table 17, is consistent with the work by Donkers et al. (2001) who indicated that education is negatively correlated with risk aversion. The reduction in risk aversion from low to high educational attainments seems much stronger for employed households in Luxembourg than for cross-border commuters.

Table 17. Risk aversion by educational attainment
percent

Characteristic	Primary or lower secondary	Upper and post secondary	First and second stage of tertiary	**Overall**
Risk averse				
Cross-border workers	83	77	64	**71**
Employed Luxembourg residents	90	76	54	**71**
Risk neutral				
Cross-border workers	15	20	31	**25**
Employed Luxembourg residents	7	20	38	**24**
Risk loving				
Cross-border workers	1	3	5	**4**
Employed Luxembourg residents	3	4	9	**6**

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
Note: Answers may not sum 100% due to rounding. The characteristics refer to the cross-border commuter in the household (reference person). The risk profile for households in Luxembourg refers to the household reference person.

Altogether, cross-border commuters most likely to earn higher household gross income are those with risk-neutral and risk-loving attitude (Table 18). The relation between household gross income and risk aversion seems to be hump-shaped for cross-border commuters from France and employed foreign–born households in Luxembourg. In fact, risk-neutral cross-border commuters from France and foreign-born employed residents in Luxembourg reported respectively €800 and €17,600 higher household gross income than risk lovers. However, these differences are not statistically significant. Conversely, risk-neutral cross-border commuters and employed Luxembourg residents earned significantly higher gross income than their risk-averse counterparts (26% and 63% respectively).

Table 18. Gross income and risk aversion by country of residence Median (rounded to the nearest 100 euro)					Employed Luxembourg residents		
Characteristic	Belgium	France	Germany	**Overall**	National	Foreign	**Overall**
Risk averse							
percent	71	76	60	71	75	67	71
Gross income	55,900	50,900	59,000	54,000	81,200	58,200	65,800
Risk neutral							
percent	24	20	35	25	22	25	24
Gross income	76,500	60,400	69,200	67,800	114,100	97,900	107,400
Risk loving							
percent	5	4	4	4	3	8	6
Gross income	76,400	59,600	78,400	70,100	141,500	80,300	89,300

Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.
Note: Answers may not sum 100% due to rounding.

Individuals' attitudes towards risk also affect portfolio choices as private investors. Table 19 shows how risk aversion relates to participation in financial assets. Overall, risk-averse households tend to own sight and savings accounts, as well as voluntary pensions or life insurance plans. Risk-neutral and risk-loving households are additionally more likely to invest in mutual funds and stocks. This behaviour is more evident for cross-border commuters than employed Luxembourg residents. The participation rate of cross-border commuters in risky assets, either via direct or indirect holding of stocks (mutual funds), ranged from 9% for risk-averse households to more than 63% for risk-loving households. For employed households in Luxembourg, the corresponding shares ranged from 9% to 43%. Accordingly, the median value of stocks (direct and indirect) conditional on stock market participation held by risk-averse cross-border commuters was about €5,200, while it was more than 5 times as much (almost €35,300) for risk-loving households (for employed households in Luxembourg, it ranged from €15,900 to €39,200). In contrast, there was not much difference between risk-neutral and risk-loving employed Luxembourg residents with regard to the holdings of stocks and mutual funds.

Table 19. Financial wealth and risk aversion Participation rates and medians	Cross-border workers						Employed Luxembourg residents					
Characteristic	Risk averse		Risk neutral		Risk loving		Risk averse		Risk neutral		Risk loving	
Financial assets	**%**	**median***	**%**	**median***	**%**	**median***	**%**	**median***	**%**	**median***	**%**	**median***
sight and savings accounts	76	8,900	87	19,700	87	28,000	97	10,500	99	30,300	100	29,700
mutual funds	5	9,800	28	16,000	47	24,000	6	23,900	33	37,500	32	35,000
bonds	2	6,300	6	15,300	5	39,300	2	16,000	5	30,000	2	50,000
stocks	5	3,100	28	9,300	46	23,800	4	6,200	22	13,500	29	14,300
other investments	2	37,000	5	29,400	8	20,000	8	8,200	20	20,900	22	10,000
voluntary pensions/life insurances	39	8,200	57	15,200	44	23,700	35	24,000	57	30,000	45	20,600
Total financial wealth	**82**	**15,400**	**93**	**44,600**	**93**	**78,500**	**97**	**22,300**	**99**	**88,600**	**100**	**51,500**

*Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted. *denotes that median values are conditional on participation and rounded to the nearest €100.*

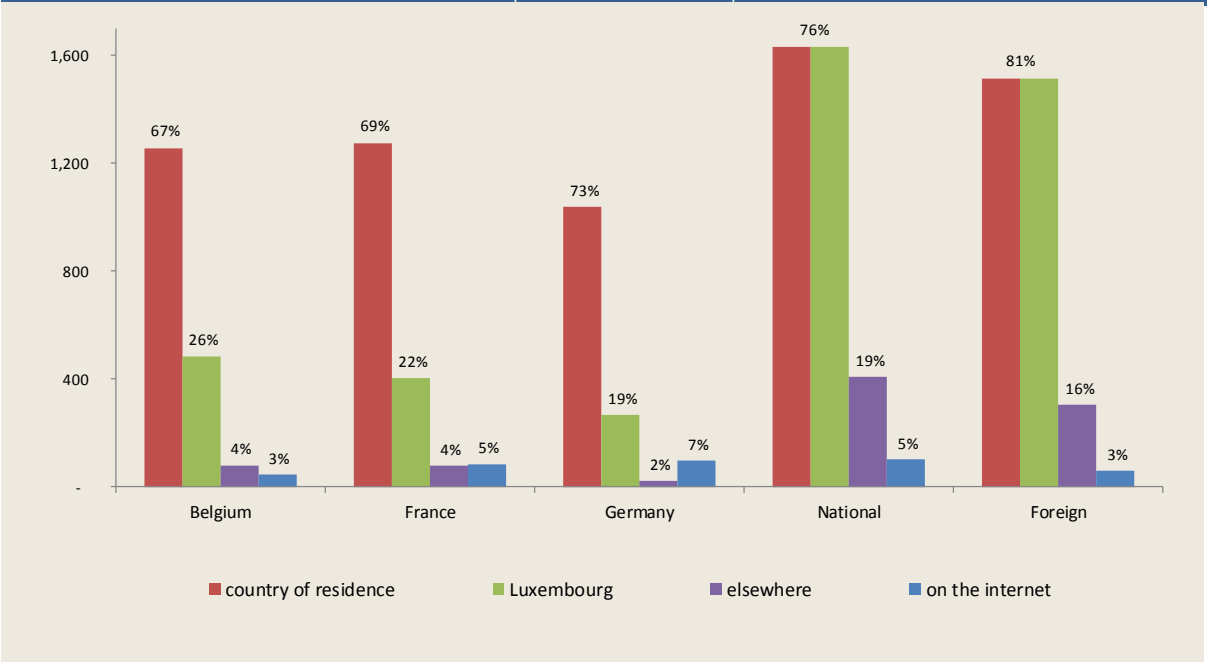
9. Consumption of cross-border commuting households

Households commuting to Luxembourg for work purposes consume products and use services in both Luxembourg and their respective country of residence. For example, using the first wave of the XB-HFCS, Mathä, Porpiglia and Ziegelmeyer (2017) show that cross-border commuters systematically exploit consumer price differences between Luxembourg and their respective country of residence in their consumption behaviour.

This section looks at non-durable goods and services expenditures by cross-border commuters and compares them to those of employed households resident in Luxembourg. Figure 11 reports the monthly household expenses including food and beverages, utilities, clothing, and leisure, but excluding consumer durables (e.g. cars, household appliances, etc.), rent, loan repayments, and insurance policies. Most of the non-durable consumption expenditures of cross-border commuters were done in the respective country of residence (more than 67%); about 20% in Luxembourg and around 8% on the internet or elsewhere. Employed households in Luxembourg reported a similar pattern. In fact, 76-81% of their non-durable consumption expenditures were done in Luxembourg, 16-19% in neighbouring countries, and the rest on the internet or elsewhere.

Figure 11. Monthly consumption expenditure (excl. durables) by country

Mean (rounded to the nearest 100 euro)



Source: Own calculations based on XB-HFCS and LU-HFCS, wave II; data are multiply imputed and weighted.

There are geographical differences for cross-border commuters from different countries. Cross-border commuters from Belgium consumed a significantly higher share of their non-durable expenditures in Luxembourg than those from France and Germany. This supports the results obtained from the first wave, which indicated that among the three neighbouring countries, cross-border commuters from Germany had the lowest share of expenditures in Luxembourg. In contrast, in Germany, cross-border commuters had the highest share of expenditures on the internet (7%).

10. Concluding remarks

The Banque centrale du Luxembourg (BCL), in cooperation with the Luxembourg Institute of Socio-Economic Research (LISER), conducts at regular intervals the Cross-border Household Finance and consumption survey (XB-HFCS) to better understand the financial and economic situation of cross-border commuters, who work in Luxembourg but live in neighbouring countries. This report provides a detailed account of the methodology and the main results of the second wave from 2014.

Overall, cross-border commuters reside in their country of birth, are married or in couple and have attained a high level of education. The majority of cross-border commuters are employed with a permanent contract and on average have been working in Luxembourg for a decade. They use the car as main mean of transport and commute an average of 46 minutes to work.

Average household net wealth of cross-border commuters was €261,900 in 2014 and increased of about 9% in nominal terms from 2010 (€239,900). At the same time, median net wealth increased by almost 20% in nominal terms from €167,000 to €199,300. Given the lower value of the household main residence, cross-border commuters reported 50% lower net wealth than households in Luxembourg with at least one (self-) employed member. The median net wealth of cross-border commuters from France and Germany was significantly higher than that of the total employed population in the respective countries. Concerning the distribution of household net wealth of cross-border commuters, we observe substantial differences between the bottom and top quintile. Households in the top quintile owned about twice as much as households in the second highest quintile, and about three to four times as much as those in the middle quintile. Moreover, while household net wealth of employed Luxembourg residents and cross-border commuters was comparable if we consider the bottom 20% of the distribution (both around €6,000), there was a marked gap at the upper tail of the distribution. In fact, median household net wealth in the wealthiest quintile was around €1,400,000 for employed Luxembourg households and €540,000 for cross-border commuters. Despite the differences in net wealth

levels, the composition of household wealth between cross-border commuters and employed Luxembourg residents does not differ by much. Regardless of the origin of the cross-border commuters, their household real assets represent more than 80% of mean total assets, while mortgage debt represents about 80% of mean total debt. This similarity extends to the share of risky assets (stocks + mutual funds) in household financial asset portfolio of about 16%. While the majority of real assets are held in the country of residence, more than 20% of household financial assets and total liabilities of cross-border commuters are held in Luxembourg.

Cross-border commuters reported higher median gross income than employed households in their respective country of residence. In contrast, employed Luxembourg resident households reported about 30% higher median gross income than cross-border commuters. Part of this income difference can be explained by the fact that, on average, a sizeable share of total household gross income of cross-border commuters (about 20%) was not earned in Luxembourg.

The majority of cross-border commuters and employed Luxembourg residents indicated to be risk-averse (around 71%). In general, better educated households tend to be more risk-loving. Moreover, those most likely to earn higher gross income are risk-neutral and risk-loving households. Overall, risk-averse households typically own sight and savings accounts, as well as voluntary pensions or life insurance plans. Conversely, risk-neutral and risk-loving households are additionally more likely to invest in mutual funds and stocks.

Finally, cross-border commuters consume goods and services in both Luxembourg and their respective country of residence. While the majority of the non-durable expenditures are done in the country of residence, cross-border commuters consumed nearly 20% of their household income in Luxembourg.

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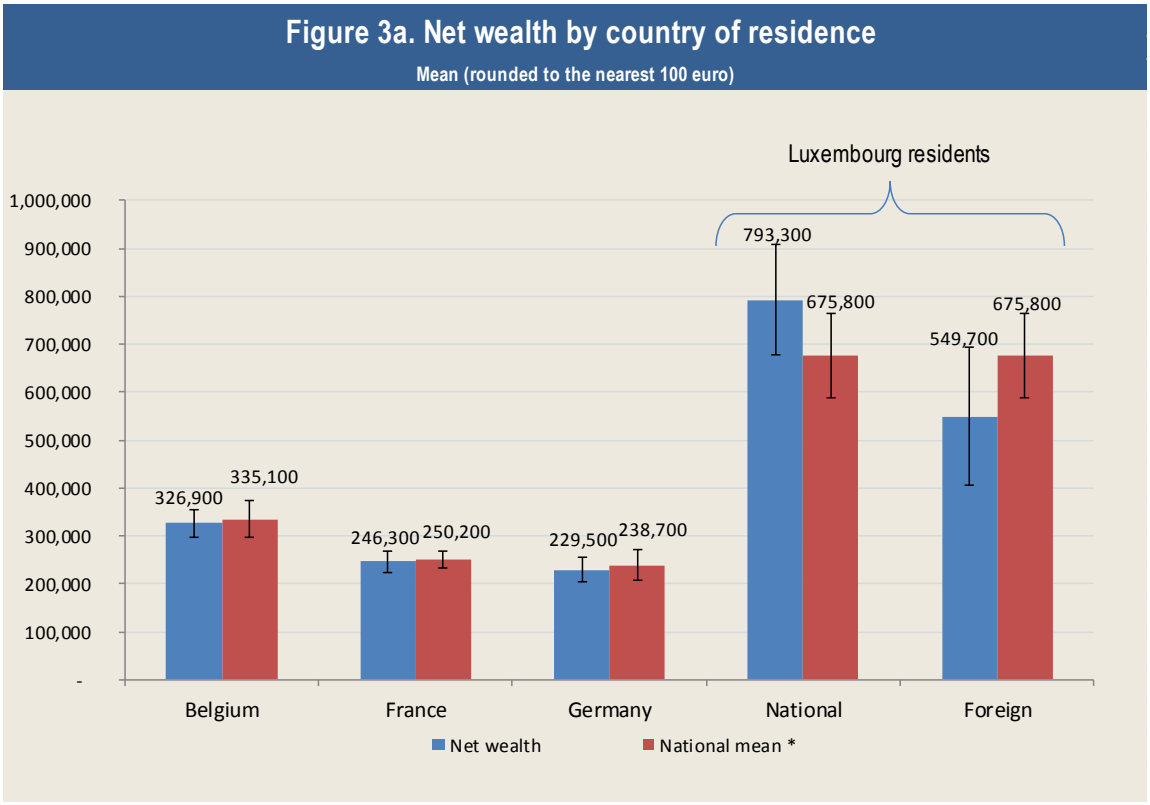
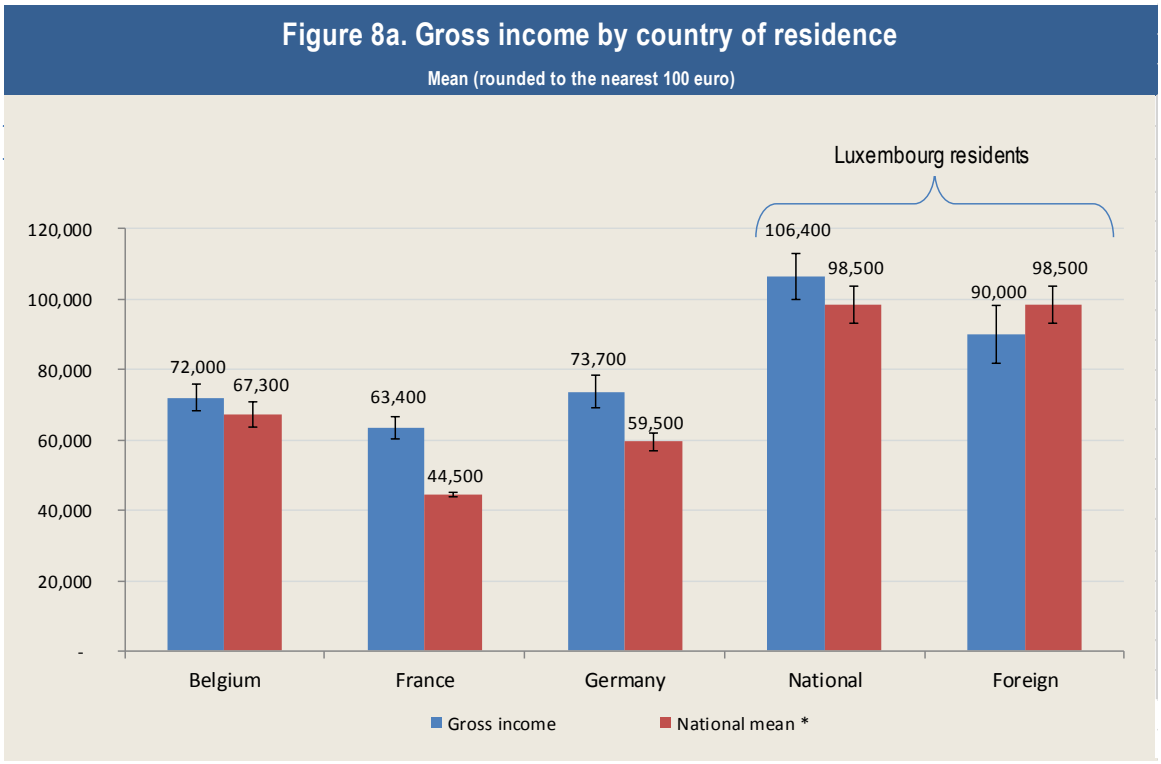
Appendix A: Additional figures





Source: Own calculations based on XB-HFCS, LU-HFCS and Eurosystem HFCS, wave II; data are multiply imputed and weighted.
*Note: Brackets indicate the 95% confidence interval. * The respective national value is calculated from HFCS dataset for Belgium, France, Germany and Luxembourg for employed households only.*

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