

Turning Local: Home-bias dynamics of relocating foreigners*

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Abstract

Using comprehensive data from Denmark, we study private investors' preferences for domestic stocks. We compare the equity home bias of foreigners recently relocated to Denmark to the equity home bias of other investors. We find that home bias of recently relocated foreigners is lower than home bias of other investors. Our main result is that when relocated foreigners' duration of stay increases, their home bias also increases. After 7-8 years, home bias of relocated foreigners does not differ from home bias of other investors. Our results imply that familiarity with domestic stocks develops dynamically with the length of stay in a given country. We discuss implications for explanations of the home-bias puzzle building on information asymmetries.

Key words: Equity home bias, individual investors, relocating foreigners, information advantage, familiarity.

JEL classification: D14, G11, G15

1. Introduction

Investors overweight domestic stocks in their portfolios (French & Poterba, 1991). This equity home bias holds true for individual and institutional investors, remains a persistent phenomenon in international finance, and has proved challenging to explain.

Coval & Moskowitz (1999, 2001) document that professional investors overweight local stocks within a country, too. Such preferences cannot be explained by real exchange rate risks, capital controls, different tax treatments of domestic and foreign stocks, etc., that the early home bias literature focused on (see Cooper, Sercu & Vanpée, 2013). Instead, Coval & Moskowitz argue, such preferences can be explained by information advantages and familiarity with local stocks. This means that information and familiarity might contribute to explaining home bias as well.

Portes & Rey (2005) and van Nieuwerburgh & Veldkamp (2009), e.g., study how information asymmetry can lead to home bias. An implicit assumption in empirical home-bias studies that examine individual investor data (e.g., Karlsson & Norden, 2007; Baltzer, Stolper & Walter, 2013; Bekaert, Hoyem, Hu & Ravina, 2017) is that investors who have lived in a country for a short period of time possess the same level of familiarity with domestic stocks as investors who have lived in the country for long. In this paper, we study the alternative hypothesis that it takes time to gather information about domestic stocks. We do so by investigating foreigners who have relocated to a new country. Our hypothesis is that foreigners, over time, build up knowledge about their new country of residence, its economy, its firms, etc. Because of this increase in information about their new country, foreigners increase home bias over time. If this hypothesis is true, we would expect that (i) home bias of newly arrived foreigners is lower than home bias of other investors, and that (ii) home bias of relocated foreigners builds up with their duration of stay in their new country.

We test these hypotheses using comprehensive high-quality register-based data covering individual retail-investors in Denmark. Our data cover every single individual, i.e. the full Danish population, for the years 2005-2012. This corresponds to approximately 4.3 million

individuals per year. We have information about the nationality of each single stock in each investor's equity portfolio held in depots by Danish banks. We calculate home bias as the value of the individual's directly held domestic (Danish) stocks divided by the value of the individual's directly held total stock holdings. We also have information about the year of arrival in Denmark, such that we can calculate duration of stay in Denmark for relocated foreigners. Finally, our data contain a host of other individual-investor variables that we use to control for investor heterogeneity that might otherwise influence investor behaviour, such as level of education, income, age of the individual, etc.

Our first finding is that home bias is a pervasive phenomenon. In fact, the average degree of home bias across Danes and foreigners alike is 86%. This strong average home bias aligns to that found in related studies using individual-investor holdings data (e.g. Baltzer et al., 2013, and Bekaert et. al, 2017). Home bias varies across individuals, however, and we use this variation to derive our two main findings. First, home bias of newly arrived foreigners is 12 percentage points lower than home bias of other investors, controlling for individual background characteristics such as income, wealth, gender, level of education, etc. This 12 percentage-points difference is highly statistically significant and large in economic terms. Second, home bias builds up with relocated foreigners' duration of stay in Denmark. When foreigners have lived in Denmark for around 7-8 years, their home bias has increased and become similar to that of other investors at app. 86%. We show that the change in home bias is a deliberate decision of foreigners. When newly arrived foreigners buy new stocks, they are much less inclined to buy Danish stocks, compared to other investors. When foreigners have stayed in Denmark for ten years or so, their tendency to buy Danish stocks (when buying new stocks) is more or less the same as that of other investors.

When average home bias is app. 86% and the average newly arrived foreigner has a 12%-points lower home bias, the average home bias of newly arrived foreigners is app. 74%. This seems high at a first glance. Scrutinizing this further, however, reveals a logical explanation. First, most investors hold very few stocks; 66% hold one stock and 16% hold two, for instance. When holding one stock, home bias is per definition 0% or 100%.

Denmark is a rich country and many foreigners come from countries with lower income. As they see their income increase, after arrival in Denmark, they start buying stocks (we find that stock market participation is increasing with income). This is most likely a Danish stock, i.e. we find that immigrants from low-income countries tend to have higher home bias than other foreigners. On the other hand, foreigners from rich countries have higher income, are more inclined to diversify, and have lower home bias. This implies that there is variation around the average degree of home bias of newly arrived foreigners: some newly arrived foreigners will have a very high home bias (often 100%), whereas other will have a lower. The average is a high home bias, but one that is significantly lower than that of Danes. We verify this in the data. There are also underlying unobservable reasons for the decision to relocate. For instance, some foreigners relocate for voluntary reasons (e.g., an attractive job offer) whereas others relocate based on need (e.g., refugees). Consistent with this, we find that, for example, a newly arrived foreign man with high income from an Advanced economy (IMF classification) who is not married to a Dane has a considerably lower home bias than the average newly arrived foreigner. This heterogeneity further supports our overall conclusion that information and familiarity differ across investors. At the same time, we find that for all groups of newly arrived foreigners, home bias builds up with their length of stay in their new country.

We conduct a number of robustness checks. For instance, we pay special attention to investors holding employee stocks and wealthy investors, consider different econometric specifications of our main regressions, study the stock market participation decision and, all in all, provide additional perspectives to our results. Our findings that (i) newly arrived foreigners have lower bias and (ii) increase home bias over time are very robust.

The main implication of our findings for the home bias literature is that information asymmetry and familiarity are not static concepts. Rather, they affect portfolio choice of investors dynamically: When foreigners have stayed longer in their new country, home bias increases. Given that factors such as inflation risks, real exchange rate risks, tax regime, etc. are the same for all investors in our sample, the most likely explanation for this increase in home bias is that information and familiarity with domestic stocks increase with duration

of stay.² When foreigners have stayed in Denmark for some years, they start understanding some Danish, talk to Danish colleagues, watch Danish news, read Danish newspapers, etc. Simply, they get exposed to information about Denmark, thereby increasing their knowledge about the Danish economy and Danish stocks. This implies that we can give a lower bound on the part of home bias that is due to dynamic learning about domestic stocks. Newly arrived foreigners have a conditional average home bias of 74% whereas Danes and foreigners who have stayed long in Denmark have an average home bias of 86%. When the 12 percentage points increase in home bias comes from learning about Danish stocks, $12\%/86\% = 14\%$ represents a lower bound of the part of home bias that is due to information asymmetry and familiarity. It is a lower bound because the total part of home bias due to familiarity and superior information is 14% plus the part of initial home bias due to these factors.³

In a broader sense, our results tells us something about the economic integration of foreigners in a new country. Bhugra & Becker (2005) describe how the process of migration occurs in three stages. They write: “First stage is pre-migration, involving the decision and preparation to move. The second stage, migration, is the physical relocation of individuals from one place to another. The third stage, postmigration, is defined as the ‘absorption of the immigrant within the social and cultural framework of the new society.’” Our paper illustrates how foreigners adapt to the norms of Danes during the third stage of migration, by adhering to the characteristics of the domestic population, over time increasing their home bias to the level of other investors in Denmark.

The papers closest to ours are Bekaert, Hoyem, Hu & Ravina (2017), Bodnaruk (2009), and Coval & Moskowitz (1999, 2001). Bodnaruk (2009), like us, studies how retail investors’

² Similarly, if the costs of trading Danish securities is lower than the costs of trading foreign securities, this cannot explain our main result either. Trading-cost differences might explain home bias in general. They cannot explain, however, why a newly arrived foreign investor should gradually increase his/her holdings of Danish stocks. To account for this gradual increase in foreigners’ home bias, we need an explanatory variable that gradually changes, too, such as newly arrived foreigners’ information about their new country.

³ In their study of US professional mutual fund managers, Coval & Moskowitz use a similar reasoning to provide an estimate of the part of home bias that is due to familiarity and asymmetric information: “Extrapolating our findings to the international scale, we find that distance may account for roughly one-third of the observed home country bias in U.S. portfolios,” Coval & Moskowitz (1999), pp. 2048.

portfolios change after investors change residency. A key difference is that Bodnaruk (2009) studies local bias, whereas we study home bias. We have more data on background characteristics of investors (such as income, wealth, education, and so on) and in particular, we have data on nationality of the investor and length of residency in Denmark. Bodnaruk characterises changes in holdings 2-3 years after an investor moves. We study longer-term effects up to 35 years after moving. As a consequence, we can evaluate how home bias develops dynamically over time as a function of foreigners' stay in a new country and derive our main result that home bias builds up over time in a systematic way. Bekaert et al. (2017) also use comprehensive individual-investor data to study what kind of retail investors display home bias. They document that home bias evolves dynamically across cohorts, as younger investors are found to display less home bias than elder. Bekaert et al. hypothesize that exposure to information influences home bias. An important contribution of our paper is that we test whether this is the case. We do so by testing whether home bias of individual investors develops dynamically with their duration of stay in a new country, and thereby with the duration of exposure to information about events in their new country, holding age, income, etc. constant.⁴ By testing the link between exposure to information and home-bias dynamics, we improve our understanding of the underlying determinants of home bias that Bekaert et al. (2017) and we document. As mentioned earlier, Coval & Moskowitz (1999, 2001) examine local bias by professional investors. We analyse home bias of retail investors.⁵ Most importantly, we condition on length of stay thereby showing that home bias of an individual investor evolves dynamically over time. Coval & Moskowitz do not condition on length of stay.

After these introductory remarks, we structure the rest of the paper as follows. In the next section, we describe the data we use. We pay particular attention to describing the

⁴ To be clear, Bekaert et al. (2017) hypothesize that exposure to international information makes younger investors less home biased. We test whether exposure to domestic information makes recently relocated investors more home biased. The underlying idea in Bekaert et al. and this paper is the same, however: Exposure to information influences home bias.

⁵ Following Coval & Moskowitz (1999, 2001), individual retail investors have similarly been shown to tilt their equity holdings towards local stocks, both within countries (Grinblatt & Keloharju, 2001; Ivkovic & Weisbenner, 2005; Bodnaruk, 2009; Seasholes & Zhu, 2010, 2013), across professional industries (Døskeland & Hvide, 2011), and across borders (Baltzer et al., 2013).

population of foreigners in Denmark and our data on equity holdings. In Section 3, we present our main results on home bias of Danes and foreigners; in particular how home bias of foreigners depends on the length of their stay in Denmark. In Section 4, we discuss results from different robustness tests. A final section concludes.

2. Data

2.1. Equity holdings of individuals

Our data are based on detailed individual-investor register-based data. We have a 100% sample of the adult (above the age of 17) population in Denmark. From the Danish Tax Authorities, we obtain data on individuals' end-of-the-year equity holdings. The data are based on direct reporting from Danish financial institutions to the Danish Tax Authorities. The first year for which we have reliable data on stock holdings of individuals is 2005. The last year in our sample is 2012.

Our data contain individuals' direct holdings of individual stocks (Danish and foreign) recorded, i.e. held, in depots at Danish banks. The data are very comprehensive. We know the ISIN code of the equity investments, the country of origin of the stock, as well of the name of the company, enabling us to identify whether the investment is an investment in a domestic (Danish) company or a foreign company.⁶ We also know the number of stocks the investor holds as well as the end-of-the year value of the investment in Danish kroner. We look at direct stock holdings outside retirement accounts, as we investigate individuals' deliberate choice of individual stocks and in particular the nationality of these stocks. When we restrict our analysis to holdings outside retirement accounts, we exactly examine those holdings the individual controls and has information about. This is because holdings in Danish pension accounts are largely not controllable by the individual, nor does the individual know the asset allocation in many pension accounts.⁷ Related literature similarly

⁶ There are a few cases where the name or the country of origin of the stock is unreported. We restrict the sample to observations where the name and the country of the stock are non-missing.

⁷ Most Danes cannot see the detailed composition of their holdings in their mandatory pension savings, as these are collectively administered. This means that an individual does not know the size of the international exposure he/she has in the pension account. For this reason, we study the holdings the individual can control and observe. We comment further on this in Section 5.5. We also note that there are no rational

examines parts of the total holdings of individuals, having data on either pension savings (e.g., Karlsson & Norden, 2007, and Bekaert et al., 2017) or, like us, holdings outside pension savings (Calvet et al., 2007).⁸

In addition to our detailed data on equity holdings kept in depots at Danish banks, we know the combined total value of assets held abroad (equity kept in depots at foreign banks, fixed income kept in depots at foreign banks, foreign real estate, etc.). 95% of foreigners in Denmark, and 99% of Danes, who hold stocks in depots at Danish banks do not keep assets abroad. In other words, the very large majority of investors do not hold stocks outside their depots in Danish banks. For this reason, we run our main tests using the total population. In robustness tests reported in Section 5, we show that our main results are essentially unaffected whether we look at the full sample or the subsample of individuals who do not keep assets abroad.

2.2. Other data

The data are hosted by Statistics Denmark. Statistics Denmark assigns an anonymous personal identification number to each individual. This number makes it possible to merge data from different sources and across years. We merge the equity-holdings data with socioeconomic background data, such as the investor's age, wealth, income, level of education, gender, and – most important for our investigation – nationality, i.e. whether the investor is of Danish or foreign origin.

In Table 1, we collect demographic summary statistics. We split the data across two overall dimensions in Table 1: (i) whether an investor is Danish or foreign and (ii) whether an investor participates in the stock market or not. On average, we have 4,322,234 individuals per year in our sample, split between 4,075,094 Danes and 247,140 foreigners. The fraction of foreigners in the total population is thus on average 5.7%. During our sample period,

arguments (based on the Danish tax or Danish pension system, for instance) why an investor in Denmark should prefer to hold domestic stocks outside retirement accounts (or inside for that matter).

⁸ The official aggregate wealth statistics from Statistics Denmark do not split between holdings inside and outside retirement accounts. From Statistics Denmark, the official aggregate value of individuals' total stock holdings is DKK 131bn (\approx USD 22bn) in 2012. The total value of equity holdings outside retirement accounts by the retail investors in our sample in 2012 is DKK 75bn (\approx USD 12bn), i.e. sensibly lower than the sum of holdings inside and outside retirement accounts.

some individuals enter our sample (turn 18 or enter the country) and some leave our sample (pass away or leave the country) such that the total number of individuals we observe during our sample period is app. 5 million (4,920,902), split between app. 4.5 million Danes and slightly more than 400,000 foreigners.

Table 1 reports that the average income of foreigners is close to half the average income of Danes (DKK 292,809 vs. DKK 180,310), average wealth is considerably lower for foreigners (DKK 464,726 vs. 64,316), and Danes are in general older (48.9 years vs. 37.4 years), due to immigrants being younger than the average Dane.⁹

In the stock market participation literature, it is generally found that stock market participation is higher for investors with higher wealth, income, level of education, and age; see, e.g., Mankiw and Zeldes (1991), Bertaut (1998), Vissing-Jørgensen (2004), Christiansen et al. (2008), and Grinblatt et al. (2011). We define an investor as participating in the stock market in year X if the investor owns at least one stock in year X. When calculating the total number of individuals holding stocks during the 2005-12 period, this is the sum of those owning stocks at least at one point in time during the sample period. In light of the differences between Danes and foreigners in terms of income, wealth, etc., and in light of the existing results in the stock market participation literature, it is no surprise that stock market participation of foreigners is lower than stock market participation of Danes. Approximately 1 million Danes participate in the stock market per year. This implies that the rate of stock-market participation is 25%. This is similar to the rate of stock-market participation reported in other studies using register-based data on Danish individual investors, see Andersen, Hanspal & Nielsen (2019), internet Appendix B, and Florentsen, Nielsson, Rangvid & Raahauge (2019). Guiso & Sodini (2013) survey the literature on differences in rates of stock-market participation across countries, and present results, based on survey-data, though, for many countries, along with a discussion of the potential causes for these. Guiso & Sodini (2013) show that the rate of stock-market participation in

⁹ Economic variables, such as value of equity, income, and wealth, are inflation (consumer price inflation) adjusted with 2012 as the base year. In 2012, the exchange rate between Danish Kroner and the US dollar was DKK 5.8 to one USD.

Denmark is lower than in Sweden and the US, but higher in than Austria, Italy, and Spain, i.e. Denmark is placed around the average in the cross-country distribution.

The participation rate of foreigners is lower, at 3.9%, with app. 10,000 foreigners participating per year on average. Similarly, when comparing Danish stockholders to the average Dane, and foreign stockholders to the average foreigner, we see that individuals who participate in the stock market generally have higher income, wealth, education, and age. In general, men have a higher tendency to hold stocks, which is also in line with result from the literature. In Section 5, we present results from more formal tests of what influences the decision to participate in the stock market.

2.3. Foreigners

Our data indicate the nationality of an individual. Statistics Denmark also records foreigners' first immigration date to Denmark, which is a key variable in our study of the relation between the duration of stay in a new country and changes in investment patterns.¹⁰ Our sample size drops significantly due to scarce historical data for foreigners residing more than 35 years in Denmark, so we analyze foreigners from their first full calendar year residing in Denmark up to their 35th residence year.

People come from all over the world, even if the group of foreigners in Denmark naturally has a higher concentration of Europeans. Poland is the country from which most foreigners are originating, followed by Germans, Turks, and Norwegians, but there are also many individuals from Indonesia, Hong Kong, Georgia, Philippines, Thailand, and so on. The online appendix includes details on the origin of foreigners.

2.4. Stock ownership

Table 1 also reports summary statistics on Danes' and foreigners' stock holdings. On average, Danish stockholders have invested DKK 82,843 in stocks. The value of Danish stocks is DKK 72,167, and the value of foreign stocks consequently DKK 10,676 (not reported).

¹⁰ We exclude individuals where nationality or immigration data are erroneously missing from the data.

The key variable we investigate in this paper is the degree of home bias of an individual, i.e. the fraction of the value of domestic stocks out of the value of total stocks. This fraction can vary between 0%, in which case all stocks are foreign stocks, or 100%, in which case the investor only holds Danish stocks. When we take the average of home bias across all Danes, we find that 85.7% of Danes' total stock holdings are Danish stocks.

85.7% is different from $72,167/82,843 = 87.1\%$. This is no mystery. The average home bias of 85.7% in Table 1 is the average of every Danes' home bias; it is not the average Dane's home bias. To illustrate, a small example with three investors (a, b, and c) might be helpful:

Investors	Danish stocks	Total	Proportions
a	50	100	50.0%
b	100	150	66.7%
c	150	200	75.0%
Averages	100	150	63.9%

Investor “a” has total stock holdings of 100, investor “b” 150, and investor “c” 200. The proportions they hold in Danish stocks, i.e. their degrees of home bias, are 50%, 66.7%, and 75%, respectively. These individual proportions form the independent variable we model in our regressions below. The average proportion across the individuals is 63.9%. This number corresponds to the number we report in Table 1, i.e. corresponding to the 85.7% average home bias for Danes. Of course, this number is different from the fraction of the average proportion in Danish stocks: $100/150 = 66.7\%$.

Both foreigners and Danes display a strong degree of home bias. Table 1 shows that foreigners on average hold 86.5% of their stock market investments in Danish stocks. Compared to the average degree of home bias of Danes, this means that there is effectively no difference between home bias of Danes and foreigners when averaging across all foreigners. We find it interesting that the average degree of home bias of Danes and foreigners in Denmark is close to the average degree of home bias among the U.S. 401(k) plan investors that Bekaert et al. (2017) study. Bekaert et al. report that the average

international allocation of the 401(k) plan investors they study is 17.7%, i.e. a home bias of $100\% - 17.7\% = 82.3\%$.¹¹

Many investors only hold Danish stocks. In fact, 76% of the investors (across all years and nationalities) hold only Danish stocks. We illustrate this in Figure 1 where we have sorted investors into quintiles based on their degrees of home bias. The upper graph in Figure 1 shows that app. 80% of the investors have home-bias degrees between 80%-100%. In the middle graph of Figure 2, we show the distribution of home bias for those investors who have less than 100% Danish stocks, i.e. in this graph we exclude investors with 100% home bias. Among this subgroup of investors there is a significant fraction of investors who do not hold Danish stocks at all. Hence, we show the distribution of investors who have some but less than 100% Danish stocks in the lower graph of Figure 1, i.e. in this graph we exclude investors with home bias equal to 0% and home bias equal to 100%. When excluding corner solutions (0% or 100% percent home bias), a smooth distribution of home bias results. As a consequence of the skewed distribution of stock holdings, it is important to control for the number of stocks investors hold in the regressions we perform.

Stockholders in Denmark display the same tendency to hold very few individual stocks as has been reported in data from other countries. Table 1 shows that an average individual participating on the stock market holds slightly less than 2 different stocks (Danes: 1.9, foreigners: 1.8). This is in line with numbers reported for, e.g., Swedish investors (Bodnaruk, 2009) and US investors (Blume & Friend, 1975 and Polkovnichenko, 2005).

Danish stock holders on average hold 1.6 Danish stocks and 0.3 foreign stocks (1.9 in total, cf. Table 1), and foreigners hold 1.4 Danish stocks and 0.4 foreign. Across individuals, the average proportions of Danish stocks, based on the number of stocks, are app. 86% for both Danish and foreign stockholders. This is similar to what we found when looking at the value of Danish stocks in relation to the total value of stock holdings.

¹¹ There are only few home-bias studies that have access to detailed individual-investor data. Baltzer et al. (2013) similarly report an average degree of home bias of individual investors of 81% whereas Karlsson & Nordén (2007) report 66%, i.e. somewhat lower than what Baltzer et al. (2013), Bekeart et al. (2017), and we find.

Danes hold a significant part of liquid wealth in a few different Danish stocks. Table 1 shows that the average wealth position of stock holders is app. DKK 1,000,000. A large part of this is housing wealth. The average value of housing (gross property value minus debt) is DKK 716,000. Liquid financial wealth (total wealth minus the value of housing) is app. DKK 318,000 on average. This means that app. 26% ($83,000/318,000$) of liquid financial wealth is in stocks. As just mentioned, a large part of this is concentrated in very few Danish stocks. In other words, the fraction of Danes' financial wealth that is exposed to the stock market (26% of financial wealth) is invested in a way that contains a high degree of idiosyncratic risk, as it is invested in few domestic stocks. Most stock holders get stock market exposure from directly held stocks only, as 700,000 stock holders (70% of all stock holders) do not hold mutual funds. In this sense, home bias of Danes is economically significant.

The wealth distribution is skewed. For instance, the value of stock holdings for the median Danish stockholder is DKK 16,108 whereas the average value, as shown in Table 1, is DKK 82,843.¹² For foreign stockholders, the median is DKK 12,132.¹³ The median total wealth is DKK 460,395 for Danes and DKK 141,099 for foreigners. Most investors thus invest only small sums in the stock market. In Section 4, we redo our analysis for 'wealthy' investors. Our main findings are robust.

The average degree of home bias is rather constant over time for both Danes and foreigners. The results of our paper are in this sense not driven by any particular years.

3. Foreigners' ownership decisions by duration of stay

The key question we seek to answer in our paper is whether foreigners' decision to buy Danish stocks (as a fraction of total stock holdings) depends on their duration of stay in

¹² The median is calculated as the average of the five observations surrounding the median, as confidentiality regulations of Statistics Denmark do not allow researchers to publish numbers for any individual, even when this individual (the median in this case) is anonymous.

¹³ Similarly, the median stock holder (Dane and foreigner) holds 1 stock, compared to an average of 1.9, and home bias for the median stock holder is 100% compared to the average of 86%. As mentioned, we do robustness on corner solutions in Section 4.

Denmark. To get a first feeling for the data along this dimension, Table 2 shows the average proportions invested in Danish stocks conditioned on the duration of foreigners' stay in Denmark.

The average degree of home bias of foreigners who have recently arrived in Denmark is 76.8%. Foreigners who have resided in Denmark longer have a higher home bias: foreigners who have resided between 2 and 5 years in Denmark invest app. 83% of their total stock holdings in Danish stocks, those who have resided between 5 and 10 years 87%, etc. This means that foreigners who have been in Denmark for a short period of time display the lowest degree of home bias. When foreigners have resided for some years in Denmark, their fraction of Danish stocks increases. In fact, when foreigners have stayed in Denmark for 5-10 years, their degree of home bias more or less resembles Danes' degree of home bias. Below, we show that after 7-8 years there is no statistical difference between home bias of Danes and foreigners. These findings appear regardless of whether we look at the value of stock investments or the number of stocks.

Table 2 also shows that home bias increases for foreigners who have stayed longer in Denmark mainly because these foreigners have lower holdings of foreign stocks. The average value of foreign stocks goes from DKK 22,623 for newly arrived foreigners to DKK 11,423 for foreigners who have been in Denmark for 5-10 years. The value of Danish stocks does not change much for the first app. 10 years in Denmark. Hence, home bias goes up during the first ten years in Denmark because foreigners keep more or less the same amount invested in Danish stocks but reduce their investment in foreign stocks. Could the reduction in foreign stocks simply be due to changes in market values of foreign stocks, i.e. reflecting a situation where the general stock market movements during our sample period have been such that foreign stocks have fallen in value for these foreigners? This is not the case. Home bias based on the number of stocks shows the same patterns. Foreigners who have recently relocated to Denmark hold on average 0.63 foreign stocks whereas foreigners who have been in Denmark for 5-10 years hold 0.36 foreign stocks on average. Similarly, the number of Danish stocks increases when foreigners stay longer in

Denmark; from 1.13 Danish stocks when foreigners have just arrived to 1.34 when they have stayed 5-10 years, and 1.51 for foreigners staying more than 15 years in Denmark.

3.1. Regressions

Foreigners who have stayed longer in Denmark are older and have higher incomes and wealth: Foreign stockholders having just arrived are 36 years old on average, and have an income of DKK 265,321 and wealth of DKK 476,184 on average. Foreign stockholders who have lived in Denmark for, e.g., 25 years are 51.2 years old on average, and have an income of DKK 375,423 and wealth of DKK 902,804 (not reported). We need to make sure that the results of Table 2 of higher degrees of home bias for foreigners who have been in Denmark for longer are not just due to differences in background characteristic. In Table 3, which contains the main finding of our paper, we show results from panel regressions where an individual's degree of home bias is related to the individual's income, wealth, age,¹⁴ level of education, and gender. We also include a dummy for whether the investor is a foreigner. We run the regression using different specifications of this dummy. One regression picks out all foreigners, another picks out newly arrived foreigners, one picks out foreigners residing in Denmark between 2 and 5 years, etc. We run each regression as a panel including all years and all individuals who participate in the stock market, i.e. hold at least one stock in a Danish depot. The result is a big panel: there are more than 8 million observations in each regression. We include calendar-year fixed effects to take e.g. macroeconomic effects that affect all individuals into account. For instance, Danish stocks have been performing well relative to international stocks during the period we investigate. Calendar-year fixed effects account for such common variation. In addition to calendar-year fixed effects, we include a number of other fixed effects to take into account potential non-linear effects arising from income and wealth on our dependent variable. These income and wealth fixed effects are created as follows. We rank all individuals according to their level of income and wealth, and then designate them to their respective income/wealth decile according to their rank in the income/wealth distribution.

¹⁴ Bekaert et al. (2017) find that home bias varies systematically with age. By including age as a control, we account for such variation.

In addition, we control for the number of stocks individuals hold, as already mentioned, by assigning dummies for whether the individual holds one stock, two stocks, etc., up to ten stocks or more. We leave out the dummies for the lowest wealth and income deciles, and for holding one stock, i.e. coefficients are measured in relation to individuals in these groups. In detail, the regression we run is the following:

$$y_{i,t} = \alpha + \gamma F_{i,t} + \sum_{j=1}^k \beta_j X_{i,j,t} + Z_{i,t} + \varepsilon_{i,t}$$

where $y_{i,t}$ is the degree of home bias of individual i at time t , $F_{i,t}$ is the dummy picking out whether individual i is a foreigner and how long he/she has been living in Denmark, $X_{i,j,t}$ is one of k control variables (income, wealth, age, education and gender in baseline regression) for individual i at time t , and $Z_{i,t}$ collects the fixed effects per calendar year, income decile, wealth decile and number of stocks.

Our main explanatory variable of interest is the dummy indicating whether the investor is a foreigner and how long the foreigner has lived in Denmark. On average across all foreigners, the coefficient to this dummy equals -0.77 , as shown in column (1) of Table 3. Given that the dependent variable is home bias of an individual, i.e. the proportion of an individual's total stocks that is invested in Danish stocks, this result means that foreigners on average hold 0.77 percentage point less Danish stocks (as a fraction of their total stocks) compared to Danes, controlling for background characteristics. In other words, the average – across all foreigners, i.e. independent of duration of residency in Denmark – degrees of home bias of Danes and foreigners do not differ a lot, also after controlling for background characteristics of the individuals.

Columns (2) through (5) reveal the main findings of our paper. Here we distinguish between foreigners depending on their duration of stay in Denmark. We find that the shorter a foreigner has lived in Denmark the lower is the individual's degree of home bias, compared to the home bias of the average Dane. The results in column (2) show that the average recently arrived foreigner holds 12.22 percentage points less Danish stocks (as a fraction of total stock holdings) compared to the average Dane, and the difference is highly significant. The average foreigner who has lived in Denmark between 2 and 5 years (column (3)), holds

5.59 percentage points less Danish stocks (as a fraction of total stock holdings) than the average Dane. The pattern of a relatively smaller difference between home bias of Danes and foreigners having lived longer in Denmark continues for foreigners having lived in Denmark between 5 and 10 years (1.09 percentage point). When foreigners have lived for more than 10 years in Denmark, there is less than a one percentage point difference between home bias of Danes and foreigners, and the difference is statistically insignificant at a 1 percent level.

The difference between the coefficients to the dummies picking out foreigners in columns (2) and (3) of Table 3 is significantly different, i.e. the difference between home bias for foreigners who have lived in Denmark for less than 2 years and Danes is statistically smaller than the difference between home bias of foreigners who have lived in Denmark between 2 and 5 years and Danes. Similarly, the difference between the degrees of home bias in columns (3) and (4), respectively the difference in home bias in columns (4) and (5), is also statistically significant. The difference between the effects in columns (5) and (6) is not statistically significant. These results are available upon request.

We find that home bias generally decreases with income, wealth, age, whereas men have a slightly higher home bias than women.¹⁵ Our results imply that the typical home-bias investor is a younger Danish (or foreign, when he has stayed in Denmark for a long period of time) man with low income and wealth. This resembles results in Karlsson & Nordén (2007) who also find that home bias is higher for men with low wealth. Our results also corroborate results in Bekaert et al. (2017) that home bias of individuals is related to their background characteristics. We note that Bekaert et al. (2017) find this for US investors using data from 401(k) plans, and we find it for investors in Denmark using data on equity

¹⁵ The income, wealth, and stock fixed effects reveal that there there is no clear evidence of non-linear effects. When moving up the income distribution, home bias of investors is reduced in a linear way: The higher is income of an individual, the lower is home bias, as the negative coefficient to income in Table 3 demonstrates, but there are no particular effects for either very rich individuals or those in the low deciles of the income distribution, i.e. no non-linear effects (results available upon request). The same goes for wealth and number of stocks. Note by the way that we include both the continuous variables measuring income and wealth and fixed effects. Our results are fully robust to including these continuous measures or not (including them or not has no real impact on our main coefficients, i.e. the coefficient relating to foreigners' duration of stay).

holdings outside retirement plans, i.e. this finding seems robust across different studies. Our estimates imply that a 20-year old man without higher education and income and wealth corresponding to the 10% fractal will have a home bias of 93.4%. A 60-year old woman with a university degree and income and wealth corresponding to the 90% fractal will have a home bias of 81.9%. This is a difference in the degree of home bias of app. 12 percentage points. The difference in home biases of newly arrived foreigners and foreigners who have stayed longer in Denmark is thus as large as the difference between two individuals that differ markedly in terms of income and wealth (10% vs. 90% fractile), age (20 years vs. 60 years), level of educations (with or without higher education), and gender. The conclusion is that the effect on home bias of having just arrived to a new country is large.

In Table 3, we show results for groups of foreigners who have stayed in Denmark for less than 2 years, between 2-5 years, between 5-10 years, etc. We do so in order to present the results in simple ways that are easy to interpret. We can, however, specify our regression in an alternative way and include 35 dummies, alongside the control variables, i.e. a dummy for foreigners who have been in Denmark for at least 1 year, another for foreigners who have been in Denmark for at least 2 years, 3 years, etc., up until the final dummy for foreigners who have been in Denmark for 35 years or more. We plot the estimated coefficients of the dummies alongside 99% confidence bounds in Figure 2.

A clear pattern emerges from Figure 2. Foreigners who have stayed in Denmark for a short period of time display a significantly smaller degree of home bias, compared to the average Danish investor. A second finding from Figure 2 is that the difference between home bias of Danes and foreigners becomes insignificant when foreigners have stayed in Denmark for 7-8 years. In other words, a lot of changes to foreigners' degree of home bias take place in their first 7-8 years in Denmark, after which home bias of foreigners resembles home bias of Danes.

3.1.1 Variation among newly arrived foreigners

Home bias of newly arrived foreigners is significantly lower than home bias of Danes, but it is still high at 77%. This is not as surprising as it might seem at the outset. The main point

is that there is variation in home bias among newly arrived foreigners due to their different backgrounds. First, there are many reasons why foreigners relocate to Denmark. For instance, expats might come to Denmark because of attractive job offers. Refugees, on the other hand, might simply need to leave their country of origin. This means that the degree of exogeneity in the decision to relocate will differ across newly relocated foreigners, implying that newly arrived foreigners' degrees of home bias will also vary.¹⁶ Second, and related, foreigners come from very different countries. Some are highly educated and come from rich countries. Other foreigners come from countries where the average level of income is lower. They see their income increase significantly upon arrival in Denmark, however, which may lead them to buy stocks. This may very well be Danish stocks (we verify this). In other words, some foreigners will have a high degree of home bias, whereas other will not. The average degree of home bias of newly arrived foreigners is higher than the reader might intuitively have guessed, but lower than that of Danes.

In Table 4, we verify that there is variation in the degree of home bias of newly arrived foreigners. The table shows results from regressions where we interact the dummy variable picking out newly arrived foreigners with the control variables we use in Table 3, as well as two new dummies: a dummy indicating whether the foreigner is married to a Dane and a dummy indicating whether the foreigner originates from an Advanced country (according to IMF classifications). A reasonable hypothesis is that foreigners from Advanced countries are more likely to come for voluntary reasons (attractive job offers etc.) compared to some foreigners from developing countries who relocate because they need to. We find that there is significant variation among newly arrived foreigners. For instance, the coefficient to the term interacting a newly arrived foreigner and income is -1.54. This means that a newly arrived foreigner with an income of DKK 100,000 has a home bias that is 9.65 (8.11 + 1.54) percentage points lower than the home bias of the average Dane. Similarly, a newly

¹⁶ An extreme form of endogeneity would be that an individual moves to Denmark to invest in Danish stocks. Such a foreigner would be even more likely to invest in Danish stocks upon arrival and would more quickly adjust to home bias of Danes. If this is systematically the case for our sample of foreigners in Denmark, then there should be a small difference between our sample of foreigners and Danes. In other words, this works against our findings. It implies that we would find even larger effects if one could control for this unobservable effect, i.e. our estimates are conservative in this regard.

arrived foreigner who has an income of, say, the 90% fractile of the income distribution of newly arrived foreigners (which corresponds to DKK 591,251) will have a home bias that is $7.91 + (5.91251 * 1.54) = 17$ percentage points lower than the home bias of the average Dane.¹⁷ The interaction terms capturing the effects of wealth and education of newly arrived foreigners are insignificant, whereas newly arrived men have a $4.59 + 13.10 = 17.69\%$ lower home bias than Danes, and newly arrived women have a 4.59 lower home bias than Danes. Age is also significant, and the coefficient positive.¹⁸ The results of regression (6) indicate that home bias of a newly arrived foreigner who is married to a Dane is basically the same as home bias of Danes. Being married to a Dane thus seems to indicate a network effect. Finally, newly arrived foreigners from both Advanced and non-Advanced countries have lower home bias than Danes, as both the foreigner coefficient (that indicates how home bias of recently arrived foreigners from non-Advanced countries differ from home bias of Danes) and the coefficient to the interaction term are significant in regression (7). Newly arrived foreigners from Advanced (IMF classification) economies have 10.57 percentage points lower home bias than foreigners from other economies. Their home bias is $4.45 + 10.57 = 15$ percentage points lower than Danes'.

To illustrate how these effects matter overall, we can pick out, for instance, newly arrived young (below 30 years) men from Advanced economies with high income (above the 90% fractal among incomes of foreigners) who are not married to a Dane. The home bias of such a newly arrived foreigner is more than 42 percentage point lower than home bias of the average Dane, as shown in regression (8) of Table 4. This is a large effect. At the same time, we should notice that even when we start with a very large sample indeed, covering the total population of a country, the number of observations drops significantly when choosing such a detailed subsample: There are 96 (i) foreigners in this group of (ii) young (iii) men (iv) not married to a Dane (v) with high income (vi) from Advanced economies

¹⁷ In regressions in columns (1), (2), and (9), where we concentrate of the effect of income and wealth, we leave out either the income or wealth fixed effects. Otherwise, in all regressions in the paper, we include both income and wealth fixed effects.

¹⁸ The coefficient is 0.41%. This means that a, e.g., 20 year old recently relocated foreigner will have a home bias that is $18.68 (-26.88\% + 20*0.41\%)$ percentage points lower than that of the average Dane, whereas a, e.g., 60 year old foreigner will have a home bias that is 2.28 percentage points lower than that of the average Dane.

(vii) who have recently relocated to Denmark and (viii) hold stocks. Hence, we cannot split the sample of newly arrived foreigners even more.

3.2. Passive versus active home-bias decisions

We have shown that foreigners hold a lower fraction of Danish stocks when arriving in Denmark, and that home bias goes up when foreigners stay longer in Denmark. However, if investors exhibit inertia this pattern could arise simply because market prices move and not necessarily because foreigners actively decide to buy Danish stocks. This means that if the Danish stock market goes up relative to foreign stock markets, home bias increases automatically.¹⁹ It is important to investigate whether this is what causes our results, because if the latter is the case, it would not be an active investor decision that lead to the change in home bias we observe among newly arrived foreigners but inertia coupled with specific market movements. In order to investigate whether the changes in home bias we document are the results of active investor decisions or passive market movements, we present in this section results from two tests that both reveal that foreigners actively increase their tendency to buy Danish stocks when their duration of stay in Denmark increases. In both tests, we study purchases of stocks, identified as the increase in the number of held shares from one year to the next. In the first test, we collect all stock purchases, and investigate for every individual the fraction of Danish stocks bought (out of total stocks bought) each year. In the second test, we run a probit model where we condition on investors holding stocks and investigate what determines the likelihood that a newly bought stock is non-Danish. By studying the stocks investors decide to buy, these results tell us why home bias changes. The results are in Table 5.

In Panel A, we show that when foreigners have just arrived to Denmark, they have less home bias in newly bought stocks compared to other investors (cf. column 2). When foreigners have just arrived to Denmark, the fraction of Danish stocks they decide to buy

¹⁹ Our sample includes the financial crisis. The Danish stock market performed similarly to comparable stocks markets during the financial crisis. The Danish stock market fell by 48% in 2008. This is roughly similar to the Swedish stock market that dropped by 40%, the Norwegian that dropped by 54%, the German by 43% etc. Home bias is constant across the financial crisis, however. We conclude that the financial crisis does not seem to affect our results in any particular way.

(when they buy new stocks) is 24 percentage points lower than the fraction of Danish stocks bought by investors in general. When foreigners stay longer in Denmark, their tendency to buy relatively less Danish stocks goes down dramatically. This means that the dynamics in home bias over the duration of stay of foreigners is the same as the one reported earlier: Foreigners increase their home bias (tendency to buy, in Table 5, and hold, in Table 3, Danish stocks) when their duration of stay in Denmark increases. This indicates that it is an active decision of foreigners to buy relatively more Danish stocks when they have stayed longer in Denmark.²⁰

The finding that it is an active decision to buy relatively more Danish stocks compared to foreign stocks when foreigners have stayed longer in Denmark also appears from Panel B of Table 5. Panel B investigates the likelihood of buying non-Danish stocks, when buying new stocks. Panel B reveals that the likelihood that a newly arrived foreigner buys a foreign, i.e. non-Danish, stock is 7.6 percentage points higher than an otherwise comparable investor (cf. column 2). When foreigners have stayed more than ten years in Denmark, this difference drops to less than one percent. In other words, when foreigners have stayed longer in Denmark, they become less likely to buy non-Danish stocks. Taken together, the results in Panels A and B of Table 5 confirm that foreigners deliberately add more Danish stocks to their portfolio when they buy new stocks, and are less likely to buy non-Danish stocks, when foreigners have stayed longer in Denmark. This means that home bias of foreigners changes because investors make active decisions to increase their holdings of Danish stocks. Changes in home bias, thus, do not merely reflect changes in relative market values.

²⁰ Note another generally interesting feature of Table 5. There are 731,695 people buying stocks (out of 1,333,716 stockholders, cf. Panel B) and there are 1,557,220 observations on stock purchases. This means that those 731,695 who buy stocks, do so about twice in 8 years, which matches general infrequent trading of households.

4. Robustness tests

4.1. Wealthy Stockholders

Several studies show that wealthy stock holders behave differently on financial markets compared to the average investor. For instance, the consumption of wealthy stock holders respond more to changes in financial market conditions than the consumption of the average stock holder (Vissing-Jørgensen, 2002; Malloy, Moskowitz & Vissing-Jørgensen, 2009) and their portfolios look different, too (Back, Calvet & Sodini, 2015). As mentioned earlier in this Section, stock holdings of the median investor in our data are considerably lower than stock holdings of the average investor, indicating that wealth is concentrated among a smaller group of the population. It is a relevant concern whether our findings go through for wealthy investors.

We investigate the top-25% of individuals in terms of stock market wealth. The average stock-market wealth for the top-25% is DKK 2,099,636 for Danes and DKK, 1,310,888 for foreigners. The rich Dane (foreigner) holds 3.77 (3.52) different stocks on average. Home bias is high also for the rich: It is 85.4% for the average rich Dane and 80.1% for the average rich foreigner (across durations of stay in Denmark).

Table 6 contains regression results. In Panel A, we look at the 25% of the population – both Danes and foreigners – who have the largest stock holdings. Recently relocated foreigners have a 21 percentage point lower home bias than the average Dane in the top 25% distribution. In addition, the difference between foreigners' and Danes' home bias disappears when foreigners have stayed 10-15 years in Denmark. We can also compare the top 25% foreigners to the average Dane. We do so in Panel B. This results in a 25 percentage point lower home bias for recently relocated foreigners, compared to the average Dane. Hence, our main results, that home bias of foreigners increase with their duration of stay in Denmark, goes through also for the wealthy.

4.2. Household level

We conduct our analyses for each individual in our sample. An alternative is to look at the household level. We present the result from this specification in Panel C of Table 6. In this specification, we aggregate stock holdings over the household, and do the same with wealth

and income. Age and education variables for each household are those of the household head, defined as the household member with the highest mean salary. The main point to notice from these results is that they are practically the same as those we have presented earlier (Table 3). If anything, the results of Panel C are even stronger. For instance, when looking at the household level, newly arrived foreigners have a 15 percentage point lower home bias than Danes, which can be compared to the 12 percentage point lower home bias we find when looking that the individual level. In this sense, the quantitative results we have presented using individual-level results are conservative estimates.

4.3. Excluding individuals with non-zero holdings of assets abroad

As mentioned in Section 2, our data are based on automatic collection of recorded holdings of stocks by individual investors in depots at Danish banks. Some investors – Danes and foreigners – also hold assets abroad (foreign real estate, stocks kept in depots at foreign banks, fixed income kept in depots at foreign banks, and potentially other foreign assets). Statistics Denmark collects the total value of foreign assets kept abroad, but not its detailed composition. This means that we do not know whether an individual’s assets kept abroad consist of, for instance, foreign property and/or stocks in depots at foreign banks. This also means that we cannot calculate total home bias (total holdings in Danish stocks divided by total holdings of stocks, whether in depots in Danish or foreign banks) for those investors who hold assets abroad. This could obviously affect our results. If, for instance, an investor holds Danish stocks in Danish depots, and we calculate a high home bias for this investor, but the investor also holds foreign stocks in depots at foreign banks, then our measure of home bias, based on the data we observe (stocks in Danish depots), would be biased. The same applies to Danes who hold Danish stocks in depots at foreign banks.

We know the total value of assets held abroad (in DKK), though. We can use this to conduct two analyses that shed light on the extent to which our results might be affected by not knowing the detailed composition of assets held abroad. First, we can analyse the characteristics of those foreigners holding assets abroad. This will tell us whether these investors are representative of the typical investors we aim at analysing in this paper. Second, we can use the fact that if a foreigner (or a Dane) does not hold assets abroad, we

know the entire portfolio of the investor: we know the entire portfolio held in depots at Danish banks and we know that the investor does not hold assets abroad (and thus also no stocks in foreign depots), i.e. we know the entire stock holdings of the investor. We can analyse if our results differ if we restrict the analysis to investors where we know the entire portfolio, i.e. investors not holding assets abroad.

There are 14,662 stock market participants (defined, as throughout the paper, as those who hold stocks in depots by Danish banks) who also hold assets abroad: 13,842 Danes and 820 foreigners. Table 1 shows that there are 1,365,529 Danish and 17,071 foreign stockholders in total. The fraction of Danish stockholders with foreign assets abroad is thus $13,842/1,365,529 = 1.0\%$. The similar fraction of foreigners is 4.8% ($= 820/17,071$). It is intuitive that the fraction of foreigners with foreign assets is higher than the fraction of Danes, as a foreigner is more likely to hold property abroad, for instance if the foreigner expects to return to his/her country of origin after a period of time, if the foreigner already had stocks held in depots at foreign banks when relocating to Denmark, etc.

Individuals with foreign assets abroad are very different from the average resident in Denmark. For instance, wealth of individuals (Danes and foreigners) who hold assets abroad is much higher than wealth of the average resident in Denmark. They are also older, more educated, and hold a higher number of stocks. Basically, if we want to say something about the typical stockholder in Denmark, as is the goal of this paper, stockholders with assets abroad are not representative.

The fact that there are few investors who hold assets abroad, and that we consequently have complete information about most investors' stock portfolios, is the reason why we have included all individuals in our analyses so far. We can run a robustness test, though, where we exclude those Danes and foreigners who keep assets abroad. The resulting (large) subsample is one where we know the complete distribution of investors' stock holdings. We present the results of this regression in the online appendix. The most important take-away from this test is that the results are similar to the results in Table 3. For instance, home bias of newly arrived foreigners is still 12 percentage points below home bias of other investors, and home bias goes up when foreigners have lived longer in Denmark.

4.4. Employee stocks

We can in our data see whether a stock is an employee stock. There are 140,465 Danes and 3,290 foreigners who at some point in time hold employee stocks. These make up app. 10% of the total number of stock market investors. One may argue that an employee stock does not represent a deliberate investment, as the employee obtains the stock as part of the work contract. Three remarks are in order. First, most of the investors with employee stocks also hold other stocks, i.e. have also made ‘deliberate investment decisions’. Second, our data not only include an indicator for whether a stock is an employee stock, but also whether the company from which the employee has obtained the stock is Danish or foreign. Most Danes with employee stocks hold Danish employee stocks, but a significant fraction, app. 24,000, hold employee stocks from foreign companies. Similarly, most foreigners in Denmark hold Danish employee stocks, but there are also foreigners who hold foreign employee stocks. In total, it is thus not a priori clear in which direction employee stocks could affect home bias. Third, and probably most important here, our main result that newly arrived foreigners have lower home bias than Danes, and increase home bias when staying longer in Denmark, is robust towards excluding individuals with employee stocks (results available upon request).

4.5. Individual fixed effects

We do not include individual fixed effects in our regressions. There are several reasons. First, given that the dummy for being a foreigner is time-constant, it would drop out from the regression if including individual fixed effects, as individual fixed effects are obviously time-constant, too. Second, we could as an alternative introduce a new specification for our regressions with a time-varying foreigner dummy (e.g., equal to 1 when an individual has been in Denmark for X number of years, such that this dummy turns on in one calendar year only, i.e. is time-varying). In this case, however, the coefficient estimates will have a different and counterintuitive interpretation compared to what we are after in this paper. Specifically, the coefficient estimates would reveal how much – at any given time of duration – the home bias of a foreigner differs from his/her own home-bias average during the 2005-2012 sample period, compared to how much the home bias of a Dane differs from his/her own average home bias during the 2005-2012 period. This is a complicated

and unintuitive way of evaluating what we are after in this paper. As robustness, however, we have run such a regression. As expected, it reveals the same economic effects as those reported in Section 3, i.e. foreigners having stayed longer in Denmark invest more in Danish stocks. The magnitudes are also similar. This means that the main results of our paper are unaffected if including individual fixed effects. We choose not to do so when presenting our results, however, as the cost involved is a more complex and opaque interpretation of the coefficients we estimate.

4.6. Stock market participation

Investments in stocks imply two decisions: Should the investor buy stocks at all, and if so, what stocks. We have analysed the second question in this paper with a focus on the fraction of stock market wealth an individual allocates to domestic stocks. In this section, we briefly check whether our data reveal the same patterns as has been reported in the existing stock-market participation literature, see, e.g., Bertaut (1998), Mankiw and Zeldes (1991), Vissing-Jørgensen (2004), Calvet et al. (2007), Christiansen et. al. (2008), and Grinblatt et al. (2011). In addition to this literature, we investigate whether foreigners' decision to participate in the stock market is related to their duration of stay in Denmark. A first impression of the relationship between years living in Denmark and stock market participation appears in Figure 3. The figure reveals that foreigners who have just relocated to Denmark have a low degree of stock market participation. It also reveals that foreigners who have stayed longer in Denmark increase their unconditional stock market participation rate.

The online appendix shows results from pooled probit regressions where we relate the participation decision to controls variables (income, wealth, gender, etc.) and to a dummy indicating whether the individual is a foreigner, respectively dummies picking out recently arrived foreigners, foreigners who have stayed in Denmark between 2 and 5 years, etc. We find that foreigners on average have an almost 16 percentage point lower probability of entering the stock market, compared to the average Dane. This gap between the stock market participation probability of Danes and foreigners decreases considerably for foreigners who have stayed longer in Denmark. In particular, there is a 21 percentage points

difference between the stock market participation probability of Danes and newly arrived foreigners, but a 13 percentage points difference between Danes and foreigners having resided in Denmark for more than 15 years. As the average participation rate of all foreigners is 3.9% (cf. Table 1), the 8 percentage points increase (from 13% to 21% lower conditional participation rate) in foreigners' stock market participation compared to Danes', as foreigners go from being newly arrived to fully settled, is large in economic terms. These results are in line with those of Haliassos, Jansson & Karabulut (2017) who investigate stock market participation of refugees arriving in Sweden. They find, similar to us, that the difference in stock market participation of foreigners and locals (in their case Swedes, in our case Danes) decline with the length of refugees' stay in their new country. Haliassos et al. do not look at home bias.

4.7. Country of origin

Foreigners living in Denmark buy stocks from a total of 29 countries (other than Denmark); results are in the online appendix. Most of them buy stocks from countries neighboring Denmark (Sweden, Norway, Germany) or other countries with well-developed stock markets (USA, UK). Many of the foreigners who buy stocks from countries neighboring Denmark originate from that country, e.g., 33.9% of those buying Norwegian stocks originate from Norway. This 'country-of-origin-bias' is lower for non-neighboring countries, e.g., US stocks, where only 13.7% of those buying US stocks originate from the USA. Overall – i.e. when looking across all countries from which foreigners arrive to Denmark – the 'country-of-origin-bias' is not strong.

4.8. Costs of underdiversification

The point of this paper is to study how home bias changes with the duration of a newly arrived foreigner's stay in a new country. We find that home bias increases when foreigners have lived longer in their new country. This allows us to provide a lower bound on the role of information asymmetry for home-bias explanations.

Do these results tell us something about the cost of underdiversification? We emphasize that we should take care not to draw too strong conclusions here because we, as mentioned, do not have access to data on Danes' savings in pension accounts. Pension savings could

reduce costs associated with home bias in outside-pension accounts, if the pension savings of the individual are internationally invested.

An important feature of the Danish pension system, however, is that many individuals cannot see the composition of their pension savings, i.e. cannot calculate home bias of their own portfolios. This is because large fractions of Danes' pension savings are in collective mandatory pension schemes, where the detailed asset composition is unknown to the individual. For this reason, we analyse home bias of those assets that the individual can control and observe. Focusing on underdiversification, and using data on the same investors as those studied here, Florentsen, Nielsson, Raahauge, and Rangvid (2019) show that the cost of underdiversification in general (i.e., not home bias as such, but the fact that individual investors hold very few stocks) is significant.

5. Conclusion

We use comprehensive data on equity holdings of individual investors in Denmark to show that recently arrived foreign investors invest less in domestic stocks, i.e. display a lower degree of home bias, than other investors. Over time, foreigners increase their allocation to domestic stocks and after app. 7-8 years, their home bias is similar to that of other investors. These findings have several implications for the home bias literature. They imply that a part of home bias – at least 14% in our base case – cannot be explained by factors that separate investment opportunity sets between countries, such as different tax systems, capital controls, etc. They also imply that investors need time to learn about and become familiar with domestic stocks before resembling other investors. In this sense, familiarity is a dynamic concept that develops over time. In a broader sense, our findings have the implication that investors increase holdings of assets as investors become more familiar with these assets. Our findings also illustrate how foreigners adapts to the cultural norms of local residents (Danes) over time (Bhugra & Becker, 2005).

While our paper is empirical, our finding that foreigners increase home bias when staying in the country for longer has implications for how to think about the determinants of home bias. Theoretical papers examining home bias have investigated how information

asymmetries can account for home bias in static settings (e.g., Brennan & Cao, 1997, Van Nieuwerburgh & Veldkamp, 2009, Dziuda & Mondria, 2012). Our paper shows that information develops over time. It would be interesting to examine how time-varying information affects home-bias models building on information asymmetries.

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Table 1. Demographics and Stock Holdings

The table shows mean values for all individuals that have been registered in Denmark in 2005-12. Standard deviation is reported in parenthesis (except for binary distributed variables where the dispersion is not economically meaningful). We first calculate year-by-year cross-sectional means and standard deviations, and then report the time-series averages thereof. The income variable is defined as total income before taxes. This includes regular salary, pension, public income transfers, irregular income (e.g. honorary income, consulting income, etc.), income from self-owned firm, capital income, foreign income, etc. Wealth is net wealth (gross wealth minus debt) at year-end, excluding pension savings. All other registered wealth is included, such as the value of cash, stocks, bonds, mutual funds, net house wealth, etc. (value of motor vehicles and boats is unregistered, though). Net house wealth is calculated as the year-end value of residential housing as evaluated by tax authorities minus the market value of mortgage bond debt. Higher education is defined as those with a university bachelor degree or higher. The proportion held in Danish stocks cannot be calculated for the total sample (as the denominator is zero for those not holding stock). Variables in DKK terms are winsorized within each year at the 1st and 99th percentiles. Statistical inference is not reported since the figures are not estimated from a sample but represent actual values calculated from the full population.

	Total sample		Stockholders	
	Danes	Foreigners	Danes	Foreigners
Avg. no. of individuals per year	4,075,094	247,140	1,020,639	9,619
Total no. of individuals 2005-12	4,498,414	422,488	1,365,529	17,071
Participation rate (%)	25.0	3.9	100.0	100.0
Income (DKK)	292,809 (193,933)	180,310 (178,590)	343,537 (231,913)	359,260 (267,943)
Wealth (DKK)	464,726 (1,301,199)	64,316 (531,174)	1,070,125 (1,941,627)	585,643 (1,472,112)
House wealth (DKK)	387,329 (920,798)	80,201 (425,289)	716,287 (1,280,950)	421,435 (992,872)
Age	48.9 (18.1)	37.4 (13.3)	53.6 (17.6)	44.2 (12.8)
Proportion with higher educ. (%)	7.7	7.4	10.4	18.8
Proportion of men (%)	48.6	44.6	53.2	49.6
Value of stocks (DKK)	20,734 (136,277)	2,522 (38,991)	82,843 (262,811)	64,071 (186,325)
Prop. of value in Danish stocks (%)			85.7 (32.7)	86.5 (32.1)
No. of stocks	0.48 (1.49)	0.07 (0.60)	1.90 (2.47)	1.80 (2.46)
Prop. of Danish stocks (%)			85.5 (31.9)	86.1 (31.7)

Table 2. Stock Ownership of Foreigners by Duration of Stay

This table reports the 2005-12 mean stock ownership of foreign nationals living in Denmark across the length of time they have resided in Denmark, with standard deviation in parenthesis. The sample is conditioned on those foreigners holding stock, where the same overall data cleaning and calculation procedure applies as described in Table 1. For example, i) the participation rate within each duration category is the average annual participation rate across 2005-12 and ii) the total number of foreigners holding stock is based on those owning stock at some point in time during the corresponding duration category. Standard deviation is not reported for the participation rate since its binary distribution implies that the interpretation of dispersion is not economically meaningful.

	Duration of local residence				
	<2 years	2-5 years	5-10 years	10-15 years	> 15 years
Value of stocks (DKK)	66,405 (225,807)	59,860 (196,657)	51,654 (148,364)	59,183 (172,977)	73,072 (200,423)
Value of Danish stocks (DKK)	43,782 (190,853)	43,823 (169,124)	40,231 (126,577)	48,801 (151,141)	59,826 (176,430)
Value of foreign stocks (DKK)	22,623 (80,998)	16,037 (66,412)	11,423 (54,902)	10,382 (54,982)	13,246 (62,321)
Proportion of value in Danish stocks (%)	76.8 (40.7)	82.6 (35.8)	86.9 (31.5)	88.6 (29.8)	86.9 (31.3)
No. of stocks	1.76 (2.75)	1.74 (2.55)	1.70 (1.95)	1.77 (2.19)	1.89 (2.70)
No. of Danish stocks	1.13 (1.28)	1.26 (1.44)	1.34 (1.36)	1.44 (1.59)	1.51 (1.76)
No. of foreign stocks	0.63 (2.28)	0.48 (1.83)	0.36 (1.26)	0.33 (1.25)	0.38 (1.71)
Proportion of Danish stocks (%)	76.2 (40.7)	82.2 (35.6)	86.5 (31.2)	88.3 (29.3)	86.6 (30.8)
Participation rate (%)	0.8	2.0	3.7	4.9	8.1
Avg. annual no. of foreign owners in 2005-12	378	935	2,050	1,923	4,332
Total no. of foreign owners in 2005-12	2,012	3,788	6,081	5,407	7,894

Table 3. Proportion in Danish Stocks: Danes vs. Foreigners and Duration of Stay

In all regressions the dependent variable is the percentage proportion of portfolio value held in Danish stocks. In regression (1) the sample includes all Danish and non-Danish residents in Denmark during 2005-12 that participate in the stock market (own at least one stock). Regressions (2)-(6) similarly include all Danes, but only foreigners with the stated duration of residence in Denmark. The binary dummy *Foreigners* takes value 1 if a resident is non-Danish and 0 if he/she is Danish. Control variables are as defined in Table 1, where *Male* is a gender dummy and the *HigherEducation* dummy equals 1 for those having a bachelor degree or higher. All regressions include calendar-, number of stocks-, income- and wealth fixed effects, where individuals are grouped into one of ten groups depending on the number of stocks they hold (2, ..., 9, 10+) and their decile position in the income distribution and the wealth distribution. Standard errors are clustered by individuals and corresponding *t*-statistics are reported in parenthesis. Star-marked coefficients are statistically significant at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Foreigners where duration of local residence is...					
	All foreigners	<2 years	2-5 years	5-10 years	10-15 years	> 15 years
Foreigner	-0.77* (-2.91)	-12.22* (-12.89)	-5.59* (-9.16)	-1.31* (-3.03)	0.75 (1.69)	0.77 (1.97)
Income/100,000	-0.32* (-11.87)	-0.31* (-11.44)	-0.32* (-11.55)	-0.32* (-11.64)	-0.32* (-11.56)	-0.32* (-11.58)
Wealth/100,000	0.03* (12.39)	0.03* (12.38)	0.03* (12.42)	0.03* (12.42)	0.03* (12.38)	0.03* (12.31)
Age	-0.16* (-88.26)	-0.16* (-88.50)	-0.16* (-88.50)	-0.16* (-88.52)	-0.16* (-88.54)	-0.16* (-88.62)
HigherEducation	0.37* (3.90)	0.38* (4.04)	0.38* (4.02)	0.37* (3.92)	0.38* (3.98)	0.37* (3.88)
Male	0.42* (6.84)	0.44* (7.15)	0.44* (7.13)	0.44* (7.12)	0.44* (7.15)	0.44* (7.13)
Constant	95.41* (709.69)	95.40* (705.52)	95.41* (705.96)	95.41* (706.46)	95.41* (706.39)	95.41* (707.10)
No. of obs.	8,178,398	8,107,788	8,111,765	8,120,279	8,119,551	8,138,531
R ²	0.01	0.01	0.01	0.01	0.01	0.01
No. of indiv.	1,378,882	1,365,442	1,366,958	1,368,744	1,368,387	1,370,970
Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes
Income fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
Wealth fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. Proportion in Danish Stocks: Variation Across Foreigners

In all regressions, the dependent variable is the percentage proportion of portfolio value held in Danish stocks. In regressions (1)-(6) the sample includes all Danish and non-Danish residents in Denmark during 2005-12 that participate in the stock market (own at least one stock), with the further restriction that non-Danish residents have resided in Denmark for less than two years. All variables are as defined in Table 1 and 3, where *Marr.Dane* and *Adv.Econ.* are dummy variables respectively taking value 1 for foreigners married to a Dane or arriving from advanced economies (IMF classification). Regression 8 further restricts the sample of relatively newly arrived foreigners to those with high income (the 90% fractal or above), younger than 30 years old, male, not married to a Dane, and from advanced economies (IMF classification). Standard errors are clustered by individuals and corresponding *t*-statistics are reported in parenthesis. Star-marked coefficients are statistically significant at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Income	Wealth	Age	Educ.	Gender	Network	Adv.econ.	High inc., young, male, non-netw., from adv.econ.
Foreigner	-8.11* (-5.84)	-11.39* (-11.79)	-26.88* (-9.94)	-12.40* (-12.54)	-4.59* (-3.71)	-15.57* (-13.81)	-4.45* (-3.19)	-42.42* (-8.05)
Income/100,000	-0.51* (-39.32)	-0.22* (-8.14)	-0.31* (-11.43)	-0.31* (-11.43)	-0.31* (-11.43)	-0.31* (-11.44)	-0.31* (-11.43)	-0.51* (-39.36)
Wealth/100,000	0.03* (12.98)	-0.02* (-13.17)	0.03* (12.37)	0.03* (12.38)	0.03* (12.38)	0.03* (12.38)	0.03* (12.38)	0.03* (12.98)
Age	-0.16* (-87.13)	-0.19* (-113.73)	-0.16* (-88.53)	-0.16* (-88.50)	-0.16* (-88.49)	-0.16* (-88.50)	-0.16* (-88.49)	-0.16* (-87.18)
HigherEducation	0.27* (2.84)	0.22 (2.32)	0.38* (4.04)	0.38* (4.04)	0.38* (4.04)	0.38* (4.04)	0.38* (4.04)	0.27* (2.82)
Male	0.37* (-0.51* (-3.82)	0.29* (-0.22* (-2.34)	0.44* (-0.31* (6.01)	0.44* (-0.31* (0.72)	0.45* (-13.10* (-7.19)	0.45* (-0.31* (8.07)	0.44* (-0.31* (-5.80)	0.37* (6.06)
Foreigner×Income								
Foreigner×Wealth								
Foreigner×Age								
Foreigner×High.Educ.								
Foreigner×Male								
Foreigner×Marr.Dane								
Foreigner×Adv.Econ.								
Constant	95.97* (798.80)	95.93* (850.79)	95.40* (705.52)	95.40* (705.52)	95.40* (705.46)	95.40* (705.50)	96.31* (993.76)	95.98* (798.69)
No. of obs.	8,107,788	8,107,788	8,107,788	8,107,788	8,107,788	8,107,788	8,107,788	8,104,999
R ²	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
No. of indiv.	1,365,442	1,365,442	1,365,442	1,365,442	1,365,442	1,365,442	1,365,442	1,363,571
Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Income fixed eff.	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Wealth fixed eff.	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Table 5. Active Decisions to Change Home Bias?

The table shows results from regressions where we in Panel A use an alternative definition of home bias, calculated as the number (not value) of newly purchased (not held) Danish stocks relative to the total number of purchased stocks. In Panel B, we investigate a probit regression where the dependent variable is an indicator of whether the stock-market investor has purchased a foreign (i.e. non-Danish) stock. In the probit model, the marginal effects of the explanatory variables on participation are calculated at their means. In regression (1) the sample includes all Danish and non-Danish investors in Denmark during 2005-12. Regressions (2)-(5) similarly include all Danish stock market investors, but only investors with the stated duration of residence in Denmark. In Specification B we further restrict on those holding at least one stock. Explanatory variables are as defined in Tables 1 and 2. Standard errors are clustered by individuals and corresponding z-statistics testing for zero marginal effect are reported in parenthesis, i.e. the ratio of the marginal effect estimate to the standard errors of the respective predictor. Star-marked coefficients are statistically significant at the 1% level.

		(1)	(2)	(3)	(4)	(5)	(6)
		All foreigners	Foreigners where duration of local residence is...				
			<2 years	2-5 years	5-10 years	10-15 years	> 15 years
<i>Panel A: Home bias in terms of purchased stocks</i>	Foreigner	-7.30* (-15.18)	-24.32* (-12.85)	-16.78* (-12.96)	-8.34* (-8.99)	-3.26* (-3.64)	-3.95* (-6.05)
	No. of obs.	1,557,220	1,542,025	1,543,202	1,545,002	1,544,494	1,547,677
	R ²	0.06	0.06	0.06	0.06	0.06	0.06
	No. of indiv.	731,695	724,891	725,591	726,419	726,149	727,516
	Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
	Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes
	No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Income fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Wealth fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
<i>Panel B: Probit; purchasing a foreign stock</i>	Foreigner	0.019* (16.57)	0.076* (12.32)	0.062* (13.32)	0.028* (10.79)	0.009* (4.84)	0.007* (5.31)
	No. of obs.	7,184,677	7,121,455	7,124,920	7,132,469	7,132,285	7,148,856
	R ²	0.22	0.22	0.22	0.22	0.22	0.22
	No. of indiv.	1,333,716	1,320,598	1,321,949	1,323,645	1,323,469	1,326,104
	Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
	Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes
	No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Income fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Wealth fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes

Table 6. Wealthy Stockholders & Household Data

This table presents results from our benchmark model estimated in Table 3, but with the sample of individuals restricted to those in the top 25% of distribution of stock holdings. Panel A includes the 25% of individuals – Danes and foreigners – with the highest value of total stock holdings. Panel B compares the 25% of foreigners with the highest value of total stock holdings to the average Dane, including all Danish stockholders. Panel C reruns our basic regressions from Table 3, but now using household level data instead of data for each individual. All regressions include the same control variables as in Table 3 (not reported here for brevity). Standard errors are clustered by individuals and corresponding *t*-statistics are reported in parenthesis. Star-marked coefficients are statistically significant at the 1% level.

		(1)	(2)	(3)	(4)	(5)	(6)
		All foreigners	Foreigners where duration of local residence is...				
			<2 years	2-5 years	5-10 years	10-15 years	> 15 years
<i>Panel A:</i>	Foreigner	-4.85*	-21.48*	-13.14*	-6.23*	-1.76	-2.60*
<i>Wealthy individuals</i>		(-8.92)	(-10.15)	(-9.31)	(-5.99)	(-1.83)	(-3.51)
	No. of obs.	2,038,966	2,022,231	2,023,182	2,024,983	2,024,906	2,029,924
	R ²	0.01	0.01	0.01	0.01	0.01	0.01
	No. of indiv.	446,442	441,988	442,453	442,970	442,833	443,859
	Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
	Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes
	No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Income fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Wealth fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
<i>Panel B:</i>	Foreigner	-5.81*	-25.21*	-16.36*	-8.45*	-3.58*	-2.24*
<i>Wealthy foreigners</i>		(-10.88)	(-11.76)	(-11.66)	(-8.23)	(-3.75)	(-3.15)
	No. of obs.	8,123,023	8,105,539	8,106,524	8,108,424	8,108,312	8,113,740
	R ²	0.01	0.01	0.01	0.01	0.01	0.01
	No. of indiv.	1,368,533	1,363,952	1,364,422	1,364,926	1,364,827	1,365,948
	Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
	Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes
	No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Income fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Wealth fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
<i>Panel C:</i>	Foreigner	-1.51*	-15.04*	-7.21*	-2.17*	-0.05	0.66
<i>Households</i>		(-4.77)	(-13.18)	(-9.80)	(-4.15)	(-0.08)	(1.43)
	No. of obs.	6,012,097	5,963,886	5,966,626	5,972,230	5,971,766	5,984,429
	R ²	0.01	0.01	0.01	0.01	0.01	0.01
	No. of households	1,008,993	999,650	1,000,697	1,001,843	1,001,508	1,003,354
	Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
	Calendar year FE	Yes	Yes	Yes	Yes	Yes	Yes
	No. of stocks fix.eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Income fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes
	Wealth fixed eff.	Yes	Yes	Yes	Yes	Yes	Yes

Figure 1. Distribution of Home Bias

The figures show the distribution of home bias across investors. The first graph shows the distribution of home bias across all investors, the middle graph for those investors who have home bias lower than 100% (i.e. we exclude in this graph investors with 100% home bias), and in the lower graph we exclude also investors with 0% home bias.

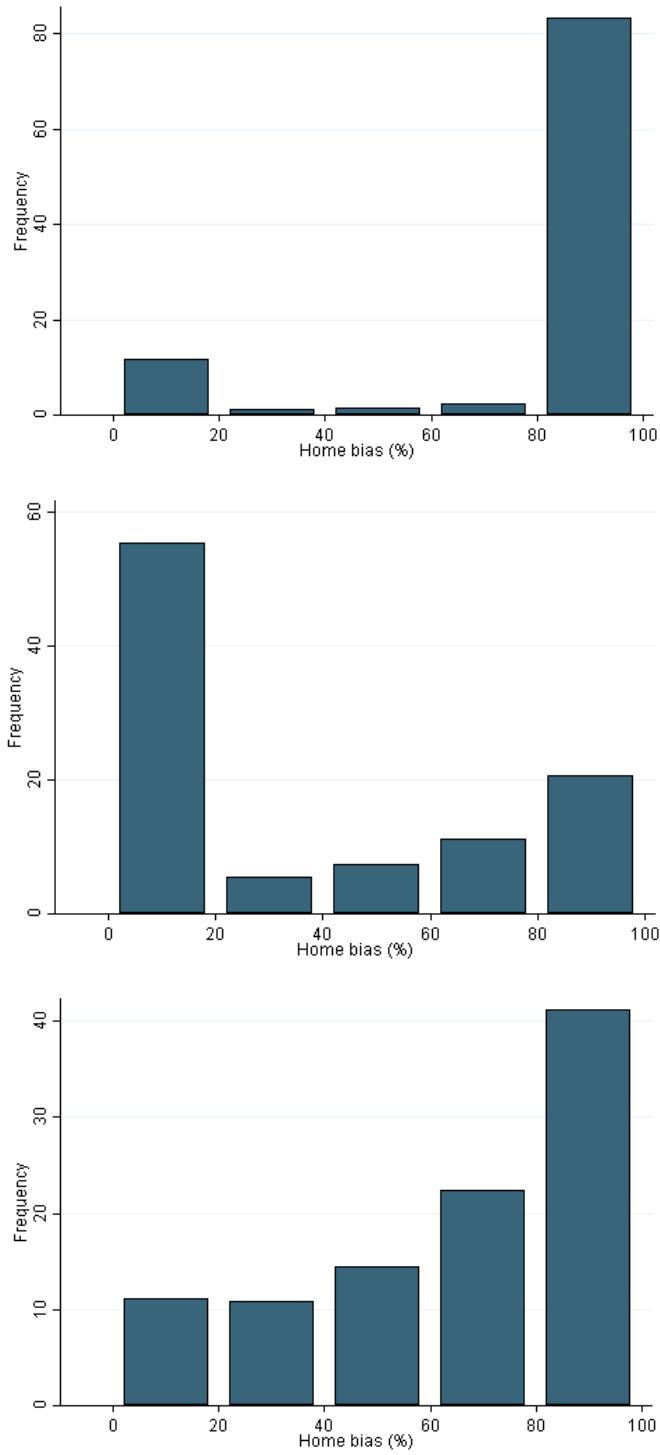


Figure 2. Proportion in Danish Stocks: Danes vs. Foreigners

The figure displays the conditional difference in the proportion of Danish stock held by foreigners' and Danes'. This difference and its 99% confidence interval is shown in percentage points across the length of time foreigners have resided in Denmark (for example, the proportion of Danish stocks in a foreigner's portfolio that has resided in Denmark for one year is 15 percentage points lower compared to that of a Dane). The figure is produced from a similar regression analysis as summarized in Table 3, but using a more detailed year-by-year breakdown, i.e. the proportion held in Danish stocks is regressed on 35 'years-since-arrival dummies' instead of using merely 5 different duration categories.

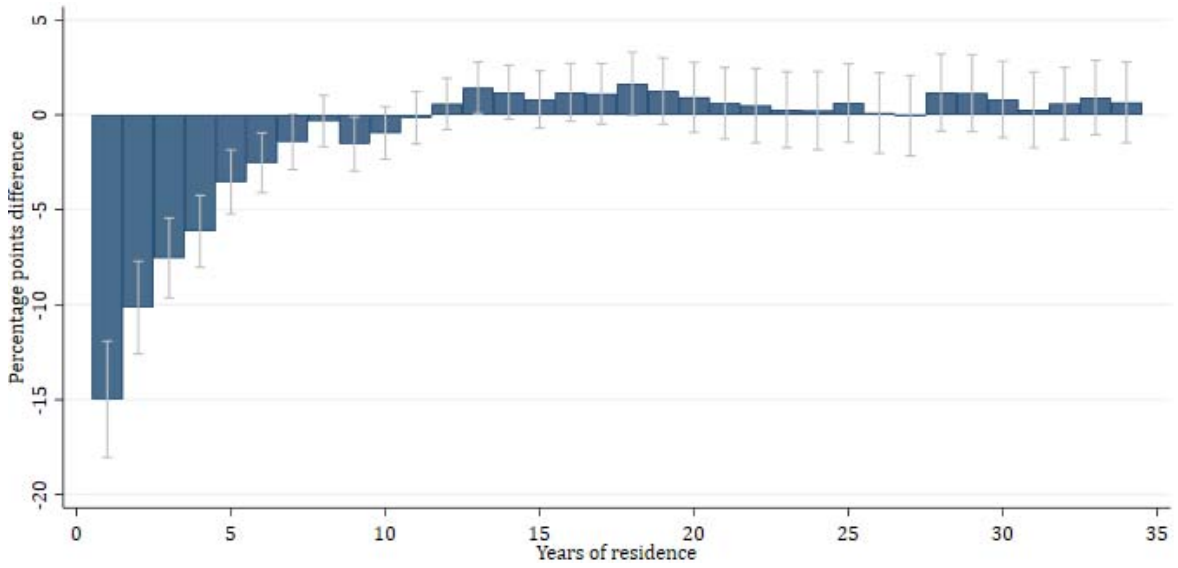


Figure 3. Stock Market Participation of Foreigners across Duration of Stay

The figure shows the proportion of foreigners holding at least one stock, broken down across the length of time the foreigners have resided in Denmark. Confidence intervals are not shown since the figures are not estimated from a sample but represent actual values calculated from the full population.

