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PEER EFFECTS IN STOCK MARKET PARTICIPATION: EVIDENCE FROM IMMIGRATION

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This paper studies how peers' financial behavior affects individuals' own investment choices. To identify the peer effect, we exploit the composition of the Luxembourg population and use the differences in stock market participation across various immigrant groups to study the effect on stock market participation of natives. We find that stock market participation of immigrant peers has a sizable effect on that of natives and that *social learning* is one of the channels through which this peer effect occurs. However, *social learning* alone does not account for the entire effect. *Social utility* might, therefore, also play an important role in peer effect transmission.

JEL Codes: D14, D83, G5, G11, I22

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1. INTRODUCTION

There is a growing economic literature that shows that people's behavior is influenced not only by their background, such as childhood, family relationships, and inherited cultural and social norms, but also by their present social contacts with peers and their behavior (Gomes et al., 2021). Peer effects have been documented for different economic decisions, including consumption (Boneva, 2014),

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stock market participation (Brown et al., 2008; Haliassos et al., 2020; Hong et al., 2004; Hvide & Östberg, 2015), borrowing (Becker & Rayo, 2006; Georgarakos et al., 2014), saving for retirement (Duflo & Saez, 2002; Haliassos et al., 2020), housing (Ioannides & Zabel, 2003; Patacchini & Venanzoni, 2014), and voting behavior (Cohen & Malloy, 2014). It has also been shown that peer effects arise through interactions in social circles (Ioannides & Topa, 2010), alumni and higher education networks (Cohen et al., 2008, 2010), networks at work (Duflo & Saez, 2002; Hvide & Östberg, 2015), and in one's neighborhood (Del Bello et al., 2015; Kling et al., 2007).

In the economics literature on immigration, a recurring and related topic is the economic and social assimilation of migrants in the host country (e.g., Borjas, 1994; Chiswick, 1978; Dustmann, 1996). For example, empirical findings on differences in financial behavior of immigrants and natives suggest that immigrants' behavior tends to converge over time to natives' behavior across several dimensions (Haliassos et al., 2017). As the assimilation of immigrants is shaped by social interaction with natives, it is likely that the reverse holds as well, namely that natives' choices are influenced by immigrants. This is evident in some everyday choices. For example, Döner Kebab is now a routine meal in Germany, while Indian curry is highly favored in the UK. Immigrants, especially if large enough in numbers, do influence natives' tastes and, therefore, are likely to affect their economic choices, such as investment behavior. In this paper, our first contribution is to study the extent to which financial preferences and choices of immigrants are shared and eventually adopted by natives. In particular, we investigate whether immigrants' stock market participation affects the stock market participation decisions of natives.

To study this question, we use representative data from a household survey in Luxembourg, where approximately 50 percent of the population is foreign born. Unlike in countries with much smaller immigrant populations, this setting allows us to explore peer effects transmitted from immigrants to natives. Moreover, the immigrant population in Luxembourg is highly heterogeneous in terms of country of origin and financial behavior, encompassing groups with very low stock market participation rates, as well as rates twice as high as those of natives. This results in a substantial degree of variation in natives' exposure to different investment attitudes.

To identify the peer effect, we employ an instrumental variable (IV) approach and solve the *reflection problem* (Manski, 1993) by exploiting the fact that immigrants and natives satisfy the *excluded peers* property (Bramoullé et al., 2009; De Giorgi et al., 2010).¹ In particular, we focus on natives and peers living in the same municipality and instrument municipality-specific stock market participation rates among immigrants by using the lagged stock market participation rates in their countries of birth. This instrument is valid because one's stock market participation is strongly correlated with the participation rates in one's own country of birth, whereas the behavior of natives is not directly affected by those living abroad, except through the behavior of immigrant peers. Moreover, this approach allows us to rule out simultaneity of individual behavior because

¹In our setting, we can study only the effect of immigrants on natives and cannot rule out the *reflection problem* from immigrants to immigrants, natives to natives, or natives to immigrants.

stock market participation in the country of birth of immigrants is not influenced by that of native residents in Luxembourg, and, therefore, reverse causality can be excluded. To further disentangle the peer effect from contextual and correlated effects (Manski, 1993), we explicitly control for individual investment preferences and for municipality-specific characteristics.

Our second contribution relates to empirical research on the mechanisms underlying peer effects in financial behavior. The existing literature has identified two main transmission channels of peer effects: *social learning* and *social utility*. *Social learning*, as defined by Bursztyn et al. (2014), encompasses all knowledge spillovers, from awareness of the investment opportunity to opinion transmission. *Social utility*, instead, aligns with Galí's (1994) notion of "keeping up with the Joneses" and represents preferences for conformity and payoff complementarities. However, it is an open question which of the two matters most. On the one hand, Bursztyn et al. (2014) show in an experimental study that peer effects are transmitted through both *social learning* and *social utility* channels. On the other hand, Banerjee et al. (2013) demonstrate that, once information transmission is properly accounted for, individual behavior no longer depends on group behavior. Results by Haliassos et al. (2020) also highlight the importance of knowledge transfer over pure imitation, as they find no evidence supporting the *social utility* channel in the transmission of peer effects. We contribute to this debate by accounting for attributes that represent learning, such as individuals' financial literacy, as well as both their and their neighbors' employment in the financial sector and education.

Our results suggest that the financial decisions of the native population are influenced by the financial choices of immigrants in their community and that this effect is stronger in municipalities with relatively more immigrants knowledgeable about stocks. In particular, we find that the magnitude of the peer effect of immigrants' stock market participation on natives' participation is ~ 0.5 . This implies that a 10-percentage point increase in the participation rate of immigrants leads to a 5-percentage point increase in the participation rate of natives. Controlling for financial learning channels, we find that at least part of this peer effect can be attributed to *social learning*. The effect of the participation rate among immigrants decreases by ~ 25 percent after controlling for financial literacy, employment in the financial sector, and the share of neighbors working in the financial sector. The latter serves as a proxy for municipality-level financial knowledge and appears to be the primary driving force behind the learning channel. Our findings are robust to a placebo test, a relaxation of the linearity assumption, and various alternative specifications.

To the best of our knowledge, this is the first study to analyze the response of the native population to the financial choices of immigrants. While the results for Luxembourg may not be entirely representative of other countries, they are likely to hold in certain areas with a large immigrant population.² Moreover, our research design provides a unique setting for identifying peer effects by exploiting the *excluded peer group* property and employing an IV approach.

²For example, Lausanne in Switzerland (41.9 percent), Mannheim in Germany (38.7 percent), London in the UK (36.7 percent), and Brussels in Belgium (35 percent) (Burdett et al., 2015).

Understanding how financial culture is transmitted through peer effects can inform the design of effective and sustainable financial inclusion policies, especially given the ongoing migration flows around the world. Our findings suggest that peer effects generate social multipliers in financial behavior. On the one hand, they promote financial literacy and, ultimately, financial inclusion through *social learning*. On the other hand, peer effects may amplify panics through *social utility*. The latter conclusion is drawn from the result that *social learning* alone does not completely account for the entire peer effect. Moreover, given the significant role financially knowledgeable individuals appear to play in transmitting peer effects, increasing financial inclusion and fostering greater stock market participation could be achieved by increasing the number of financially literate peers in local networks.

The paper proceeds as follows. Section 2 summarizes the main findings on peer effects in investment decisions. Section 3 reviews the setup of the empirical analysis. Sections 4 and 5 discuss in detail the methodology and the data. Section 6 presents the main results and describes the robustness tests. Section 7 concludes.

2. PREVIOUS RESEARCH

Our work contributes to two streams of literature. The first is the area of research that explores differences in financial market outcomes between immigrants and natives (e.g., Chen, 2013; Haliassos et al., 2020), as well as the interdependence (Kelly & Gráda, 2000) and assimilation (e.g., Haliassos et al., 2017) of immigrants' financial behavior. The question of whether immigration affects natives' financial decisions has, however, received little attention.³ One exception is Brown et al. (2008), the study most similar to ours, which examines the effect of stock market participation in one's neighborhood on one's decision to own stocks. To identify the causal link between community and individual stock market participation, they focus on the behavior of "native" residents in the USA, that is those residents whose state of birth and residence coincide, and instrument average ownership in the community by using information on participation rates in the states of birth of "nonnative" neighbors. The results show that an individual is more likely to participate in the stock market if more people in their community are stock market investors and that this effect is stronger for communities in which individuals are more likely to seek advice from their neighbors.

The second is the large body of research that analyzes peer effects in financial behavior in a variety of settings. Among the first to identify the causal effect of peers' choices on individuals' financial outcomes is the work by Duflo & Saez (2002), who study retirement savings decisions. As in most papers studying the role of peer effects in financial choices, they find a positive relation between group behavior and individual decisions (see Table A.1 for a literature overview). However, there is no consensus on what drives these effects.

In particular, Bursztyrn et al. (2014) conduct an experimental study to disentangle two channels of social influence in financial decision-making, *social learning*

³ Many studies pose similar questions in the context of education. Two examples are Gould et al. (2009) and Angrist and Lang (2004).

and *social utility*, and conclude that both matter. In contrast, Banerjee et al. (2013) distinguish between a pure *information effect*, which reflects the awareness of opportunity, and an *endorsement effect*, which depends on participation among one's peers. For microfinance borrowing decisions, they find that the information effect matters, but there is no statistical evidence of the *endorsement effect*. Li (2014) further provides evidence consistent with the *social learning* channel. More specifically, he studies the importance of information sharing regarding financial decisions within family networks and finds that the probability of investing in stocks increases if children or parents recently entered the stock market. By showing that the results hold only for entry decisions and that there is no correlation with stock market exits, he concludes that information sharing is driven by *social learning*. Haliassos et al. (2020) also conclude that the effect of the transfer of knowledge is more important than pure imitation, by documenting that exposure to financially literate neighbors increases households' participation in stock markets. Contrary to these studies, Cooper and Rege (2011) find that, under uncertainty, the main driver of peer effects is *social regret*, which is a channel consistent with Bursztyn et al.'s (2014) *social utility* hypothesis.

The remaining empirical literature on peer effects in financial behavior estimates the combined effect of *social learning* and *social utility*. For example, several studies investigate the effects of social interactions on portfolio choices by examining professional traders (Hong et al., 2005; Pool et al., 2015) and private investors (Ivkovic & Weisbenner, 2007; Kaustia & Knüpfer, 2012). These papers find that investors who live in the same city or neighborhood (Hong et al., 2005; Ivkovic & Weisbenner, 2007; Kaustia & Knüpfer, 2012) are more likely to trade the same stocks (Hong et al., 2005; Ivkovic & Weisbenner, 2007), have a portfolio overlap (Pool et al., 2015), and enter the stock market if their peers recently experienced positive returns (Kaustia & Knüpfer, 2012). Several other papers highlight the importance of social interactions in investment decisions by arguing that sociability reduces fixed participation costs through cheaper information sharing (Georgarakos & Pasini, 2011; Hong et al., 2004; Ivkovic & Weisbenner, 2007). Cohen et al. (2008, 2010) reveal that U.S. mutual fund portfolio managers rely on their education network, which allows them to perform better on holdings of firms they are connected to through their network than on nonconnected holdings. And while all these studies attribute their results to *word-of-mouth* communication about stocks among investors, their conclusions about the quality of the shared information differ.⁴

To summarize, there is a vast literature on peer effects in economic behavior. Most of the papers conclude that economic choices are affected by those of peers through social interactions. However, only a handful of papers attempt to disentangle its drivers. Our contribution to the literature is twofold. First, we

⁴Our paper is also closely related to the literature on peer effects in consumption (Agarwal et al., 2021; Boneva, 2014; Cai et al., 2009), indebtedness (Becker & Rayo, 2006; Georgarakos et al., 2014), housing choice (Ioannides & Zabel, 2003; Patacchini & Venanzoni, 2014), and program participation (Aizer & Currie, 2004). For a comprehensive review of identification challenges, such as endogenous sorting, see surveys on neighborhood and social network effects and their role in shaping individual behavior and economic outcomes by Durlauf (2004), Topa and Zenou (2015), and Ioannides and Topa (2010).

estimate how immigrants' financial behavior affects natives' financial decisions. Second, we quantify *social learning* and *social utility* channels of the estimated peer effect. Our results, combined with recent findings on the nature of peer effects in financial behavior and differences between immigrants and natives, suggest that financial culture and investment attitudes are transmitted through social interactions. This finding can contribute to the design of effective policies that foster financial inclusion.

3. STUDY BACKGROUND AND SETUP: LUXEMBOURG AND ITS IMMIGRANTS

Luxembourg offers a unique context to study the effects of immigration and exposure to different financial cultures on the portfolio choices of natives. There are several reasons for this. First, approximately half of the population in Luxembourg is foreign born, with this share exceeding 60 percent in certain areas of the country. This considerable presence of immigrants ensures that natives are sufficiently exposed to their influence for peer effects to arise (see Table A.2).

Second, the population composition varies greatly across municipalities in terms of the relative shares of natives and immigrants, as well as the origin of the immigrant population. According to the Luxembourg Census of 2011, the share of immigrants at municipality level varies between 15 and 65 percent of the total population. The majority of immigrants in Luxembourg come from the neighboring countries (Belgium, France, and Germany) and southern Europe (Portugal and Italy), constituting between 12 and 54 percent of the total municipal population and between 52 and 90 percent of the foreign-born residents (see Table A.2). Interestingly, immigrants from the same country of birth often choose the same municipalities for their residence in Luxembourg. For example, in some municipalities, the Portuguese make up 45 percent of the total population and 81 percent of the immigrant population. A similar pattern is observed for the French and Belgians, with their shares in certain municipalities reaching 14 percent (27 percent) and 18 percent (64 percent) of the total (immigrant) population, respectively.

Third, the fact that over the years Luxembourg has attracted very different types of immigrants results in a high degree of heterogeneity in their stock market participation (Table 1). Notably, while immigrants from Portugal barely participate in the stock market, participation rates of Germans and Belgians are twice as high as those of Luxembourg natives. When compared to the participation in their countries of origin, Portuguese immigrants in Luxembourg participate less, while Germans, Italians, and Belgians participate almost twice as much. This difference reflects heterogeneity in the selection into immigration across these countries. While immigrants from Germany, Italy, and Belgium are more likely to hold skilled jobs that require higher education, immigrants from Portugal are more likely to hold low-skilled jobs, have lower educational attainment, and earn lower incomes.⁵

⁵ More details on the differences in sociodemographic characteristics between natives and immigrants are provided in Tables A.3 and A.4. Household sociodemographic characteristics refer to the characteristics of the household head, identified as the financially knowledgeable person for the purpose of the survey.

TABLE 1
COMPOSITION OF LUXEMBOURG POPULATION AND STOCK OWNERSHIP RATES BY COUNTRY OF BIRTH

Groups	Country of Birth	Population in Luxembourg (%)	Risky Asset Ownership Rates in Luxembourg in 2014 (%)	Risky Asset Ownership Rates in 2010 (Instrument) (%)	
				All Residents	Only Natives ^a
Natives	Luxembourg	56.55	20.84	24.34	27.60
Main immigrant groups	Portugal	16.27	0.48	7.25	6.81
	France	6.24	22.74	21.23	na
	Italy	3.59	21.49	9.24	9.96
	Belgium	3.20	42.84	25.80	27.25
Immigrants from other European countries available in the Eurosystem HFCS dataset	Germany	2.37	39.20	21.39	23.30
	Netherlands	0.76	12.97	22.48	na
	Spain	0.72	37.11	14.09	na
	Greece	0.31	0.00	3.57	3.68
	Finland	0.21	97.06	38.54	39.20
	Austria	0.15	91.41	12.94	13.73
	Slovakia	0.12	0.00	3.26	3.17
	Slovenia	0.08	0.00	19.69	20.07
Malta	0.04	na	20.01	19.39	
Cyprus	0.01	na	35.06	37.69	

Notes: The table presents the composition of the population in Luxembourg by nationality based on Census 2011, risky asset ownership rates in Luxembourg in 2014 based on the second wave of the LU-HFCS, and risky asset ownership rates in the country of birth based on the first wave of the Eurosystem HFCS. Data are weighted and multiply imputed. We observe 107 of 116 municipalities existing in 2011.

Abbreviation: LU-HFCS, Luxembourg Household Finance and Consumption Survey.

^aIn France, Spain, and the Netherlands, data on ownership rates are computed only for the total population because the country of birth/nationality is not collected/available (na).

TABLE 2
SUMMARY STATISTICS OF MUNICIPALITY CHARACTERISTICS

	Mean	Median	Mean Standard Deviation
Immigrants (%) (based on LU-HFCS sample)	34.7	35.9	23.4
Immigrants (%) (based on census)	33.5	32.6	9.8
Stock market participation of all population (%)	20.2	14.3	21.2
Stock market participation of natives (%)	22.5	13.3	25.9
Stock market participation of immigrants (%)	16.4	2.3	23.1
Financially literate (%) ^a	72.9	75.0	13.8
Risk loving (%)	4.3	0.0	12.4
High education attained (%)	29.2	26.5	24.8
Unemployed (%)	2.0	0.0	6.0
Working in financial sector (%)	5.3	0.1	8.7
Age	50.0	51.2	8.6
Homeownership (%)	77.1	78.9	22.3
Income (euro)	89,138	86,010	34,068
Main residence value (conditional mean) (euro)	667,126	631,172	231,195
Net wealth (euro)	783,839	708,524	543,526
Municipality population (based on census)	4,669	2,148	9,904
Municipality square kilometer	22.3	20.3	13.4
Municipality number observations (based on LU-HFCS sample)	15	8	27
Canton number observations (based on LU-HFCS sample)	160	84	154

Notes: The table presents summary statistics for sociodemographic and economic characteristics at the municipality level. Two datasets are used: the 2014 wave of LU-HFCS and 2011 Census data. Statistics are reported only for municipalities in the LU-HFCS sample. Mean and median are not weighted by municipalities' population and, thus, are not representative of the country. Our data cover municipalities with 499,553 residents, representing 98 percent of the population in 2011. We observe 107 of 116 municipalities existing in 2011.

Abbreviation: LU-HFCS, Luxembourg Household Finance and Consumption Survey.

^aFinancially literate percentage is measured as a share of correctly answered financial literacy questions.

Together, the unequal distribution of immigrants across municipalities and the pronounced differences across immigrant groups create substantial variation in natives' exposure to other cultures, including varying attitudes toward investment and stock market participation. Table 2 shows that stock market participation varies considerably across municipalities. This variation is driven by differences among natives and among immigrants, reflecting heterogeneity not only in population composition of each municipality but also in financial behavior.

Altogether, these facts imply that natives in Luxembourg are exposed to different cultures and investment attitudes. Moreover, given the substantial variation in the population composition and, thus, financial behavior across municipalities, Luxembourg provides a unique framework to study how immigrants' portfolio choices affect the investment decisions of their native neighbors.

4. METHODOLOGY AND EMPIRICAL STRATEGY

4.1. Identifying and Estimating Peer Effects: Instrumental Variable Approach

To identify the effect of immigrants' stock market participation on investment decisions of natives residing in the same municipality, we first specify a linear-in-means regression model, including the variable meant to capture endogenous peer effects and a set of sociodemographic and economic characteristics:

$$(1) \quad y_{i,m} = \alpha^* + \beta^* \hat{E}(y|m) + Z'_{i,m} H^* + u_{i,m},$$

where $y_{i,m}$ is an indicator taking value 1 if a native household i residing in municipality m has investments in stocks or mutual funds. $Z'_{i,m}$ is a row vector of household sociodemographic and economic characteristics, and $u_{i,m}$ is an error term with the assumed properties of $E(u_{i,m}) = 0$, $\text{Cov}(Z'_{i,m}, u_{i,m}) = 0$, and $\text{Cov}(\hat{E}(y|m), u_{i,m}) = 0$. We use asterisk (*) to indicate that the estimated coefficients (α , β , and H) are likely biased, as explained later ($\text{Cov}(\hat{E}(y|m), u_{i,m}) \neq 0$).

Ideally, we would like to calculate the average stock market participation rate of immigrant peers of a household i living in municipality m . However, the number of observations for some municipalities in our sample is rather low. We overcome this issue by calculating stock market participation for a specific immigrant group using all information in the neighboring municipalities within a canton. We then use municipality-specific foreign population weights from the 2011 Census data to obtain stock market participation rates among immigrants at municipality level.

We specify $\hat{E}(y|d, c, m)$, the average stock market participation of immigrant peers of a household i living in municipality m , in equation (2):

$$(2) \quad \hat{E}(y|d, c, m) = \sum_c \left\{ \left[\frac{\sum_j y_{j,d,c}}{N_{d,c}} \right] \times \frac{N_{m,c}}{N_m} \right\},$$

where $y_{j,d,c}$ is the individual participation decision of immigrant j from country c residing in canton d and $N_{d,c}$ is the number of immigrants from country c living in canton d .⁶ $\left[\frac{\sum_j y_{j,d,c}}{N_{d,c}} \right]$ is thus the average stock market participation of immigrants from country c residing in canton d . This information is based on 2014 Luxembourg Household Finance and Consumption Survey (LU-HFCS) data. To obtain municipality-specific participation rates among immigrants, we weight these stock market participation averages for a given country by $\frac{N_{m,c}}{N_m}$. This is the municipality m share of immigrants from a given country of birth (c) based on census data from National Institute of Statistics and Economic Studies of the Grand Duchy of Luxembourg (STATEC).

It is well known that due to the *reflection problem* (Manski, 1993), a simple regression of a native's decision to invest in stocks on stock ownership rate among

⁶There are 12 cantons in Luxembourg. We combined the smallest cantons Clervaux and Vianden, as well as Redange and Wiltz, to ensure a minimum of 58 observations per canton.

immigrants in their community would not produce a consistent estimate of the peer effect of interest, that is, how natives change their stock market participation behavior in response to different investment attitudes of their immigrant peers. More specifically, the ordinary least squares (OLS) estimate of the coefficient β , meant to capture this effect, would be biased due to reverse causality and omitted confounding *contextual* and *correlated* effects.

To estimate the peer effect consistently and to rule out correlation of investment behavior between natives and immigrants driven by unobserved correlated characteristics, the ideal experiment in our context would be to allocate immigrants randomly to municipalities. In the absence of such an experiment, we solve the reflection problem by employing an IV approach and by controlling for municipality-specific characteristics and individual risk preferences. In particular, our identification strategy exploits the fact that the network of natives and immigrants in Luxembourg partially overlap: the network of natives consist of both natives and immigrants, while the network of immigrants additionally include links to their countries of birth. As shown in Bramoullé et al. (2009) and De Giorgi et al. (2010), this partial overlap of the network allows for the identification of the peer effect by instrumenting the peer's group mean behavior with the mean characteristics of the peer's peers, assuming they do not interact directly with the person in question—the so-called *excluded peers*. The intransitivity of natives' and immigrants' networks guarantees the existence of IVs for the stock market participation rates of immigrant peers (De Giorgi et al., 2010).

We exploit this feature to construct the IV for immigrants' stock market participation and rely on the intuition of Guiso et al. (2004) that one's place of birth may have long-lasting effects on one's financial behavior. In particular, we instrument immigrants' municipality-specific participation rates by lagged stock ownership rates in their countries of birth, which resembles the instrument used by Brown et al. (2008). For the municipality m , we weight the stock market participation rate in the immigrant's country of birth by the municipality-specific share of immigrants from that country:

$$(3) \quad \hat{E}^{IV}(y|m, c) = \sum_c \left\{ \left[\frac{\sum_k y_{k,c}}{N_c} \right] \times \frac{N_{m,c}}{N_m} \right\}.$$

$\left[\frac{\sum_k y_{k,c}}{N_c} \right]$ is the participation rate in the country of birth c , where N_c is the number of households k in country c and $y_{k,c}$ is an indicator taking value 1 if a household k residing in country c has investments in stocks or mutual funds. We use lagged values of the instrument to rule out simultaneous correlated responses to common shocks across countries, thus reducing the potential for spurious correlation. This means that we use 2010/2011 Eurosystem HFCS to estimate the average stock market participation for all participating countries. As before, $\frac{N_{m,c}}{N_m}$ is the municipality m share of immigrants from a given country of birth c , with N_m and $N_{m,c}$ taken from census data from STATEC on the number of migrants for each municipality.

To be valid, the IV should satisfy two identifying assumptions. First, it must be relevant, meaning that immigrants' stock market participation should be correlated

with stock ownership rates in their countries of birth. Second, it must satisfy the exclusion restriction, which means that financial decisions of those remaining in their countries of birth should affect financial choices of the Luxembourg native population only indirectly through their immigrant peers. Under these conditions, stock ownership rates in the countries of birth can be used as an IV for immigrants' participation rates in Luxembourg.

While the first assumption can be tested, the exclusion restriction poses a potential threat to our identification. In particular, the exclusion restriction would be violated if there are common unobservable characteristics correlated with the investment decisions of both natives and immigrants living in the same municipality or if individuals living outside Luxembourg affect natives' financial choices directly.

The latter condition is unlikely since, in principle, Luxembourg natives do not interact directly with foreigners who did not immigrate to Luxembourg. The former condition is a larger concern since we use IVs at the municipality level: if immigrants and natives sort themselves into neighborhoods based on unobservable correlated characteristics, which are also correlated with their stock market participation, they could have similar investment preferences and financial choices, even in the absence of the peer effect (Goldsmith-Pinkham & Imbens, 2013). If these characteristics are also shared with nonresident peers, then the estimated peer effect would be biased upward.

To address the issue of correlated effects, we control for individual characteristics that might affect both investment preferences and the choice of municipality but are rarely observed in the data and therefore remain "unobservable" in most empirical studies. In particular, we control for individual risk preferences, financial literacy, and employment in the financial sector. We also control for a set of neighborhood-specific characteristics by including the municipalities' average rental prices and the share of residents working in the financial sector. The former captures groups' economic condition and location within Luxembourg, while the latter accounts for the population composition. If peers had similar unobserved information sets, tastes for risk, or faced similar economic conditions, possibly due to self-selection into peer groups, then one would observe positive correlation in stock market participation even in the absence of social interaction effects. Explicitly controlling for these characteristics mitigates the potential bias. This approach carries the further advantage that, by explicitly controlling for individual and neighborhood-specific attributes, it provides a better analysis of the investment decision, as well as peer effect transmission.

Formally, to control for the confounding factors, that is the contextual and correlated effects, we include neighborhood and individual characteristics discussed earlier and rewrite equation (1) as follows:

$$(4) \quad y_{i,m} = \alpha + \beta \widehat{E}(y|m, c) + Z'_{i,m} H + W'_m \Gamma + X'_{i,m} \Delta + \epsilon_{i,m},$$

where W_m is a set of neighborhood-specific characteristics (rental prices and the share of residents employed in the financial sector) and $X'_{i,m}$ is a vector of risk preferences, financial literacy, and an indicator of individual employment in the financial sector. In this specification, $E(\epsilon_i | m, Z, W, X)$ is more likely to be zero, so the estimate of the endogenous peer effect β is more likely to be unbiased.

One possible concern regarding our specification might be that we include only two municipality-level controls capturing factors common to both natives and immigrants. This choice is driven by both data availability and sample size. However, we do perform a number of robustness checks, including different municipality controls, some of which we describe in Section 6.3.2 and present in Table A.9. The endogenous peer effect we estimate is robust to these alternative specifications.

Another potential threat to identification could be that the variation in the IV stems from other confounding factors related to the country of origin. To ensure that the channel of transmission derives only from investing in the stock market, we separate the effects of the IV from such confounders. To do this, we construct an alternative instrument that, instead of relying on stock market exposure, uses the gross domestic product (GDP) per capita of the country of origin. We instrument the stock market participation of immigrants with this alternative instrument while retaining our initial instrument as a control. The estimates yield null results in the second stage, leading us to conclude that our original instrument truly captures the influence of stock market participation of immigrant peers.

We estimate all specifications using both simple OLS regression and an IV approach. The OLS regression serves as a natural point of comparison for the IV results we produce.

4.2. Identifying Mechanisms

The correlation between individual decisions and the behavior of the group, net of contextual and correlated effects, may be driven by two forces: *social utility* and *social learning* (Bursztyn et al., 2014). Both these channels help explain why peers might play an important role in one's financial decisions. *Social utility*, also referred to as the *social interaction effect* (Cooper & Rege, 2011) or simply “keeping up with the Joneses” (Galí, 1994), operates through *social norms*, *social regret*, *preferences for conformity*, and *payoff complementarities* (Cooper & Rege, 2011). *Social utility* would induce people to behave similarly due to the intrinsic preference to fit in with the group, without necessarily considering the role of information.

Social learning, on the contrary, may arise because financial decisions require costly information, prompting individuals to rely on the knowledge of others. According to Sorensen (2006), *social learning* is a particular form of an endogenous peer effect, whereby individuals might be directly influenced both by the information provided by peers and by knowledge about their decisions. Dahl et al. (2014) show that the transmission of information is one of the most important drivers of peer effects. This channel also includes social multiplier and “snowball” effects, making *social learning* especially relevant for policymakers. *Social learning* may occur through *rational social learning* when valuable information is transmitted through *imitation* or *through knowledge spillovers* (Cooper & Rege, 2011).

Banerjee et al. (2013) distinguish between the *endorsement channel* of peer effect transmission, which encompasses both *social utility* and the transmission of opinions, and the *pure learning channel*, which includes only awareness of the opportunity and, thus, real knowledge transmission. Despite attempts to identify word-of-mouth communication using various sociability proxies, this analysis does not differentiate between what we refer to as *social utility* and *social learning* mechanisms.

We aim to disentangle *social utility* and *social learning* in several ways. First, we control for one's basic financial literacy, specific knowledge about stocks, and employment in the financial sector, serving as a proxy for knowledge of financial markets and investment opportunities. After including these controls, a significant *endogenous peer effect* would indicate the presence of drivers beyond pure information transmission, such as *social utility*. Second, we capture possible knowledge spillovers from neighbors by controlling for the share of the municipality population employed in the financial sector and, therefore, more knowledgeable about financial markets. Finally, we explore whether peer effects change depending on peers' education and financial literacy. A higher peer effect in the presence of more sophisticated peers would indicate the importance of knowledge transmission and *social learning* as the driving forces behind the *endogenous peer effect*.

A word of caution is required regarding the interpretation of our results. First, as we cannot measure preferences for conformity directly, we speculate that *social utility* manifests itself in the estimate of the peer effect that remains after accounting for *social learning*. This way of measuring *social utility* is arguably imperfect, as the included covariates may not capture all potential knowledge spillovers. Moreover, variables proxying for *social learning* may, to some extent, themselves capture individuals' preferences for conformity.

Second, controlling for factors that contribute to *social learning* allows us to assess the relative importance between the remaining effect of immigrants' stock market participation and the information channel only to the extent that it is captured by these specific characteristics. For instance, the coefficient on the share of neighbors working in the financial sector, the variable closest to capturing information transmission, cannot be strictly interpreted as a learning channel. Instead, it represents a combination of both knowledge spillovers and potential sorting based on occupation, thus also reflecting *contextual effects*.

Finally, although it is arguably of interest, we cannot draw inferences on how financial knowledge affects one's portfolio choices. While our set of individual controls may capture how financial knowledge is correlated with individual investment decisions and account for the learning channel, these variables cannot be interpreted causally. This is because financial literacy not only captures one's own financial knowledge and what was learned from one's peers but also encompasses insights gained from previous investment decisions, potentially giving rise to reverse causality.

In summary, our research design allows us, first, to identify the *endogenous peer effect* of immigrants' stock market participation decisions and, second, to better understand what drives this effect.

5. DATA AND SAMPLE DEFINITION

5.1. Individual-Level Data

The individual-level data on Luxembourg residents is from the second wave of the LU-HFCS collected in 2014. The survey provides information on 1,601 households, of which 875 are headed by individuals born in Luxembourg, referred

to as *natives*, and 726 are headed by individuals born abroad, referred to as *immigrants*.⁷

The LU-HFCS provides a representative data sample of the Luxembourg population suitable for our analysis for several reasons. First, it contains detailed balance sheet information, a rich set of sociodemographic and socioeconomic characteristics, and information on respondents' investment attitudes and financial knowledge. Second, it includes the country of birth of the respondent, even though this information is typically unavailable due to the anonymization of the underlying household data. Finally, it includes the four-digit postal code of the main residence, enabling us to match households to their respective municipality. This allows us to calculate the stock market participation among immigrant peers at the municipality level.

Our main dependent variable is a binary variable indicating households' stock market participation. It takes the value 1 if a household holds stocks (directly or indirectly through mutual funds) and 0 otherwise. Our main explanatory variable is the municipality-specific stock market participation rate among immigrants. As explained in Section 4.1, ideally, we would compute it by simply taking the municipality-specific share of foreign-born households holding stocks, weighted by the corresponding population weights. However, as our sample contains only a few immigrant observations in certain municipalities, we use canton-level information to calculate immigrant stock market participation for a given country of birth. To compute municipality-level participation behavior, we weight the average stockholding of immigrants from a given country in a given canton by the share of its population in the respective municipality.

Given the richness of the survey, we employ a broad range of controls to account for heterogeneity in investors' sociodemographic and economic characteristics. Since information on a household's wealth and investment holdings is provided by the *financially knowledgeable person* (FKP), we use that person's individual characteristics in our analysis. In particular, the regressions include the FKP's age, gender, marital status (single, married, or in official partnership [reference category]; widowed or divorced), whether the FKP's partner (if any) is foreign born, and whether his or her parents were immigrants. We also control for the level of educational attainment (low [reference category], medium, and high), employment status (employed [reference category], self-employed, unemployed, retired, and other nonworking status), and the FKP's employment in the financial sector. Additionally, we include an indicator for risk preferences, defined as the willingness to "take substantial or above average risk expecting to earn substantial or above average returns." Further, we control for financial sophistication by including a dummy variable indicating whether respondents correctly answered the question regarding the difference in the risk profiles of stocks and bonds, as well as a variable indicating the share of correct answers to a set of questions concerning other aspects of financial literacy (mortgage interest rates, inflation,

⁷For a detailed technical report on data collection and descriptive statistics, see Girshina et al. (2017).

and diversification). Finally, we condition on the number of household members and on log-transformed total gross household income.⁸

To construct the municipality-specific IV on immigrants' stock market participation rates, we make use of the first wave (2010/2011) of the Eurosystem Household Finance and Consumption Survey (HFCS). To this end, this dataset has several advantages. First, it contains information on immigrants from European countries, who represent 78 percent of all immigrants in Luxembourg and 34 percent of its resident population.⁹ Second, this data is harmonized across the EU countries, thus allowing us to calculate stock market participation rates using the same definition across countries. Finally, as the data are also harmonized between the waves, we use the lagged value of the instrument, which allows us to rule out possible correlated shocks between the endogenous variable and its instrument. To construct the IV, we first calculate the stock market participation rates in the immigrants' countries of birth.¹⁰ Second, based on 2011 Population Census data, we use the country shares of immigrants in each Luxembourg municipality to construct a weighted average participation rate for each municipality.

In the main analysis, we restrict the full sample of all households residing in Luxembourg to 875 native households, that is, those whose FKP is born in Luxembourg. We exclude households residing in municipalities where no immigrants were sampled in the survey (42 observations) or where immigrants surveyed were not from the European countries included in the first wave of the Eurosystem HFCS (26 observations). Due to the multiply imputed nature of the dataset, we also exclude observations for households that are not included in all imputates. This selection leads to a final sample of 805 observations.

5.2. Municipality-Level Data

In 2011, Luxembourg had 116 municipalities, of which our survey covers 107. We choose to study the peer effect at the municipality level for two main reasons. First, the municipality in Luxembourg is a geographic area small enough for peer effects to matter, with a maximum surface of 113 km² and an average of 22.3 km² (Table 2). As previous research suggests, peer effects decay as the geographic area increases. Areas with a radius larger than 5–10 miles (Pool et al., 2015) or 50 miles (Ivkovic & Weisbenner, 2007), which is equivalent to area sizes between ~78 and 7854 square miles, tend to exhibit decreasing peer effects.¹¹

Second, administrative data on population composition are available only at the municipality level. In particular, we use the 2011 Population Census, collected

⁸ Income declared as zero is recoded to 1 euro.

⁹ First wave of HFCS covers 14 European countries in addition to Luxembourg: Belgium, Germany, Greece, Spain, France, Italy, Cyprus, Malta, the Netherlands, Austria, Portugal, Slovenia, Slovakia, and Finland.

¹⁰ French, Dutch, and Spanish data do not include the country of birth. We experimented with an instrument using only data on the native population in the countries of birth. First-stage results change marginally, but overall results remain the same.

¹¹ To put the size of Luxembourg into perspective, the total surface area of the country is 2586 km², divided into 116 municipalities (as of 2011) or 12 cantons. In comparison, the surface area of New York City is 1,214 km² and is divided into five boroughs—a common unit of analysis for neighborhood peer effects in the U.S. setting.

by the STATEC and containing information on residents and their origins in each municipality, to construct weights for our IV. To address the issue of some municipalities having a limited number of observations in our LU-HFCS sample, we include neighboring municipalities within a canton to calculate participation rates for immigrant groups. With an average canton area equivalent to a 9.07-km radius, this is an area small enough to assume that immigrants from the same country behave similarly and for peer effects to matter.

Additionally, we use census information to construct municipality-specific controls, namely quartiles of the distribution of square meter rental prices and the share of residents employed in the financial sector.

6. THE EFFECT OF IMMIGRANTS' STOCK MARKET PARTICIPATION ON THE STOCK MARKET PARTICIPATION OF NATIVES

6.1. *Main Empirical Results: OLS and Two-Stage Least Squares*

Our main results are presented in Table 4, which provides estimates from the linear probability model of natives' stock market participation on stock ownership rates among their immigrant peers. The baseline specification includes sociodemographic and economic controls, such as income, level of education, and other relevant characteristics, as described in Section 5.1 (column 2 of Table 4). The results show a strong positive correlation between the stock ownership of native and foreign-born peers. In particular, the effect of immigrants' stock market participation on natives' participation is 0.67 in the OLS specification. Thus, a 10-percentage-point increase in immigrants' stock market participation leads to a 6.7-percentage-point increase in the probability of natives' participation to invest in stocks.

Turning to the IV approach, the first-stage results show a strong correlation between the stock market participation of immigrants in Luxembourg and that in their countries of birth (Table 3). Although immigrants in Luxembourg are on average twice as likely to invest in the stock market compared to households remaining in their country of birth, the ranking across countries is preserved: immigrants from countries with higher stock market participation are more likely to invest in stocks than those from countries with lower stock market participation (Table 1). These results validate the choice of IV, and the F -statistic confirms its explanatory power.¹² In addition, the endogeneity test suggests that IV estimates are preferable to OLS.¹³

¹² One possible concern is that first-stage results may be driven by income effects rather than the cultural persistence of financial behavior. Three facts address this concern. First, the ranking of stock market participation rates among the countries is preserved (Table 1). This indicates that immigrants from high-participation countries tend to participate more than immigrants from low-participation countries. Second, we conduct a robustness check with an alternative instrument based on GDP per capita, as explained in Section 4.1. Third, we control for the average municipality rents, which capture heterogeneity in the income of its residents.

¹³ In our baseline specification, we have one endogenous variable and one instrument, as well as the heteroscedasticity robust standard errors. Thus, to evaluate the relevance of the instrument and to ensure that the estimates in the second stage are reliable, we are guided by the "rule of thumb" value of the F -statistics of 10 suggested by Stock et al. (2002).

TABLE 3
FIRST-STAGE RESULTS

	1	2	3	4	5
Average stock market participation in country of birth	2.55*** (0.38)	2.50*** (0.36) Yes	2.50*** (0.35) Yes	1.91*** (0.29) Yes	1.91*** (0.29) Yes
Sociodemographic controls				Yes	Yes
Financial knowledge and preferences controls				Yes	Yes
Percentage of municipality population employed in financial sector				Yes	Yes
Municipality rental price				Yes	Yes
F-statistic of instrument in the first stage	46.01	47.89	51.28	42.80	44.98
p-Value	0.000	0.000	0.000	0.000	0.000
F-statistic on residuals from the first stage	0.902	0.016	0.013	0.021	0.024
p-Value endogeneity test	0.346	0.907	0.928	0.901	0.892
Observations	805	805	805	805	805
Mean stock market participation	0.207	0.207	0.207	0.207	0.207

Notes: The table presents first-stage regressions as described in Section 4.1. The data are the 2014 LU-HFCS sample of natives living in municipalities where at least one immigrant was interviewed and 2010/2011 Eurosystem HFCS data are available for his or her country of birth. The controls are described in Section 5 and include an indicator for male FKP, age and age squared, marital status, household size, levels of education, occupational status, log of income, and indicators for a foreign-born partner and foreign-born parents (sociodemographic controls); indicators for risk preference, employment in financial sector, and financial literacy related and not related to stock ownership (financial knowledge and preferences controls); percentage of municipality population employed in financial sector and dummies for three groups of municipality average rental prices per square meter. Data are weighted and multiply imputed. Standard errors in parentheses are clustered at municipality level. Heteroscedasticity robust Hausman test is in the form of an auxiliary regression: significant coefficient on the residuals from the first stage suggests endogeneity of the instrumented variable.

Abbreviations: FKP, financially knowledgeable person; LU-HFCS, Luxembourg Household Finance and Consumption Survey. ***, $p < 0.01$.

The baseline two-stage least squares (2SLS) estimates are presented in column 2 of Table 4 and are very similar to those of the OLS: a 10-percentage-point increase in immigrants' stock market participation leads to a 6.5-percentage-point increase in the probability of natives investing in stocks.

6.2. Mechanisms

To account for heterogeneity in risk preferences and financial awareness, we estimate specifications in which we explicitly control for the propensity to take high risk to achieve high returns, financial sector employment, and financial literacy (column 3 of Table 4). The effect of immigrants' stock market participation decreases slightly to 0.62 and 0.63 in OLS and 2SLS specifications, respectively. This suggests that the correlation between immigrant and native investment behavior can hardly be attributed to sorting on financial sophistication and correlated preferences, even though they matter *per se*.

As shown in Table A.5, more risk-loving individuals have a 21-percentage-point higher likelihood to invest in stocks. Concerning financial literacy, only *financial literacy related to stock ownership* appears to matter for stock market participation: knowledge of the different risk characteristics of bonds and stocks is associated with a 9-percentage point increase in the probability of investing in the stock market. This result is in line with findings that more financially knowledgeable people are more likely to invest in stocks (Lusardi & Mitchell, 2011a, 2011b; van Rooij et al., 2011). In our analysis, however, this correlation cannot be interpreted causally, as knowledge about stocks may be driven by learning through investment experience, suggesting possible reverse causality. Moreover, financial literacy may include knowledge transmitted by word of mouth attributable to *social learning*. Although we cannot give a causal interpretation to financial literacy controls in our setting, including them in the regression specification helps to isolate the *endogenous peer effect* by accounting for correlated preferences and to capture the *social learning* channel. After accounting for financial knowledge of the difference in risk between stocks and bonds, neither employment in the financial sector nor other financial knowledge explains natives' decisions to invest in stocks.

Next, we control for the municipality-specific share of residents employed in the financial sector (column 4 of Table 4). This control is meant to account for two factors, sorting and *social learning*, sorting because it is plausible that financial sector employees self-select themselves into better locations or locations closer to Luxembourg's financial center. However, this variable will also contain *social learning* since the proximity to financial sector employees could provide opportunities to learn about financial products. After controlling for the share of peers employed in the financial sector, the effect of stock market participation among immigrant neighbors decreases by about 25 percent to 0.47 in the OLS and to 0.5 in the 2SLS regression. This suggests that the total effect of immigrants' stock market participation is at least partially driven by knowledge spillovers from neighbors employed in the financial industry. As the share of neighbors working in finance is, however, also likely to capture a supply effect through the availability of and awareness of certain financial products or sorting based on occupation, we cannot interpret it as capturing solely *social learning* in a strict sense.

TABLE 4
OLS AND 2SLS RESULTS

	1	2	3	4	5
OLS					
Immigrants' stock market participation	0.84*** (0.13)	0.67*** (0.15)	0.62*** (0.15)	0.47** (0.19)	0.51** (0.19)
2SLS					
Immigrants' stock market participation	0.73*** (0.18)	0.65*** (0.22)	0.63*** (0.21)	0.50* (0.28)	0.54* (0.30)
Sociodemographic controls		Yes	Yes	Yes	Yes
Financial knowledge and preferences controls			Yes	Yes	Yes
Percentage of municipality population employed in financial sector				Yes	Yes
Municipality rental price				Yes	Yes
F-statistic of instrument in the first stage	46.01	47.89	51.28	42.80	44.98
p-Value	0.000	0.000	0.000	0.000	0.000
Observations	805	805	805	805	805
Mean stock market participation	0.207	0.207	0.207	0.207	0.207

Notes: The table presents OLS and 2SLS regressions as described in Section 4.1. The data are the 2014 LU-HFCS sample of natives living in municipalities where at least one immigrant was interviewed, and the 2010/2011 Eurosystem HFCS data are available for his or her country of birth. The dependent variable is an indicator of stock market participation. Main explanatory and instrumental variables are described in Section 4.1. The controls are as mentioned in Table 3 and are provided in detail in Table A.5. Data are weighted and multiply imputed. Standard errors in parentheses are clustered at municipality level.

Abbreviations: LU-HFCS, Luxembourg Household Finance and Consumption Survey; OLS, ordinary least squares; 2SLS, two-stage least squares.
*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

TABLE 5
HETEROGENEITY BY IMMIGRANT SHARE: OLS AND 2SLS RESULTS

	1 OLS	2 2SLS
Immigrants' stock market participation	0.24 (0.23)	0.19 (0.41)
High immigrant population	-0.11** (0.04)	-0.10* (0.06)
High immigrant population × immigrants' stock market participation	0.79** (0.33)	0.73* (0.43)
Sociodemographic controls	Yes	Yes
Financial knowledge and preferences controls	Yes	Yes
Percentage of municipality population employed in financial sector	Yes	Yes
Municipality rental price	Yes	Yes
F-statistic of instrument in the first stage		28.36
p-Value		0.000
Observations	805	805
Mean stock market participation	0.207	0.207

Notes: The table presents OLS and 2SLS regressions specified in Section 4.1 but augmented with an indicator for a high share of immigrant population in a municipality and its interaction with immigrants' stock market participation. The data sample as well as the dependent, main explanatory and instrumental variables are as described in Table 4. The control variables are as specified in Table 4, column 5. High immigrant population is an indicator equal to 1 if the share of immigrants in a municipality is higher than the median across municipalities. Data are weighted and multiply imputed. Standard errors in parentheses are clustered at municipality level.

Abbreviations: OLS, ordinary least squares; 2SLS, two-stage least squares. ** $p < 0.05$. * $p < 0.1$.

To further address the sorting of financial sector employees to certain geographic areas, as well as sorting based on wealth and income, we control for municipality-specific residential rental prices as a proxy for municipality affluence (column 5 of Table 4). The inclusion of this control does not affect the overall results.

Finally, we demonstrate that the peer effect we estimate varies with the intensity of exposure to immigrants' behavior, as one would expect from the true *endogenous peer effect*. Table 5 shows that the effect is larger in municipalities with a higher share of immigrants and smaller where the share is relatively low. In particular, in municipalities with relatively few immigrants, the peer effect is only 0.24 (0.19) and is not statistically significant, as estimated in the OLS (2SLS) regression including controls for individual and municipality-level characteristics. In contrast, in municipalities where the share of immigrants is relatively high compared to the median across Luxembourg municipalities, the estimated effect is significantly larger, with a difference of 0.79 (0.73).

Our findings can be interpreted as follows. First, our IV approach allows us to conclude that immigrants' stock market participation affects the portfolio choices of natives. Second, we show that this peer effect persists even after including a set of controls capturing contextual and correlated effects. Finally, we find that the *social learning* channel accounts for a sizable portion of the estimated peer effect, albeit not entirely. This could mean either that we fail to control for all possible drivers of

social learning or that the remaining effect of immigrants' stock market participation behavior represents the *social utility* effect related to preferences for conformity or payoff complementarities, or a combination of the two.

Our findings are also important for policymakers. First, they provide evidence of herding behavior in financial markets. Second, native households adjust their financial choices when exposed to other financial cultures. Furthermore, the composition of the peer group plays an important role in explaining financial behavior: the impact of the share of municipality population employees in finance suggests both *social learning* and sorting.

Our estimates of the *endogenous peer effect* are in line with those documented in the literature on portfolio choice (Table 4; Table A.1). Our findings on the transmission of peer effects align with the conclusions of Bursztyn et al. (2014), who show that both *social utility* and *social learning* matter. Bursztyn et al. (2014) also find that social learning effects are most pronounced among the financially unsophisticated when observing behavior among financially sophisticated peers. In our study, we find evidence that natives do, indeed, learn from those working in the financial sector, who are financially savvy. Similarly, Haliassos et al. (2020) find that exposure to financially literate neighbors increases households' participation in stock markets and that the transfer of knowledge is more important than pure imitation. These findings are consistent with the results of Banerjee et al. (2013), who show that peer effects are larger when individuals transmitting knowledge are more important in a network sense. In our case, the substantial combined effect of variables capturing *social learning* confirms that learning is arguably the main driver of peer effects in financial choices, consistent with the results of Cai and Szeidl (2018) and Banerjee et al. (2013).

6.3. Robustness Checks

Placebo Tests

The first robustness test aims to confirm that our results do not stem from spurious correlations between individual behavior and municipality characteristics. To conduct the test, we randomly assign natives to different municipalities. If the effects of immigrants' stock market participation and the share of the municipality population employed in the financial sector genuinely capture peer effects and not spurious correlation, the results should disappear when a household is randomly assigned to a municipality alongside its corresponding municipality-specific characteristics.

The results of the first placebo test are presented in Table A.6. In the first column, we present OLS and 2SLS estimates with municipality-level explanatory variables assigned correctly, making it comparable to column 1 in Table 4.¹⁴ The second column presents the results when immigrants' stock market participation is assigned correctly, but the share of municipality population employed

¹⁴To focus the analysis on the main variables of interest, we limit the covariates included in this placebo regression to immigrants' stock market participation and the share of peers employed in the financial sector. To account for the interplay between one's own employment in the financial sector and that of peers, we include the former as a control.

in the financial sector is assigned randomly. In this case, the latter becomes even smaller, while the effect of stock market participation increases, and individual employment in the financial sector becomes significant. This suggests that the effect of local employment in the financial sector is not spurious and that in the absence of controlling for it, its effect is picked up by peers' stock market participation and one's own financial sector employment. In column 3, we additionally randomize immigrants' stock market participation and find that both variables are now insignificant, while the effect of individual employment in the financial sector becomes even stronger. Finally, in column 4, we randomly assign immigrants' stock market participation but correctly assign the share of the municipality population employed in the financial sector. Now the only effect that matters is the share of the municipality population employed in the financial sector, and its effect is comparable in magnitude to the original effect of immigrants' stock market participation, suggesting that in this context, they might proxy for each other. In columns 5–8, we repeat the exercise but omit the control for employment in the financial sector. As expected, this increases the effect of the share of the municipality population employed in the financial sector while otherwise confirming the results.

To make these placebo checks even more informative, we repeat the randomization within six Luxembourg regions. This means that we randomly assign native households to the municipalities within their region of residence. This addresses the possible concern that unobserved characteristics of the macro-area of residence may affect stock market participation decisions. The resulting estimates are presented in Table A.7 and confirm our earlier findings. First, the estimated coefficient of immigrants' stock market participation loses significance when randomly assigned. This suggests that natives are not affected by immigrants with whom they lack close interaction. The pattern is similar for the share of the municipality population employed in the financial sector: its coefficient is significant only when assigned correctly and when immigrants' stock market participation is randomized. Therefore, there seems to be no substantial interaction between households living in different municipalities within the same region for peer effects to occur. Moreover, it is reassuring for our results that individuals do not seem to sort by occupation not only across municipalities but also across regions. Compared to randomization across municipalities throughout the entire country, the estimated coefficients are stronger, further validating our placebo design and consistent with previous findings that suggest peer effects decay with distance.

In summary, these placebo regressions confirm that immigrants' behavior generates a peer effect toward their native neighbors and that it is not driven by spurious correlation.

Exploring Alternative Specifications

In this section, we test the robustness of our results to several alternative specifications. First, we relax the linearity assumption by estimating a probit model. This does not change our conclusions (Table A.8).

Second, to account for possible sorting on dimensions other than those we control for in our main specification, we include additional municipality-level

controls, such as the share of the college-educated population, the share of those aged 65 years or above, and average income (Table A.9). Controlling for these additional characteristics also does not affect our results.

Third, we adjust standard errors to account for possible spatial correlation in the stock market participation of both natives and migrants. Table A.10 compares standard errors that account for spatial correlation (see Conley, 1999) and standard errors clustered by municipality (as in the main specification).¹⁵ We find that spatial correlation-adjusted standard errors are smaller than standard errors clustered at municipality level, which increases the statistical significance of our results.

Fourth, we test whether the peer effect varies depending on whether foreign peers have lower or higher participation rates than natives (Table A.11). We find that the estimated effect is sizable in both cases and is quite symmetric. This suggests that natives are both less likely to hold stocks if the average stockholding of immigrants in the same municipality is low and more likely to invest in the stock market if the average stockholding of immigrants in the same municipality is high.

The “negative” peer effect can arise for two reasons. First, it could be that financial mistakes propagate as much as financial knowledge does. We investigate in detail the role of financial literacy and education in Section 6.3.4 but do not find evidence supporting this channel. Second, it could be that peers with low stock market participation rates invest in other types of assets that crowd out investment in stocks. We believe that the latter is what explains our results.

In fact, Table 1 shows that the Portuguese in Luxembourg not only have the lowest stock market participation rate among the main immigrant groups but also are the only ones that participate less in Luxembourg than at home. This is the result of historical selection into immigration from Portugal to Luxembourg, represented by a disproportionately high share of people with low levels of education who, after moving to Luxembourg, are much more likely than others to work in the construction sector.¹⁶

As is shown in a paper by Bach et al. (2023), having experience in the construction sector plays a fundamental role in explaining the investment behavior in real estate markets. It could thus be that people with less knowledge of stocks and who participate less in the stock market, have better knowledge of real estate and choose this type of investment instead. In fact, after controlling for wealth and income quantiles, the Portuguese are more likely to invest in real estate compared to both natives and immigrants from the main migrant countries.

These differences in portfolio allocation could be at the heart of the “negative” peer effect in stocks. In particular, the potential peer effect in real estate ownership could work along the same lines as the peer effect in stock market participation: natives living in municipalities with a higher share of Portuguese immigrants (working predominantly in the construction sector) may be more inclined to invest in brick and mortar instead of financial products. Therefore, what we observe as a

¹⁵We use Stata package ACREG (Arbitrary Correlation Regression) to compute spatial correlation-adjusted standard errors. However, the package is not compatible with the multiple imputation structure of our dataset. Therefore, we run the ACREG command separately for each implicate.

¹⁶Twenty-three percent of Portuguese immigrants work in the construction sector.

“negative peer effect” in stock market participation could be the other side of the coin of the “positive peer effect” in real estate ownership.

The Role of Immigrants in the Family Network

Another possible concern for the validity of our results is the presence of immigrants in one’s family network. In fact, natives who are married to a foreign spouse or whose parents were immigrants could exhibit behavior similar to foreign peers not because they are affected by them but because they share cultural background. To address this concern, we control for having a foreign-born partner and foreign-born parents in all our regressions. We find that the coefficients on both indicators are small, are not statistically significant, and do not affect the estimates of our main variable of interest (Table A.5). In this section, we tackle this issue further and estimate a number of alternative specifications, which we present in Table A.12.

First, we show that the results hold for a sample in which Luxembourgish natives do not have a foreign spouse (columns 1 and 2 of Table A.12). We find that, if anything, the point estimate of the peer effect is larger in this subsample compared to our baseline (0.60 and 0.65 vs. 0.51 and 0.54 in OLS and 2SLS respectively).

Second, we control for stock market participation in the parents’ country of birth (columns 3 and 4 of Table A.12). Including these controls does not affect the estimated effect of immigrants’ stock market participation, suggesting that the parental origin participation levels are not a confounding factor in this case.

Finally, we estimate a specification in which we interact immigrants’ stock market participation with an indicator for a foreign-born parent (columns 5 and 6 of Table A.12). We find that individuals most affected by their foreign peers are those whose parents are Luxembourg natives (main effect of 0.57 and 0.55 in OLS and 2SLS, respectively). This effect, if anything, decreases among second-generation immigrants, although the difference is not statistically significant.¹⁷

The Role of Financial Literacy and Education

In this section, we test our conclusion that a substantial portion of the estimated peer effect is driven by *social learning* by further differentiating between the *social learning* and *social utility* channels. We do this by exploring the role of financial literacy and education among both natives and their foreign peers in the transmission of peer effects.

We start by testing two alternative hypotheses. The first is that the peer effect varies with peers’ general financial literacy, that is, knowledge in domains not related to stocks, provided they lack specific knowledge about stocks. The second hypothesis is that it is specific knowledge about stocks that matters, independently of the knowledge in other domains.

To test the former—whether peers’ behavior matters even if they do not know about stocks but their level of financial literacy is relatively high otherwise—we

¹⁷ We also estimate the specification for subsamples of natives with at least one foreign-born parent and those with both parents being Luxembourg natives. The results are in line with those obtained in the specification with the interaction term.

define an indicator equal to 1 if the share of natives answering correctly the three financial literacy questions not related to the stock market but answering incorrectly the question about stocks is lower than the share of similarly defined immigrants.¹⁸

If general financial knowledge matters more than specific knowledge about stocks, this would be indicative of the *social utility* channel (i.e., imitation without specific learning), and we would expect a positive coefficient on the interaction term. If, on the contrary, specific knowledge about stocks is what matters, we would expect a negative interaction term (since the dummy is defined to capture those who answered incorrectly to the question about stocks), indicative of the *social learning* channel. We find that the interaction term is negative, even if we cannot estimate it precisely (columns 1 and 2 of Table A.13).

Next, we test whether it is instead the specific knowledge about stocks that matters. To do this, we define a dummy variable equal to 1 if the share of immigrants answering correctly about stocks is higher than the share of natives. If the peer effect is driven by *social learning*, we would expect a positive interaction term. We find this to be the case even if, again, we cannot estimate the effects precisely (columns 3 and 4 of Table A.13).

Columns 5 and 6 of Table A.13 present the specification with both interaction terms together and find similar patterns.

We proceed by studying whether the peer effect varies with the level of education among natives and immigrants. To do this, we first run a specification in which we interact the stock market participation among immigrants with a dummy that takes the value 1 if the share of natives with high education in the municipality is lower than the share of immigrants with high education.

We find that in municipalities where natives have relatively low levels of educational attainment, they are less likely to participate in the stock market but, at the same time, more likely to make portfolio choices similar to those of their peers. In other words, when natives have lower education compared to their foreign peers, they are more likely to emulate their behavior (columns 1 and 2 of Table A.14).

Second, we test whether sensitivity to immigrants' stock market participation varies with natives' levels of education. To do this, we specify a regression that includes interaction terms of immigrants' stock market participation with dummies for high- and medium educational attainment at the individual level.

We find that both interaction terms have a negative sign and that the coefficients decrease with education levels. This suggests that, if anything, the more educated the natives are, the less their participation decision is affected by their foreign peers. However, due to the small number of observations in each education group, we cannot estimate these coefficients precisely (columns 3 and 4 of Table A.14).

Combined, these findings suggest that the levels of financial literacy and education affect the transmission of peer effect, which underscores the importance of the *social learning* channel. However, it is important to consider two caveats. First, we

¹⁸The three financial literacy questions not directly related to stocks are about (1) the difference between fixed-rate and floating-rate mortgages, (2) inflation, and (3) diversification.

are unable to rule out *social utility* directly. In fact, even among the most educated natives, the peer effect is not zero, possibly indicating a propensity for imitation. Second, we lack statistical power to estimate some of these channels precisely, leaving room for future research.

7. DISCUSSION AND CONCLUSIONS

We contribute to the literature on peer effects in financial behavior by studying, for the first time, how the financial choices of immigrants affect the behavior of natives. Furthermore, we contribute to the debate on the transmission of peer effects by disentangling *social learning* and *social utility* channels.

Our study exploits the unique population composition of Luxembourg to explore the relationship between immigrants and natives. In particular, immigrants in Luxembourg exhibit significant heterogeneity in their financial behavior. For instance, participation in the stock market is almost nonexistent among Portuguese-born households, while households from Germany and Belgium are twice as likely as natives to invest in stocks. Moreover, there is considerable variation in population composition at the municipality level. Combined, these factors create substantial variation in natives' exposure to different financial behaviors. We capitalize on this variation to estimate peer effects in stock market participation.

To identify the causal *endogenous* peer effect, we exploit the fact that immigrants satisfy the *excluded peer group* property in relation to natives, enabling us to adopt an IV approach. We further account for *contextual* and *correlated* effects by controlling for municipality-specific characteristics that capture correlated preferences and sorting.

Finally, we isolate the *social learning* channel by controlling for characteristics that potentially capture financial knowledge spillovers. We interpret the remaining effect as evidence of *social utility*. In particular, our results show that controlling for individual and group financial knowledge accounts for a significant portion of the total peer effect, highlighting the importance of knowledge transmission. However, as we cannot fully explain the effect, we conjecture that *social utility* also plays a role, or there may be other relevant information channels we do not consider. Additionally, we cannot interpret our information-sharing proxies only as learning, as they partly capture sorting across municipalities based on social and employment status.

Our findings align more closely with those of Burszty et al. (2014), who show that both *social learning* and *social utility* drive the peer effect. This conclusion differs from Banerjee et al. (2013), who find that only *awareness of the opportunity* matters. The two results could be reconciled by the possibility that the importance of these channels may vary across types of financial decisions, specifically Banerjee et al.'s (2013) study decisions to borrow, which individuals are less willing to both share and copy, making it intrinsically different from the investment behavior, the focus of our study.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web site:

Data S1 Supporting Information.

Data S2 Supporting Information.

Table A.1: Previous Papers on Community Effects on Individual Financial Decisions.

Table A.2: Luxembourg Population: Natives, Immigrants, and Main Groups of Immigrants by Country of Birth, %.

Table A.3: Summary Statistics of the Sociodemographic Characteristics of Natives and Immigrants.

Table A.4: Summary Statistics of the Economic Characteristics of Natives and Immigrants.

Table A.5: OLS (Ordinary Least Squares) and 2SLS (Two-Stage Least Squares) Results.

Table A.6: Placebo Treatment.

Table A.7: Placebo Treatment: Randomization Within Regions.

Table A.8: Probit Results.

Table A.9: Additional Municipality Controls: OLS (Ordinary Least Squares) and 2SLS (Two-Stage Least Squares) Results.

Table A.10: OLS (Ordinary Least Squares) and 2SLS (Two-Stage Least Squares) Results with Spatially Adjusted Standard Errors.

Table A.11: Heterogeneity by the Direction of the Peer Effect.

Table A.12: The Role of Immigrants in the Family Network.

Table A.13: Heterogeneity by the Level of Financial Literacy.

Table A.14: Heterogeneity by Levels of Education.