Who is internationally diversified? Evidence from 296 401(k) plans

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Abstract:

We examine the international equity allocations of 3.8 million individuals in 296 401(k) plans over the 2005-2011 period. We find enormous cross-individual variation, ranging from zero to over 75%, and strong cohort effects, with younger cohorts investing more internationally than older ones, and each cohort investing more internationally over time. Access to financial advice, lower fees and more international fund options are associated with higher international allocations, suggesting a role for plan design and policy. Education, financial literacy and the fraction of foreign-born population in the zip code also have positive effects on international diversification, consistent with familiarity and information stories.

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Introduction

The proportion of domestic stocks in most investors' equity portfolios well exceeds their country's relative market capitalization in the world, making investors forego substantial diversification benefits. This home bias phenomenon remains one of international finance's major puzzles. An ever-growing number of studies investigate the determinants of home bias from both rational and behavioral perspectives (see Sercu and Vanpee, 2012, for a survey).

The country-level international under-diversification documented in the literature masks much individual heterogeneity. Table 1 shows statistics for the international equity allocation (as a percentage of the total equity allocation) of 3.8 million U.S. individuals in 296 different 401(k) accounts, over the 2005 – 2011 period. We stratified the data into older people (born in 1960 or earlier) and younger people (born in 1980 or later), and contrast average international allocations for either the 5 most diversified firms relative to the 5 least diversified firms, or the most diversified state (Iowa) relative to the least diversified state (Nevada). Irrespective of the salary group (we considered three groups), people in Iowa have about 5 to 10% higher international allocations than people in Nevada; the difference for diversified versus non-diversified firms is larger still, at 20-30%. Moreover, older people are consistently less internationally "diversified" than younger people.

Our analysis of this cross-individual dispersion provides a unique perspective relative to the related international finance literature, which has primarily used cross-country data on asset holdings to uncover various determinants behind home bias. Research has documented both host and destination (target) country factors behind these biases, but the focus has been mostly on destination country factors, such as corporate governance issues, stock market development and investment restrictions.[1] To identify these destination country factors, studies then focus on the related problem of foreign investment bias, examining to what degree home biased countries under-invest in various countries. Particularly popular are explanations based on information barriers (Ahearne, Griever and Warnock, 2004; Brennan and Cao, 1997; Van Nieuwerburgh and Veldkamp, 2009) and familiarity biases (Portes and Rey, 2005).

For comparison, Bekaert, Siegel and Wang (2013) document the cross-country dispersion in home bias relative to a CAPM (relative market capitalization) benchmark for 35 countries, normalized to be between 0 (no home bias) and 1 (all equity holdings in domestic stocks). The least home-biased developed country is the Netherlands with a

[1] The determinants proposed by those studies include transaction costs (Glassman and Riddick, 2001), real exchange rate risks (Fidora, Fratzscher and Thimann, 2007), information barriers (Ahearne, Griever and Warnock, 2004), corporate governance issues (Dahlquist, Pinkowitz, Stulz and Williamson, 2003; Kho, Stulz and Warnock, 2009), stock market development (Chan, Covrig and Ng, 2005), the need to hedge local consumption streams (Aviat and Coerdacier, 2007), investment restrictions (Bekaert, Siegel, Wang, 2013) and lack of familiarity (Portes and Rey, 2005), to name a few.

home bias over the 2001-2009 period of only 34.7%; while Spain, the worst, has a home bias of 87.5%. It is straightforward to convert the numbers of Table 1 into relative home bias numbers (we divide by the fraction of world market capitalization accounted for by non-US markets, which is 64.4%, and subtract that ratio from 1). For a "1960" cohort person with median salary at a poorly diversified firm normalized home bias is 92.45%; whereas it is only 43.63% for a "1980" cohort person at a relatively well diversified firm, indicating that the cross-individual dispersion of home bias within the US is of the same order of magnitude as the cross-country dispersion in home bias.

Understanding this cross-individual dispersion may have profound implications for the international diversification literature. First, pure destination country factors, such as various investment restrictions in different countries or corporate governance problems, which are difficult to measure to begin with, cannot explain the cross-individual variation in international diversification for US individuals. Second, the cross-individual dispersion suggest that individual heterogeneity in preferences or background risk may play a large role in driving international under diversification and may be more important than the "cost" of international investing or international risk factors such as transaction costs and real exchange rate risk.[2] Personal characteristics such as age, salary and wealth may play a role. Familiarity bias (Huberman, 2001) or informational asymmetry between local and non-local investors (Coval and Moskowitz, 1999) also have implications for the incidence of "international" home bias for individuals in different locations within the US (e.g. based on the number of foreign born people in a region), or working for different firms (international versus domestic firms).[3] Finally, cross-country studies miss a set of potentially very important determinants of home bias, which may be policy relevant, such as education levels or the quality of the 401(k) investment options available to the individual.

Each individual in our sample can be characterized by personal characteristics, the area where she lives, captured by the zip code, and the firm she works for. We therefore proceed in three steps. We first analyze the importance of personal characteristics like age, cohort, salary, and wealth indicators, as well as access to financial advice. From these regressions, we identify zip code and firm fixed effects, and analyze these separately. Fortunately, several of the firms in our sample are large firms with multiple branches in different locations; in some cases spread out over the whole country. This enables us to meaningfully differentiate location from firm effects.

One key fact emerging from the data is that there is an upward trend in the extent of international diversification. We show that part of this, but only a small part, is the potentially rational response to the slowly decreasing importance of the US market in the

[2] There may of course be variation in the quantity, quality and diversity of the foreign investment options in different 401(k) plans and we explicitly examine their effect in Section V.

[3] See Brown et al. 2015 for an application of the information advantage story to the local tilt of the equity portfolios of state pension plans.

world equity markets. We also find negative age and positive cohort effects. As is well-known (see Ameriks and Zeldes, 2004), time, age and cohort effects cannot be separately identified. We argue that the most plausible characterization of the data is a strongly positive cohort effect coupled with a pure time effect, as opposed to assuming that investors decrease their international allocations as they age and that this decrease is counteracted by an overall trend towards more diversification. The cohort effect is partially responsible for the trend towards more international diversification over time. In addition, each cohort invests more internationally each year, which delivers the strong upward trend in international diversification (see Figure 5). The trend and cohort effects are consistent with the ongoing globalization process making people more comfortable with foreign investments over time.

As alternative explanations for the cohort effects, we also analyze the role of past return experiences by investigating various return sensitive variables, such as the Malmendier and Nagel (2011) stock market experience effect, adapted to the international investment setting by substituting the stock market return with the foreign minus the U.S. equity return, or the foreign return alone (return chasing), based on the idea that people having experienced higher relative or absolute international returns might be more likely to invest internationally. Similarly, we explore the effect of investors' inertia by checking whether the cumulative returns of foreign vs. US equities experienced by the individual between different dates explain the degree of international allocations. And finally, we consider the role of periods of stress in the markets as possibly inducing investors to become more home-biased. The analysis is reported in Section II and we conclude that a simple cohort effect best explains the data.

Among the individuals' personal characteristics, we find higher salaries and higher house values (measured by the median house value in the zip code where the individual resides) are associated with higher international allocations, while higher account balances are associated with lower international allocations, albeit only the salary effect is economically meaningful. These results are obtained after controlling for trends, the cohort-birth year, the international diversification benchmark, and the percent of the portfolio invested in target date funds (TDFs).

On the contrary, a very important and sizable variable correlated to the degree of international diversification is access to financial advice. About 11% of the individuals in our sample sign an investor agreement to receive online advice from Financial Engines, and approximately one third of them access the advice website regularly. Individuals who signed up for advice have international allocations that are 5.304 percentage points higher than those who never signed up, and 2.246 percentage points higher than those who signed up, but have not accessed the website recently. Interactions of access to advice with the demographics indicate that advice is more strongly associated with higher international allocations for older cohorts, the cohorts that based on our results would

otherwise invest less in international stocks. Similarly, all else equal, advice is associated with higher international allocations for individuals with lower account balances.
Additional demographic characteristics are captured in the zip code and the firm fixed effect analysis. In studying the zip code effects, we find that higher education levels are associated with significantly higher international equity allocations, both statistically and economically, and that the same is true for financial literacy. For example, shifting the proportion of people with a bachelor's degree or higher in the zip code from the 5th to the 95th percentile of the distribution in the sample generates a 1.54 percentage points increase in international allocations. Similarly, going from poor to high financial literacy amounts to a 1.62 percentage point increase in international diversification over and above the effect of education. We also find evidence potentially consistent with the familiarity hypothesis. Zip codes with a higher percent of the population born in foreign countries have higher international allocations, even controlling for the average (median) house value per zip code, and for state GDP growth and levels, although the increase over the 90% range in this variable is more modest, equaling 0.75%. Also consistent with the familiarity or information hypotheses, is our finding that more export-oriented states feature higher international allocations.

A firm's culture or the firm's activities may make their employees more familiar and comfortable with investing internationally. For this reason, we attempt to measure how "international" a firm is, either directly or indirectly. We control for whether the company is public, the country of incorporation of the parent, and the presence of foreign subsidiaries. We also control for firm size, leverage, profitability and sales and investment over assets. The firm fixed effects reveal that employees of profitable firms invest less and employees in private firms and in firms with foreign subsidiaries invest more in international equity.

Finally, one important dimension through which the firm affects the international allocations of its workers is through training sessions, social interactions, the investment options available, their quality and fees, and their evolution over time. To control for these features we re-run our baseline specification adding fixed effects based on the quarter the individual joined the firm interacted with the firm's identity and further interacted with the quarter-year of observation. The results indicate that most effects remain robust across specifications but the, cohort effect is halved. Further analysis controls directly for the fraction of international funds among the equity funds offered by the plan, the expense ratios relative to the domestic equity funds in the plan, the relative turnover, and fund age, the expense ratios of the international funds in the plan compared to all the funds in their same category, the difference between historical alphas of international versus domestic equity funds in the plan, and total plan size.[4] The results indicate a significant association between international diversification and plan features.

[4] We obtained these detailed data for all the plans offered by the firms in our sample for 2012 only.

For example, shifting the fraction of international funds by the 90% range of this variable, from 10.5% to 33.3%, is associated with an increase in international allocations between 4.85 and 5.19 percentage points, depending on the specification. In addition, improving expense ratios from the 95th percentile to the 5th percentiles is associated with 2.86 percentage point higher international allocations. To the extent that plan features are determined by the employers and are not exclusively the result of the employees' demands, the findings above indicate that improving the quality of the international investment options offered by 401(k) plans in terms of number of funds available and their fees, will generate more investment in international equity.

Hitherto, the large majority of the home bias studies are based on aggregate statistics, whereas an individualized perspective on home bias is largely limited to the studies on Swedish households by Calvet et al. (2007), Karlsson and Norden (2007) and Norden (2010). Calvet et al. (2007) do not specifically focus on international diversification, but the article mentions that Swedish households are relatively well diversified internationally because popular Swedish mutual funds have a high international allocation. Karlsson and Norden use a sample of 9,415 Swedish individuals for the year 2000 to study the likelihood of home bias, finding that wealth affects it negatively and age positively. Norden (2010) shows that under-diversified people are worse off than people who are well diversified internationally, but the advantage of the latter is diminished by their proclivity to excessively churn their portfolio. Graham, Harvey, and Huang (2009) use a UBS survey on 1,000 investors, to demonstrate that investors who feel competent trade more often and have more internationally diversified portfolios.

The remainder of the article is organized as follows. Section I describes the data and some summary statistics. Section II investigates the effect of personal characteristics and time effects on international diversification, whereas Section III focuses on geography, and section IV on firm effects. Section V investigates the effect of plan quality and menu design on the international diversification, while Section VI reports a number of robustness checks, aimed primarily at showing that the account variation we rely on mostly reflects portfolio variation at the individual level. Section VII concludes.

I. International Diversification at the Individual level

Data description

To implement this study we use a large proprietary dataset made available by Financial Engines, the largest independent registered investment advisor, with an emphasis on providing advice and investment management through 401(k) plans. The dataset includes record-keeper information on demographic characteristics, balances, salary, 401(k) contributions, household zip codes and the "style" of the asset allocation (see Sharpe, 1992) split up over 5 asset classes and company stock. The underlying style analysis

applied to the funds in each plan uses 15 asset classes. Style analysis finds asset class weights such that the residual return (the difference between the actual fund return and the style return) has minimal variance, with the weights adding up to 1 and constrained to be non-negative. Priors based on each fund's investment objectives and the use of all available data with exponentially declining weights help reduce estimation noise. One of the aggregated asset classes is "International Stocks" and its underlying style analysis model uses indices on European, Pacific and Emerging stock markets. We have data on 3.8 million individuals. Data are drawn every quarter, with a given individual being sampled approximately every 6 months. For a limited number of companies, the data sample starts in 2005, but the sample becomes much more complete during the second half of 2006 and runs till the end of 2011. In addition, we have detailed information on the plan investment options for a more recent subperiod, and on other features of the 401(k) plans, such as plan size, from IRS Form 5500. The final data set combines proprietary data from Financial Engines on asset allocations, contributions and demographics, information on 401(k) plans menus and features, financial information on the companies from CRSP, Compustat and CapitalIQ, and Census and other sources of socio-economic data matched through household zip codes.

An important consideration is whether individuals in our sample receive financial advice, particularly because Financial Engines provides financial advice and asset management services to the firms we have data on. There are two types of advice that are relevant for our purposes. First, under the "managed account" model, Financial Engines simply manages the portfolio on behalf of the client, charging a fee on assets under management. We exclude these individuals as the international allocation in such accounts is high, but set by Financial Engines. Second, Financial Engines also provides online advice, which the client must himself implement. We have information on both when the individual signed the Investor Service Agreement and when he last logged on, and control for this form of advice in our regressions. Finally, our data include separate information on the allocation to target date funds and we control for it in our analysis.

Our sample contains 296 firms. In Appendix Tables 1 and 2 we report some characteristics of the firms and workers in our sample and compare them to the firms in Compustat and the S&P500 Index, and to the population of full-time U.S. workers as reported in the Current Population Survey (CPS). In terms of size, whether we look at assets, sales or numbers of employees, the firms in our sample are substantially larger than the Compustat firms. Average net income and capital expenditures in our firms also exceed that of Compustat firms. For example, the median number of employees is about 4,500 in our sample, whether it is only 950 in the Compustat sample, while the average number of employees per firm is more than 17,000 in our sample and about 7,600 in Compustat. The presence of such large companies means that the employees of one firm may be geographically dispersed across the country. Our firms have higher ROA's but their leverage ratios are similar to those of the companies in Compustat. Average annual

returns are higher in our sample but they are very dispersed because of the crisis occurring in the middle of our sample period. Compared to the firms in the S&P500, the firms in our sample are smaller, with slightly smaller asset size but far fewer employees. Our companies are mostly established companies, with the median age being 65 years and the 90% range varying between 9 and 148 years. Finally, in Panel D we contrast the characteristics of the private and public firms in our sample. The public firms in our sample are larger in terms of assets, sales and number of employees. However, the private firms are not small upstart companies. Their median age is 62 years and the median number of employees is about 2,500. The average plan size is large, roughly USD 1 billion on average, but there are lots of small plans as well, so that the median size is only about USD 300 million.

In Appendix Table 2, we compare worker characteristics in our sample with those of full time workers in the overall population. The workers in our sample tend to have higher salaries with the average and median salaries being around 15 to 20,000$ higher than in the population at large. The average tenure is also about 5 years longer. Finally, the workers in our sample are on average about 4 years older. Salary shows a smooth concave pattern with respect to age, first almost linearly increasing, then flattening out around the 51-55 age group, with salaries starting to decrease for people aged over 60. We also report account values for our sample, which have a very skewed distribution with the mean at $70,000 higher than the average annual salary, but the median value of $25,786 actually lower than the median annual salary. Account values may reflect a mixture of tenure, past salaries and contribution rates. Contribution rates vary between 0 and 17%, and are on average equal to 6%.

Measuring International Diversification

We start with some simple notation. Let $wint_{t,i}$ be the allocation to international equities of individual i at time t and $weq_{t,i}$ her allocation to all equities (domestic and foreign equities). Our main variable of interest is the extent of international equity diversification, $idiv_{t,i} = wint_{t,i}/ weq_{t,i}$. The international home bias literature has used a wide range of measures, including international holdings over GDP (Aviat and Coeurdacier, 2007), or portfolio flows scaled by market capitalizations (Portes and Rey, 2005), but our focus is on portfolio choice, so that the international equity allocation is the natural variable to focus on. A number of articles (Ahearne et al, 2004, for example) have used relative weights, controlling for what the allocation would have to be under, typically, a simple World CAPM benchmark. Such relative weights also partially control for international versus local valuation changes. We use such a CAPM benchmark weight in our empirical analysis but focus on the actual extent of international equity diversification as our main variable of interest. Bekaert et al. (2013) study several biases plaguing standard measures, including size biases arising from the fact that countries with a relatively large

market capitalization are mechanically less likely to be severely home biased on a relative basis than countries with a small market capitalization. However, because we focus on allocations from citizens of one country, we need not worry about such biases.

We would like to also characterize the international allocation to bonds, but we do not have the data, as the bond asset allocation reported in our data set does not distinguish domestic from international bonds (even though the original style analysis performed by FE did have an international bond category). This also makes it natural to scale by equity holdings, not by total holdings.

The focus on equity diversification has two additional advantages. First, by focusing on international allocation among stock market participants, we avoid confusing international non-diversification with stock market non-participation. Second, the focus on equity allocation potentially circumvents issues raised by optimal asset *location*. A high bond allocation and low equity allocation may reflect optimal asset *location*, given that the effective tax rate on bonds is mostly higher than on equities. Under certain assumptions, the relative equity allocation should be constant across different accounts, even across taxable and tax deferred accounts (Huang, 2008), and therefore the idiv variable can be meaningfully examined even in accounts with relatively low equity allocations. Nevertheless, the robustness section of the paper replicates the baseline results excluding individuals with high bond allocations, finding that the results continue to hold. Another tax issue is that some foreign countries levy withholding taxes on dividends and interest rates, eroding the advantage of holding international assets in the non-taxable account. We also consider a robustness check eliminating investors that may engage in such an asset location strategy focusing on accounts with high bond allocations for people with relatively high salaries and account balances. Again, our main results remain robust.

International Diversification across the US

Insert Figure 1 here: Cross-individual variation in International Diversification

In Panel A of Figure 1 we show a histogram of the international allocations over all of our observations. The average allocation is 17.8%, and 37% of our observations lie between 10 and 25%. In addition, 17% of the allocations are exact zeroes, while 3% of our observations reflect allocations to international equity of over 50%.

The reason the average allocation of 17.8% is usually viewed as "under"-diversification, is that foreign equity markets during our sample period represent on average 64% of world market capitalization (computed using MSCI data; the MSCI index covers approximately 85% of the free float-adjusted market capitalization in each country). We denote the relative importance of foreign equity markets in world markets as $idiv_{t,bm}$. Note that this benchmark is only optimal under the strict assumptions of the CAPM, but we use it here as a reference point for our analysis.

In panel B of Figure 1, we show the histogram for $relidiv_{t,i} = idiv_{t,i} / idiv_{t,bm}$. When relidiv is larger than 1, the individual is over-diversified; if it is 1, the individual invests according to existing relative market capitalizations, while 0 represents full home bias. The statistic is bounded from above by 100 divided by the fraction of the world market capitalization represented by foreign equity markets. This bound is 156%, when evaluated with the average value of the foreign equity market fraction. Looking at Figure 1 (Panel B), we see that only slightly over 2% of the observations are higher than 90%, representing almost full or over-international diversification. Slightly over 47% of the observations show relative diversification less than 25%.

These data are consistent with aggregate data on international diversification. From various editions of the ICI Factbook, we computed a proxy for the proportion of mutual fund holdings in international equity funds to total equity funds. The estimates use the assets under management in "world" equity open-end funds divided by the total of the world and domestic equity categories from Table 3 of the Factbook. This fraction increases from 23.3% in 2006 to 26.0% in 2011. These numbers likely slightly over-estimate the international diversification proportion, as the "world" category also includes global funds, which can invest both internationally and in the US. Overall, these numbers appear consistent with ours.[5]

Insert Figure 2:Geography and International Diversification

Figure 2 shows the international diversification averages for each state. Aggregating at the state level compresses the distribution considerably, but we still clearly see a spread between relatively well–diversified states (Utah, Iowa, Hawaii) with idiv's of over 20%, and poorly diversified states (Alabama, West Virginia, and Nebraska) with idiv's close to 15%.

Insert Figure 3: Firms and International Diversification

In Figure 3, we show the histogram after aggregating idiv and relidiv over firms. One possibility is that the quality and diversity of a firm's 401(k) plan options is the main driver of the observed cross-individual variation in international allocations. For example, Elton, Gruber and Blake (2004) study over 400 plans and find them "inadequate" in 62% of the cases. More generally, if the inter-personal characteristics are not well diversified within a firm, or firm features play a big role in home bias (either through location effects, firm culture, industry, or plan features), then the distribution of international allocations should remain relatively wide, compared to Figure 1. Alternatively, if pure inter-personal characteristics are an important source of cross-individual variation in international allocations, aggregating over individuals in a firm is likely to eliminate much of the cross-sectional variation we observe in Figure 1. Figure 3 reveals that 84.5%

[5] Also, Jonathan Reuter, in a discussion of our work, mentioned a median international allocation, excluding target date fund allocations, of 21.2%, using Brightscope data on 17,913 defined contribution plans.

(69.90%) of average firm (relative) international allocations are in the 10-25% (25-50%) range, a much tighter distribution than in Figure 1. This suggests that personal characteristics may explain much of the observed inter-personal variation in international allocations.

Insert Figure 4: Trends in International Diversification

Finally, Figure 4 focuses on potential time effects in international diversification by graphing quarterly time fixed effects. In Panel A, we simply show time fixed effects in idiv, and they exhibit a marked upward trend, roughly increasing from about 12% to 22% in 2010, before dropping back to 18% in 2011, when European stock markets experienced a downturn following the flare-up of the sovereign debt crisis in August of that year. In Panel B, we graph the same time fixed effects, but super-impose the proportion of world markets accounted for by non-US markets. Clearly, this proportion increased over time as well, moving from about 60 to 65% over the sample period. Thus, when investigating international allocations from the perspective of a simple World CAPM benchmark, international allocations should have increased over time. Alternatively, inertia coupled with different valuation changes for foreign versus domestic markets may also cause individuals to become automatically more diversified over time. In Panel C, we show the time effects in relidiv, which controls for the variation in the international equity market capitalization proportion. The figure shows that there is a trend in international allocations over and above what happens to the underlying market capitalization benchmark. Nevertheless, we always include the benchmark foreign equity proportion as an independent variable in our regressions, and we will also verify whether relative returns in foreign versus domestic equity have a large effect on international allocations.

II. Personal Characteristics and International Diversification

II.1 Trends, Age and Cohorts Effects

Trends

In Figure 4, we noted a marked increase in international diversification over time. We therefore first focus on this time effect. A positive time trend can be due to a pure positive time effect, a positive cohort effect with older cohorts investing less in international stocks, or a negative age effect coupled with a change in the age distribution, or some combination of the above. As is well known (see Ameriks and Zeldes (2004)), these three effects, when modeled as is usual by dummy variables, are co-linear and cannot be separately identified. Yet, if the effects are persistent, identifying them is important for predicting future trends in international diversification. In this section, we explore the time effects in international diversification.

Table 2 reports some summary statistics on the personal characteristics that we refer to throughout this and the next section. Our actual regression results are reported in Table 3.

For each specification, we run three different panel OLS regressions, one with the listed independent variables, one controlling for firm fixed effects, and one controlling for zip code fixed effects (there are close to 30,000 different zip codes represented in our sample). For each regression coefficient, we report OLS t-statistics in square brackets, and indicate statistical significance at the 1, 5 and 10% levels, using the usual 3, 2 and one asterisk(s). In addition, to control for potential correlation among workers of the same firm due to, for example, changes in plan features or economic shocks at the firm level, we also run regressions clustering the standard errors at the firm level. For example, a number of firms introduced automatic enrollment at different points during the sample period and this likely affected the correlation of the investment choices of their workers (see Madrian and Shea, 2001). The clustered standard errors are about 40 times larger than those in alternative specifications with firm or zip code fixed effects. To examine the sources of this increase in the standard errors, we also considered specifications with clustering at the individual level or at the firm-"tenure wave" level, and regressions with firm-year or firm-tenure wave fixed effects. We define a tenure wave as the group of people starting work at a firm in the same quarter-year, as they may receive similar information regarding the 401(k) plans, face similar investment options and return environments, and may even have personal contacts through investment information sessions that may influence their investment decisions (Duflo et al., 2006). The firm clustered standard errors deliver the largest standard errors among all these specifications. The main sources of these increased errors are the correlation of an individual's allocations over time (see Kezdi, 2004, for a discussion of the potential importance of such correlation), and the correlation between individuals joining the firm at the same time. We indicate significance with clustered standard errors at the 1% level with an underscore and a bold; and significance at the 5 or 10% levels with an underscore only.

An important variable to control for in our regressions, and which may have bearing on the presence of trends, is the use of managed accounts and financial advice. First, as Financial Engines rolled out its managed accounts program, the pool of people in our sample may have changed towards more or less sophisticated people. The former is true if people consciously fail to sign up for managed accounts, thinking they are financially savvy enough to manage their 401(k) assets themselves. This may in turn account for an upward trend in international diversification.[6] Alternatively, people signing up for managed accounts may realize that financial advice should result in better diversified portfolios than what they can achieve without any help from a sophisticated quantitative model. While the percent of people using managed accounts increased over time, we do not find the characteristics of the workers who use managed accounts, and which we drop from our sample, to be meaningfully different from those who do not. Panel C of Appendix Table 2 shows that the two groups are virtually identical in terms of

[6] We thank Jonathan Reuter for pointing out this possibility.

observables such as age, salary and account balance, although people using managed accounts have on average 4 years lower tenure than people who do not, since the introduction of such accounts is a recent phenomenon. Second, around 11% of the individuals in our sample sign up for financial advice and approximately a third of them access it regularly. Because advice is an important determinant of international diversification we dedicate a separate section to it (Section II.3). Third, because TDFs control the international asset allocation within their portfolios, we include a variable representing the percent of a person's account balance that is invested in TDFs. Increased popularity of TDFs may in fact contribute to the increase in international allocations over time. As Table 2 shows, the average TDF allocation is 16.08%, with a number of plans not featuring target date funds at all, and some individuals investing their full balance in target date funds. Note that the major fund families (such as Vanguard and Fidelity) do not vary the international equity fraction over time or with age (it is in fact 30%), so that we do not need to interact this variable with age.

In addition, we control for the fraction of international assets relative to the world market capitalization, the idiv benchmark, a possible source of a trend in international diversification discussed in the previous section. We compute this fraction specifically for each person, based on the time at which the information on the allocations was drawn, and use it as an independent variable in all specifications.

Our first regression in Table 3 simply adds a linear and quadratic trend to these two variables. All four independent variables are highly statistically significant with the coefficients as expected. An additional percentage point invested in TDFs is associated with a 0.08 percentage point higher international allocation. The effect is stable across specifications and highly statistically significant. Similarly, as the importance of the U.S. in the world markets decreases, we observe an increase of the average international equity allocation in our sample, with the effect varying between 0.19 and 0.21 percentage points. The trend coefficients are no longer statistically significant once we cluster the standard errors but imply strong trends upward. We have also estimated a regression with time dummies. While these time dummies are significant using OLS standard errors, many become insignificant when clustered standard errors are used. Moreover, the fitted temporal function generated by the specification with just a quadratic trend and the capitalization benchmark is almost indistinguishable from the temporal function generated by time dummies. We therefore prefer to use the parsimonious but economically equivalent quadratic trend specification.[7]

We analyze a number of possible economic explanations for the trend in international allocations. First, we examine the role of cohort and/or age effects. Second, we examine

[7] We rerun the regressions in Table 3 and in the other Tables in the paper using a Tobit specification to account for the fact that 17% of the observations have zero international equity allocations. The results are robust and a subset of them is reported in Appendix 5.

the return experience effect described in Malmendier and Nagel (2011), return chasing, and simple valuation effects (foreign versus US returns) coupled with inertia.

Age and Cohort Effects

Age and cohort results are reported in Columns (4) to (9) of Table 3, Panel A and in Panel B. The cohort variable starts at 40 (for people born in 1940 or earlier) and ends at 90 (for people born in 1990 or later). Age is measured in years. Given that the age and cohort variables are 99% negatively correlated, Table 3 reports regression results where either the cohort or age variable are added to our baseline "trend" regression, either in linear form (Panel A) or quadratic form (Panel B). We have also run regressions with cohort dummies, although, unless rather coarse cohort dummies (spanning a decade) are used, statistical significance is compromised by using a large number of cohort dummies. In addition, both age and cohort effects are well captured by a mildly quadratic function; the parametric functions have the advantage of being parsimonious; and the adjusted R^2 from specifications with a parametric function is as high as those from specifications with dummies.[8]

The table reveals that the cohort and age effects do not eliminate the trend, but that while the trend coefficients do not survive clustering of the standard errors, the age and cohort effects are always highly statistically significant. We find a positive cohort and a negative age effect. We postulate that the negative age effect is implausible on economic and statistical grounds. First, the age effect cannot really contribute to a general upward trend in international diversification, unless the age distribution has shifted over time towards younger people. We examine the age distribution over time in our sample and find it to be quite stable (results are available upon request). Not surprisingly, the trend term becomes stronger in the age specification, which is reflected in similar quadratic coefficients than in the cohort specification but linear trend terms that are substantially larger. Second, the age effect implies that investors decrease their international allocations as they age and that this decrease is counteracted by an overall trend towards more diversification. This seems unlikely. Moreover, if the global trend does not persist, the graying of the population would imply that home bias, over the long-run, would get worse in the aggregate. To test this directly but informally, we ran a regression of the *change* in idiv for each individual with multiple observations over the full sample onto a constant, the change in the benchmark idiv and the change in the target date fund allocation. A negative age effect would tend to make the constant negative in such a regression. We obtain a highly significant positive constant. Of course, this may simply reflect the overall positive trend, but despite substantial cross-heterogeneity in international diversification, only 26% of the population decreases its international diversification over time. Finally, the quadratic specifications in Panel B continue to yield

[8] We also ran a specification with firm-time fixed effects, where the latter where either at the annual or quarterly level. The key results regarding age and cohort effects are robust to these specifications.

an overall negatively sloped age function, but we never see both coefficients reach significance under clustered standard errors, with the coefficients varying quite a bit across specifications.

A cohort effect is much more plausible, both economically and statistically. We find a cohort coefficient of 0.16-0.17, with rather limited evidence for a quadratic specification. The linear and quadratic functions are almost indistinguishable for most cohorts, with the exception of the youngest cohort where the presence of a quadratic term would somewhat mitigate the increase in international diversification. Because the quadratic coefficient is mostly not significant under clustered standard errors, we proceed with the linear specification. There are a couple of plausible economic explanations for a cohort effect. The simplest one is the ongoing globalization process that is familiarizing particularly the younger generation with global markets and global investments. If this is true, our results are potentially consistent with one of the most common findings in the international literature regarding the effect of familiarity on home bias. We come back to this hypothesis when we investigate zip code effects. The potential long-run implications are important, as a sticky cohort effect would suggest that home bias will gradually go away. However, the results imply that an individual will increase its international allocation by about 1.6% over a decade, making the aggregate trend implications of the cohort effect rather modest. While the cohort variable explains about 10% of the total variation explained by all independent variables, the average cohort varies too little within our sample period to cause a marked increase in international allocations. The average cohort was (19)62 in 2006 and (19)65 in 2011, implying only a 0.5% aggregate increase in idiv over that time period.

Figure 5 shows the international allocations by (coarse) cohorts, with people born before 1950, people born in the fifties, sixties, seventies, and after 1980. There is a monotonic relation from old (low idiv) to young (high idiv), but all cohorts also increase their international allocation over time. What drives this overall diversification trend is unclear. It may be due to the overall globalization phenomenon making people more comfortable with international investing. The ongoing globalization process may also affect international allocations by making the international opportunity set better over time thereby enticing more international investment.[9]

Insert Figure 5 Cohorts and International Diversification

Return-Sensitive Variables

Another potential reason why cohorts matter is that investment behavior is affected by past return experiences. Malmendier and Nagel (2011) show that recent stock market experiences shape the risk taking and asset allocation of US individuals. To examine this

[9] Section V investigates the effect of plan menus, fund quality and expense ratios on international allocations.

phenomenon, they create a weight function of past returns, depending on a parameter, λ, which can imply quite general weight patterns of past returns since birth. They find λ to be around 1.5, which means recent returns are weighted more heavily than returns in the more distant past. Using SCF data and regressions that include, inter alia, age and time dummies, they show that this experience variable has a positive effect on stock market participation, risk tolerance and the proportion of risky assets held.

For our purposes, the relevant return is not the US stock market return, but the difference between the foreign return and the US return. People having experienced first – hand poor international returns relative to the experience in the US stock market (for example, the roaring '90s) may be more reluctant to invest abroad and vice versa. We use the return on the MSCI international index (excluding the US) minus the US return, measured in dollars. The "MN experienced return" then becomes in essence a complex interaction of age, time effects, and past relative returns. We estimate λ together with the coefficient on the MN variable using non-linear least squares. We run a number of preliminary regressions with fixed λ, using a relatively fine grid, and start the estimation at a λ that optimizes the R^2 of the regression. We find the optimal λ to be 3.999 (see Table 4). This is substantially higher than the estimate in Malmendier and Nagel (2011) for the US stock market, but still implies declining weights for relative returns. Because we only have international data since 1969 and there were virtually no international investments before 1980, a declining weight function seems the only plausible economic outcome. We find that the MN effect is statistically significant and it even remains so when clustered standard errors are used. However, the coefficient is negative, not positive, which is not consistent with the experience effect documented in Malmendier and Nagel. To help interpret this finding, Figure 6 graphs the Malmendier–Nagel experienced return variable as a function of age for different points in time. Interestingly, the functions are mostly positive and decreasing with age; that is, younger people experienced more positive relative foreign returns, which may help explain the cohort effect we documented above. However, this effect is non-linear and depending on the year, from age 40 to 50 the effect becomes quite small (and even negative for the 2005 and 2006 years, perhaps reflecting the experience of the nineties when the US stock market performed very well). For lower λ's, we do find sometimes positive coefficients, but they are mostly not statistically significant. On the contrary, the linear cohort effect remains highly statistically significant and becomes larger. Note that the MN and the cohort variable are 67% correlated: for this reason, we also run a specification with the MN variable but excluding the cohort variable. In this specification, λ is estimated to be slightly above 1.0, but the MN variable still features a negative coefficient (results are available on request). Regressions replacing cohort by age effects yield results similar to those reported in Table 4. Given these results, the pure cohort variable appears an easier to interpret and more robust determinant of variation in international allocations.

We also examined an alternative specification of the MN variable, simply using the foreign return, rather than the foreign return minus the US return. In fact, the idea of investors "chasing returns" in international markets is a standard one in the capital flow literature, going back to at least Bohn and Tesar (1996). When we run the non-linear least squares model with this variant, we find that λ is equal to 1.00, and the MN variable has a positive and statistically significant effect on international allocations (see Table 4). That is, people having experienced higher foreign returns allocate more internationally. However, the coefficient is no longer significant with clustered standard errors, while the cohort effect remains robust.

An alternative explanation of the time variation in international diversification is that people exhibit inertia: they select an international allocation, perhaps when joining the firm, and never or rarely change it. If that is the case, the time variation in idiv should be partly explained by relative cumulative returns (foreign versus US) between the different records of account balances. We compute these individualized cumulative returns using daily MSCI returns.[10] Column (3) of Table 4 shows that this variable has the wrong negative sign and is not statistically significant under clustered standard errors. The introduction of firm or zip code fixed effects in columns (4) and (5) does not change these conclusions. Note that the regression still includes the benchmark idiv variable, which remains highly statistically significant and also partially reflects valuation changes. When we exclude this variable, the sign of the coefficient on the relative return duly becomes positive, but it is not significant under clustered standard errors.

Finally, it is often suggested that in times of stock market crashes, investors become more risk averse and become at the same time more home – biased. To test this conjecture we rely on the indicator proposed in Baele et al. (2013), who use data on bond and stock returns to measure the occurrence of stress periods in which stock markets decline and liquid benchmark bonds increase in value. When we include as an explanatory variable in the regression the monthly incidence of these "Flights to Safety" days they identify for the US, we find that the coefficient on this variable is indeed negative and highly statistically significant in the simple OLS regression and the zip code fixed effect regression, but that it switches sign for the firm fixed effect regression and is not significant with clustered standard errors.

Given the non-robust, hard to interpret, and/or insignificant results we find, we do not use any of the return sensitive variables in the benchmark specification that we take forward.

II.2. The Effects of Income and Wealth

We now address whether income and wealth have an effect on international diversification. We have data on salary and account balances. We also have data on

[10] Notice that using daily MSCI returns to impute individual returns is a noisy measure because of contributions.

tenure at the firm, but these data are less complete, and we decided not to use them in the main specification because of their correlation with cohorts on the one hand, and the fact that account values may also largely reflect a combination of tenure and salary on the other hand. We also collected the median house value at the zip code level from Zillow, which is, for many households, perhaps the best indicator of overall wealth. We express all these variables in 2005 dollars using the CPI to deflate. Note that Zillow only covers a subset of the zip codes in our sample, so that the sample size is significantly smaller than the one used in Table 3.

As Table 2 shows, the distributions of salary, account values and house values are all right skewed and we therefore take natural logarithms before using them as independent variables. We consider both linear and quadratic specifications. The quadric term for house value is not statistically significant, but the quadratic terms for salary and account balances are and they are therefore kept in our final specification reported in Table 5. We report again the usual three specifications, but when zip code fixed effects are used, we must drop the house value as an independent variable because the cross-sectional variation dominates the time-series variation in house values in our sample. Note that most of our benchmark variables (% in TDF, international diversification benchmark, and cohort) maintain their sign and significance, with the coefficients on the TDF and cohort variables becoming slightly smaller, while the coefficient on the diversification benchmark increasing substantially.

The coefficients on salary, account balances and house values are mostly statistically significant, even under clustered standard errors. The effect of house value on international diversification is positive. To get a sense of the economic magnitude, an increase in house value of $50,000 at the $200,000 average house value, would generate roughly a 0.17% increase in idiv (the derivative with respect to house values for these magnitudes is the coefficient divided by 4). At the $58,000 average salary, an increase of $10,000 in salary would roughly generate a 69 bp increase in the international allocation coefficient (82 bp at the median salary of $47,625). For account balances, the negative quadratic effect makes international allocations a negative function of account balances. For the average account balance of $64,000, a $5000 increase would generate only a 8 bp drop in international diversification (18 bp at the median account value of $23,434). Finally, note that account balances and salary are positively correlated, so that their joint effect may be somewhat smaller than the univariate effects.

Because we lose many observations with the Zillow database, we consider an alternative data source for house values, namely the Census-Bureau/American Community Survey. This survey provides the median house value per zip code over the 2008-2012 period. Hence, there is no panel available as with the Zillow database. Moreover, median house values over USD 1 million are reported as +1,000,000. Since this only affects 158 zip codes we set them simply to 1,000,000. Our results, reported in columns (4) and (5) of

Table 5, are very robust to using this variable instead of the Zillow database house value. The coefficients on account values and salaries are very close to those reported in the previous columns and the coefficient on house value now becomes somewhat higher at 0.84 with firm fixed effects, and 0.98 without, while retaining statistical significance.

We conclude that differences in house values and account balances only generate economically small effects on international allocations, while we do detect more sizable salary effects.

Finally, a major potential source of heterogeneity in asset allocations is variation in risk aversion across individual investors. There is, however, not an obvious link between risk aversion and the optimal allocation to international assets in a portfolio. Under the CAPM benchmark, with a risk free asset, optimality simply suggests holding the market portfolio and our benchmark idiv is the optimal international equity portfolio. In a 401(k) context, where shorting and leveraging is not possible, the risky frontier may have different international allocations for people with different risk tolerances. For example, high beta foreign investments (such as, currently, emerging markets) may be more prevalent in portfolios of more risk tolerant investors. Therefore, individual- and zip code-level demographics might also capture variation in risk attitudes across individuals. Finally, it is also possible that person-specific characteristics, experience or behavioral biases account for the differences in investment behavior (Cesarini et al., 2009, Campbell et al., 2013, Korniotis and Kumar, 2013).

II.3 Access to Online Advice

In this section we examine the effect of signing up for financial advice on international allocations. The proportion of individuals in our sample that sign an investor agreement to receive online advice from Financial Engines is 11.27%. This proportion varies across firms, ranging from 0% to 55.1%, and it also varies over time, ranging between 7% and 10%.[11]

Panel A of Table 6 compares the characteristics of the employees who signed up for online advice with FE to those who did not. Online advice employees have similar age, around 45 years old, to those who do not sign up for advice, but have significantly higher salary, $73,095 vs. $56,420, and account values, $124,977 vs. $58,735. Interestingly, they are also less likely to invest in Target Date Funds, having 7.74% of their portfolios in such funds vs. 16.83% for the non-advice employees.

For those who signed up for financial advice, we also have information on the date of the last login onto the online advice website. Based on this, each time we observe an individual, we flag those whose last login is within a year as receiving non-stale advice. Among the individuals who signed up for advice, the advice is accessed within the past

[11] Over the sample period, Financial Engines' recommendations increased from roughly 20% to 40% in international equities, as a fraction of total equity exposure."

year on average 36.3% of the times. Summary statistics comparing those who have accessed the website within the past year and those who have accessed it more than a year before the observation date indicate that the two groups are quite similar in terms of age, salary, account values, and reliance on TDFs (results available upon request).[12]

Regressions in Panel B of Table 6 replicate columns (2) and (3) of Table 5 controlling for whether the individual has signed up for and has recently accessed online advice. Column (1) indicates that, all else equal, individuals who signed up for advice have international allocations that are 4.27 percentage points higher than those who do not. This result is further confirmed in column (2) where we add a control for how recent the advice is: someone who accessed the online advice website within the past year has all else equal international allocations that are 5.304 percentage points higher than those who have not signed up for advice and 2.246 percentage points higher than those who signed up, but have not accessed the website recently. The regressions contain controls for firm fixed effects, and clustering of the standard errors at the firm level. The effects of advice are similar in economic magnitude and significance when we control for zip code fixed effects instead (columns (3) and (4)).[13] Notice that we cannot tell from our data whether this different investing behavior is due to people accessing online advice being different from otherwise similar people who do not, or to a direct effect of advice on international allocations.

Controlling for financial advice slightly decreases the trend effect in the firm fixed effects regressions and leaves it essentially unchanged in the regressions with zip code fixed effects. The cohort coefficient is unchanged, with younger cohorts enjoying on average 13.4 to 14.2 basis points higher international equity allocations. Similarly, the significance and economic magnitude of the coefficients on the other variables is unchanged: a percentage point higher allocation to TDFs all else equal is associated with a 5.6 to 6.7 basis points higher international allocations, the growing importance of international markets in terms of capitalization generates a 32 basis points higher allocation per percent increase in capitalization, and the effect of salary, account values and house values is similar to that reported in Table 5.

Finally, columns (5) and (6) examine the interactions between signing up for online advice and demographic variables. The coefficients indicate that signing up for advice is all else equal more strongly associated with higher international allocations for older cohorts, the cohorts that based on the findings in Table 5 and the current table would

[12] Notice that this is a very coarse measure of advice as it flags as receiving advice those who have logged on to the Online Advice website, without measuring whether they actually took advice, how long they stayed on the website, and which type of information they perused. Thus, the advice dummy coefficient measures the average correlation with international allocations across different intensities of advice. The comparison of the coefficients of stale vs. non-stale online advice suggests that a more precise measure of the degree of advice might generate a bigger effect.

[13] Unreported results indicate that the effect of online advice and its recency are similar in regressions that do not include firm or zip code fixed effects.

otherwise invest less. This effect is statistically significant even after clustering the standard errors at the firm level. Similarly, among those who sign up for advice, all else equal advice is associated with increasing international allocations for individuals with lower account values. To the extent that older cohorts have higher account balances, these two effects may partially counteract each other.

We also rerun the regressions in Tables 3, 4, and 5 dropping those individuals who sign up for advice at some point and the results are robust (available upon request).

Given the importance of the advice variables and their interactions with the demographics, we include them in the baseline specification that we use in the following sections.

III. The Geography of Home Bias

While personal characteristics and advice explain about 5.5% of the variation in international allocations (not reported), adding zip code fixed effects increases the adjusted R^2 to well over 9% (see column (3) of Table 6 Panel B). To examine what these location effects reflect, we re-run our benchmark specification, including the salary, account balance, advice variables, and their interactions, but excluding the house value variable, and extract the zip code fixed effects. We then run simple OLS regressions of these zip code effects onto a number of "locational" variables at either the zip code or the state level. Our independent variables can be grouped into three broad themes: wealth, education, and familiarity/information. The first two are really personal characteristics that we can only measure at the zip code level. First, we include the zip code median house value in the regression. Because it substantially reduces our sample size (we only have house values for 12,446 zip codes), we typically run our specifications with and without this variable. Second, it is quite conceivable that education is correlated with financial savvy and perhaps also helps to alleviate any undue apprehension about foreign investments (Lusardi and Mitchell, 2007). Fortunately, we have the percentage of the population over 25 years old in each zip code with a high school degree or higher, with a bachelor's degree or higher; or with a master's degree or higher. The summary statistics in Table 7, Panel A, reveal that educational attainment displays substantial variation across zip codes. The 5%-95% range of the distribution is 36.7%-81.9% for a high school degree, 0%-32.5% for a college degree, and 0%-24.00% for a master's degree or higher. We also create a financial literacy variable by computing the average performance on the 5 financial knowledge questions in the National Financial Capability survey. These data are available only at the state level.

Finally, most of our other variables can be related to the familiarity/information hypothesis. The first set concerns the percent of the zip code population that is foreign born, for which we do not only have the total, but also the split over Latin America,

Europe, Asia and the rest of the world. If familiarity plays a large role in international allocations, it is conceivable that the presence of immigrants in a particular area directly or indirectly increases familiarity with foreign culture, products and securities. These variables also display substantial variation across zip codes, with the 90% range of total foreign-born population varying between 0% and 26%. Also, in the international literature, it is common to use distance from foreign markets as a control variable. Such a measure requires knowing the relevant destination countries for most US investments. Given the well-documented international foreign investment biases towards nearby countries, we compute the distance to Toronto and to Mexico; in addition, we compute the distances to London and Tokyo, the financial centers of the two largest investable equity markets outside the US. Our next variable measures whether the employee is living in a metropolitan area, a large rural area, a small rural area or an isolated area, using data from Rural Urban Commuting Area codes (RUCA). It is conceivable that an urban environment enhances familiarity with foreign "things". For the purposes of the summary statistics, we simply coded the variable as going from 1 (metropolitan area) to 4 (isolated), but we use separate dummies in the regression analysis.

Our last set of variables is at the state level. Familiarity relative to the foreign world can be enhanced by the work environment, for example through work for a company that has a lot of business with foreign countries. We therefore also include two measures of "trade openness," the sum of imports and exports at the state level divided by state GDP, and the level of exports divided by state GDP, expressed in percent. Because the data on imports are less complete than those on exports, most of our analysis uses the export variable. Again, there is plenty of cross-state variation in these variables, with the 5th percentile of the distribution of state openness being 8.7% and the 95th percentile being 38.6%. Note that there is a large literature in international finance, starting with Obstfeld and Rogoff (2000) that links home bias in goods to home bias in assets through equilibrium models with transaction costs. However, Van Wincoop and Warnock (2010) show that such a link is empirically rather unlikely. Instead, our motivation to include these variables rests on a familiarity argument. Finally, a more direct measure of potential information flow would be the logarithm of the number of international phone minutes per year per state. Unfortunately these data are not available, and we use long-distance minutes as a proxy.[14] To measure economic well–being, we include in the analysis GDP per capita and cumulative GDP growth over the five-year period preceding our sample, and over the 2006-2011 period. These variables help mitigate concerns that any positive effect of the foreign born population on international diversification is due to reverse causality: richer areas or areas that are doing well economically are better diversified, and at the same time attract more foreign immigrants.

[14]The data are gathered from the FCC Statistical Trends in Telephony report, see Bekaert et al. (2014), for more details. The data are spliced with data on inter-state mobile phone minutes.

Before we consider the regressions results, it is worth repeating that in our data set location effects need not be highly correlated with firm effects. While it is true that many employees live close to the place where they work, our sample contains multiple firms with a multitude of branches that are quite spread out geographically.

Table 7, Panel B, reports the regression coefficients for zip code effects extracted from a regression that includes our baseline specification (target date fund, benchmark idiv, trends, and cohort), plus the salary, account balance, advice variables and their interactions. We verified that the results are robust to using zip code fixed effects derived from a regression with only the baseline variables, which has slightly more observations. The table reports 6 different specifications, but three of those simply add the house value variable to an equivalent specification without the house value variable, which has many more observations. The first two specifications use coarse indicators of education (% bachelor's degree or higher), immigration (total percent born abroad), and distance (total distance). The third and fourth specifications are more granular with respect to education (high school, college, higher degree), the origin of the foreign born population, and the distance variable. In the 5th specification we replace the Zillow house values by the ones drawn from the Census, increasing the number of observations considerably. Finally, in the last specification, we take the specification of column (4) and replace the ratio of state exports to GDP with state openness.

The key results can be easily summarized. First, we find a highly significant effect of education levels on international allocations. A 1% increase in the percentage of people in the zip code who hold a bachelor's degree or higher is associated with a 0.047 percentage points higher international diversification in the zip code. The effects are even higher if we separately look at the people with high school, bachelor's and advanced degrees. To get a sense of the economic variation the coefficients imply, we evaluate the regression coefficients at the 90% range of the distribution reported in Panel A of Table 7. We use the coefficients from the base specification in column (3) without the house values, but note that the coefficients are similar in the specifications with house values (columns (2) and (4)-(6)). For a high school degree, the international allocation is predicted to change over this range by about 1.44 percentage points (.0318*(81.9-36.7)), for a college degree by about 2.06 percentage points (.0634*32.5), and for a higher degree by about 1.52 basis points (0.0633*24.0). We also examine financial literacy directly, and this variable has a coefficient varying between 2.36 and 4.39, significant at the 1% level across all specifications. The financial literacy variable reflects the average score on 5 financial knowledge questions so that the large coefficient implies a substantial economic effect of financial literacy. Even considering a 90% range of only 0.4, going from poor to high financial literacy amounts to an increase in international diversification that varies between 0.94 and 1.75 percentage points depending on the specification. We should also note that general education is already controlled for, so

that improving financial literacy per se has the potential to greatly increase international diversification outcomes.

Second, we observe a substantial "foreign born" effect with a coefficient around 0.03, statistically significant at the 1% level in all specifications. Economically, in this case, given that the foreign population varies between 0% and 26%, the 90% range would be a 0.75% effect. When we look at the origin of the immigration, we find that the variables are statistically significant for Latin American and European origin, but less consistently so for Asian origin. The strongest effect comes from the European origin, with a coefficient of 0.099.

Third, overall distance has the expected negative effect on international diversification, but the effect is only statistically significant at the 10% level and loses significance once house values are included in the regression. When we split this variable up in its components it appears that the distance variables have the expected negative sign in the larger sample when house values are not included in the regression and switch sign when they are. The exception is the distance from Toronto for which the opposite is true. The coefficients in Column (5), which include house values from the Census and thus come from a larger sample, are consistent with those from the large sample and no house value controls reported in Column (3). For long distance minutes, we find an unexpected negative effect for the large sample, but a positive effect when we control for the Zillow house prices. Going from 42 to 57 long distance hours (the 90% range) is associated with an increase of 56 basis points in international diversification. Finally, we find a lower international diversification in both urban and larger rural areas (versus isolated areas as the benchmark). Further analysis which includes only urban, rural and isolated dummies generates a positive and strongly statistically significant coefficient for the urban dummy, indicating that the reason for the difference is due to other controls, like foreign born, education and financial literacy being strongly correlated with the urban dummy (available upon request).

Fourth, the GDP growth variables have a significant positive effect on international diversification, and more so for lagged growth. On the contrary, GDP per capita at the state level has a robust, albeit economically really small, negative effect on international diversification. Fifth, trade openness generates strong and consistent positive effects on international allocations, both when measured using exports and when measured using both exports and imports for the shorter sample. The 90% range for the exports variable, which is 11.1%, would induce an increase in international diversification varying between 0.98% and 1.58% depending on the specification, while the 90% range for state openness implies an increase in international diversification of about 1.59%.

Finally, Zillow house values have a marginally or no statistically significant effect on zip code variation in international diversification, with wealthier zip codes experiencing higher international allocations, except for the specification in Column (6) where the

coefficient is negative although not statistically significant. In Column (5) we replicate the results in Column (4) using house value data from the 2010 Census, which has much wider coverage, but reflect the average house price over the period 2008-2012 rather than over our sample period, like the Zillow index does. We find that controlling for Census house average prices does not change the magnitude, sign and significance of the coefficients from the regressions without house values, while restricting the sample to the Zillow zip codes substantially changes some of the coefficients on the other variables and quadruples the explanatory power of the regressions.

We conclude that there are relatively strong locational effects in international equity allocations, related to education and financial literacy, immigration, GDP growth and state trade openness.

IV. Firm Characteristics and International Diversification

Firm fixed effects substantially increase the adjusted R^2 in the regressions we have run so far (See Panel B of Table 6). The reason can be twofold. First, the firm people work for affects their familiarity with and attitude toward foreign investments and goods, and the characteristics of their human capital. Second, the quality of the investment options offered and the information about retirement investing provided might vary across firms. In the worst case scenario, a particular plan may not even have an international mutual fund option. Alternatively, the options may be limited and/or have exorbitant fees, making international diversification ultimately not optimal. In this section we analyze the first reason, while we dedicate the next section to the effect of plan menus, the proportion of international funds offered by the company's plans, their fees and quality.

A firm's culture or the firm's activities may make their employees more familiar and comfortable with investing internationally. For this reason, we attempt to measure how "international" a firm is, either directly or indirectly. We collect information from CapitalIQ on the ultimate parent and the country of the ultimate parent (for private and public firms) of the company. Using this information, we can create a dummy that is equal to 1 if the ultimate parent is foreign. About 16% of the firms in our sample have a foreign parent (see the summary statistics in Table 8, Panel A). We also quantify whether the firm has foreign subsidiaries, using information from Orbis. We create a dummy variable that is equal to 1 if the firm has foreign subsidiaries, and we also code a variable that simply equals the fraction of subsidiaries that is foreign. As Table 8, Panel A, shows, 56% of our firms have at least one foreign subsidiary. The cross-firm variation in the fraction of foreign subsidiaries is vast, varying between 0 and 87.3%. A firm's activities may also make it more or less "foreign." We therefore examine the openness, ((imports+exports)/output), of the industry the firm belongs to.

We supplement this information with a number of variables measuring different firm characteristics, most of which do not have clear ex-ante predictions regarding their effect on international diversification. First, we include a dummy variable to indicate whether

the firm is private or publicly traded. Second, we include two measures of size, the logarithm of the assets and the logarithm of the number of employees. We conjecture that employees at public and large firms may be more likely to be familiar with foreign investments, or they may have more elaborate and diverse 401(k) plans with more and better international options. We also use a leverage measure (debt/assets) and sales intensity measure (sales/assets). Third, we include measures of profitability (net income as a percent of assets) and investment intensity (capital expenditures as a percent of assets). Fourth, we include the logarithm of the age of the firm, where the logarithmic transformation is necessary because some firms in our sample are very old. Table 8, Panel A, reports summary statistics on these firm characteristics.

While we have panel data for some of these variables, most of them are very stable over time so we run our analysis on the firm fixed effects, and we simply average the independent variables. Again, we use the baseline specification, which includes target date fund allocation, idiv benchmark, trend variables, cohort variable, salary and wealth variables (account balances and house values), the advice variables and their interactions. We examine 6 different regression specifications. The first regression eliminates the firm characteristics from the analysis, as they halve the size of our sample and only include controls for whether the company and its parent are public or private and the possible foreign location of its headquarters and subsidiaries. We find that individuals employed in private firms have significantly higher international equity allocations (column (1)). Since 33% of the private firms in our sample have a public parent company, which is often foreign, we also control for whether the parent is public or private and for the presence of foreign headquarters. The Table shows that while working for a private firm is associated with 3.9 percentage point higher international allocations, the effect decreases to only 1.68 percentage points when there is a public parent company. The coefficient on the Foreign Headquarters dummy is not significantly different from zero.

In the remaining regressions, we add firm characteristics such as size, age, profitability, etc., in addition to a dummy for whether the firm has foreign subsidiaries. Notice that our sample now loses about 170 firms for which not all the data are available; most of these firms are private firms. The regression in Column (2) indicates that having foreign subsidiaries is associated with 3.59 percentage point higher international allocations and that the effect is statistically significant.[15] Among the other firm characteristics only profitability is significantly correlated with international allocations, with a negative effect amounting to 17 basis points per percent of profitability. One possibility is that workers in profitable firms invest disproportionally in company stock, crowding out international investments. To examine this substitution effect further, we calculated the aggregate allocation to company stock at the firm level. That is, we take the last observation on company allocations per individual in each year and multiply this

[15] Controlling for the fraction of foreign subsidiaries instead than the dummy yields similar results.

allocation by the total account value to obtain a dollar allocation and aggregate this over each firm-year. We then match firm-year aggregate company stock allocations to firm-year profitability, leading to 513 observations for profitability and company stock allocations. We do find a positive but small correlation between the two variables, at 10.9%, which is significant at the 1% level.

In columns (3) and (4) we add other controls aimed at measuring the international nature of the firm the individual works for, namely industry fixed effects and industry openness, respectively. The private and foreign subsidiaries dummies and the profitability measure remain significant, both statistically and economically, while the new variables are not statistically significant, although the industry dummies increase the R^2 substantially. Finally controlling only for firm characteristics and not for ownership or foreign subsidiaries (column (5)), does not change the results.

V. Plan Quality and Menu Design

One important determinant of the degree of international diversification in people's portfolios, and more generally of the allocation to different asset classes, is the availability of international investment options, their quality and fees.

To examine this issue, we take two different approaches. First, we replicate the main results in Tables 3, 5, and 6, controlling for fixed effects based on the quarter the individual joined the firm interacted with the firm's identity and further interacted with the quarter-year of observation. The rationale behind this approach is to control for the host of conditions that a group of workers joining a given firm in the same quarter faces at the time they join and over time (automatic enrollment, training sessions, social interactions, the investment options available, their quality and fees, and their evolution over time …).

Second, for a subsample of more recent data we control directly for the fraction of international funds among the equity funds offered by the plan, the expense ratios relative to the domestic equity funds, the relative turnover, alpha, and fund age, the relative expense ratio of the international funds compared to their peers, and total plan asset size. Note that one quality dimension we do not investigate is the potential heterogeneity in the target date funds offered by the plans. Balduzzi and Reuter (2013) actually find large heterogeneity in performance, asset allocation, market timing, and security selection among target date funds with the same target date across fund families.

Panel A of Table 9 reports the results of including fixed effects based on the quarter the worker joined the firm interacted with the identity of the firm and with the quarter-year of observation. Column (1) replicates Column (4) of Table 3, while the following four columns replicate Columns (2) and (5) of Tables 5 and 6, respectively. The Table shows that the effect of TDFs, the international diversification benchmark and the trend effects are robust across specifications and in most cases only slightly smaller compared to those

obtained previously. The effect of target date funds varies between 3 and 3.4 basis points as opposed to 5.7-6.8 basis points, and it is still strongly statistically significant. The effect of the international diversification benchmark is relatively unchanged. The trend effects are weaker and, as before, not statistically significant once standard errors are clustered. The cohort coefficient is one-third the size it was, dropping from 16 to 5.5 basis points, but it maintains its statistical significance. The fixed effects we introduce appear to capture some of the cohort effect in the data. The substantially lower quadratic coefficients for the salary variable, implies that salary has a substantially weaker effect as in the specifications with firm fixed effects only. However, the quadratic term for account balances is now positive, rendering the account balance effect on international allocations positive. The advice dummy and its recency continue to have a strong and statistically significant effect on international equity allocations, inducing an increase in international allocation of 2.415 percentage point if the advice is stale and 4.05 percentage point if it is not. These effects are slightly smaller than before. Their interaction coefficients with salary, account values, and house values, both from Zillow and the Census, have most of the time the same signs, and similar significance to those reported previously, but smaller magnitude (with the exception of the account value interactions, which are larger). In addition, the R^2 is now above 13% across specifications.

Appendix Table 3 repeats the regressions in Panel A controlling for quarter-year times firm fixed effects, to account for the fact that we do not have tenure information for all individuals, and thus to check the robustness of our results to a larger sample albeit using a coarser type of fixed effects. The results are remarkably similar to those reported in Panel A.

Finally, Panel B repeats the regressions above controlling directly for the fraction and the quality of the international funds offered by the plans, based on the information on a snapshot of the plans offered by the firms in our sample in 2012. As such, it captures the most recent features of the plans, and, to the extent that there is correlation over time, the historical ones.

For each plan, we calculate the ratio of the number of international over domestic equity funds, the ratio of the median expense ratio of international equity funds over the median expense ratio of the domestic ones, similar constructed ratios for turnover and fund age, the expense ratios of the international funds in the plan compared to all the funds in their same category, the difference between historical alphas of international and domestic funds, and total plan size. The last rows of Panel A of Table 8 report the summary statistics for these plan characteristics and show quite a wide variation in terms of the fraction of the equity funds that are international, ranging from 10.5% to 33.3%, relative expense ratios, going from half to more than double those of the domestic funds, difference in historical alphas and rank in terms of expense ratios. On average, 20% of the equity funds in the plans in our sample are international, their turnover and age is

similar, albeit slightly lower, than the domestic funds in the same plan, and they have slightly lower historical alphas both in terms of means and medians.[16] As expected, the international funds tend to have higher expense ratios than the domestic ones, with the mean 29.4% higher and the median 12.1% higher.

Panel B indicates that shifting the fraction of international funds over the 90% range of this variable, from 10.5% to 33.3%, increases international allocations by an amount between 4.85 and 5.19 percentage points, depending on the specification. The effect is similar in size to that of having an individual going from no online advice to non-stale online advice and it is statistically significant across specifications. The Table also indicates that if the gap between the median expense ratio of the international and domestic funds in the plan is higher, the international allocations are all else equal lower. Improving expense ratios and going from the 95th percentile to the median, with fees on international funds 12.1% higher than the domestic ones in the plan, is associated with international allocations 1.6 percentage points higher; going all the way to the 5th percentile, with international fees 51.1% lower than those on domestic equity funds, is associated with international allocations that are 2.86 percentage points higher. The effect is significant at the 1% level once we cluster the standard errors. Relative turnover has the expected negative sign, relative fund age and plan size have positive effects, while the difference in historical alphas has an incorrect negative sign but the effect is economically small. However, none of these effects is statistically significant once we cluster the standard errors. Finally, plan quality in terms of the expense ratio of the international funds in the plan compared to the universe of similar international funds has a negative effect, which is significant at the 1% level with clustered standard errors. Panel B also shows that adding such plan features to the regressions does not overall change the magnitude and statistical significance of the other coefficients when compared to Tables 3, 5, and 6.

To the extent that plan features are determined by the employers and are not exclusively the result of the employees' demands, the findings above indicate that improving the quality of the international investment options offered by 401(k) plans in terms of the number of funds available and their fees, should generate more investment in international equity.

Lastly, we add these plan characteristics to the analysis of the firm fixed effects presented in Panel B of Table 8. Columns (6) and (7) show that these variables contribute substantially to explain the fixed effects, as the R^2 increases from 16.5% to 28%. Among the plan features, expense ratios, both relative to the domestic equity funds in the plan and to the universe of similar international funds, are the only ones to be statistically significant and are associated, as expected, with lower international allocations. The other plan features have the expected sign, but are not statistically significant. Moreover,

[16] Alphas are calculated relative to the style analysis with 15 asset classes used by Financial Engines.

adding these plan quality variables to the analysis does not change the magnitude and statistical significance of the foreign subsidiaries dummy and the profitability measure, although the statistical significance of the private firm dummy disappears in the last column.

VI. Robustness Checks

While we have already reported on a number of robustness checks along the way, here we specifically focus on the problem that our data represent one 401(k) account per person, which may not be representative of the full portfolio of the individual.

To investigate this issue, we focus on sub-samples of individuals for whom there is a high chance that their wealth is dominated by their 401(k) account and that this 401(k) account is their only account. Of course, our selection criteria will use variables that are themselves correlated with international diversification. While this is not desirable, it would make finding robust results all the more surprising.

Our first criteria simply use tenure and age, and is based on the fact that relatively old workers with a relatively low tenure at the firm are more likely to already have a 401(k) account from a previous employer, or to have an IRA account. Having examined the joint distribution of age and tenure, our exclusion criteria are as follows:

For workers with tenure between 0 and 3 years, we exclude people of age 36 or older;

For workers with tenure between 4 and 5 years, we exclude people of age 41 or older;

For workers with tenure between 6 and 10 years, we exclude people of age 46 or older;

For workers with tenure between 11 and 15 years, we exclude people of age 51 or older;

For workers with tenure between 16 and 20 years, we exclude people of age 56 or older.

In the baseline specification, this sample still has more than 9 million observations. We also create a sub-sample based on salary and account value, excluding individuals with a salary of above 100,000 USD or an account balance of over 200,000 USD. Such individuals are likely to have substantial taxable assets, making their 401(k) account less representative of their overall allocation. This sample has over 14 million observations. Finally, we create a sub-sample combining both criteria, which reduces the sample size to about 8 million observations.

In Table 10, we show these results in columns (2) through (4) focusing on the benchmark specification with only the target date fund variable, the idiv benchmark, trends and cohort. In Panel A of Appendix Table 4, we add salary, account balances and house values, while in Panel B of Appendix Table 4 we add the advice variables and their interactions with cohort, salary, and account values. All regressions include firm fixed effects, although the results below are robust to other specifications. In the first column,

we repeat the benchmark full sample result, reported for convenience. Focusing first on Table 10, we can see that the target date fund variable and the international diversification benchmark remain statistically significant and of similar magnitude in all the subsample specifications. The cohort effect is also very robust with the coefficients only varying between 0.14 and 0.16, and its statistical significance survives clustering of the standard errors by firm. On the contrary, the trend coefficients are less robust in terms of magnitude and statistical significance. These results carry over to Panel A and B of Appendix Table 4. There, the salary effect is stable, while the account balance effect becomes more negative with the smaller samples, although it is not statistically significant once the standard errors are clustered. The advice variable maintains its statistical significance, while its interactions with the cohort, and account variables are of similar sign and magnitudes as those in Table 6, with the interactions with salary being a bit less robust. Finally, the effect of house value on international diversification remains significant and positive and of the same magnitude as before.

We also investigate the bond allocation for our accounts. A high allocation to bonds may indicate an asset location strategy and suggest a sizable taxable portfolio. The mean allocation to bonds (conditional on equity market participation) is 18.64%, with the 90% range going from 0% to 52%. As we explained before, our focus on idiv (foreign equity over total equity) implies that high bond allocations may not necessarily be a problem. However, to increase the representativeness of the sample, we also investigate a sample excluding accounts with bond allocations of over 50%. This removes 1,142,168 observations from the sample. Again, Column (5) in Table 10 (and Panels A, B of Appendix Table 4) shows that the results are quite robust.

By focusing on the relative equity allocation, we do not confuse stock market participation biases with international under-diversification. Yet, it is also of interest to investigate overall international allocations. Unfortunately, we do not observe the allocation to international bonds, although we surmise it is relatively small. The last column of Table 10 (specification (6)) reports results where we change the left hand side variable to the proportion of overall assets that is invested internationally. This increases the sample considerably, as portfolios with zero equity holdings are now included. Yet, the main results remain largely intact. The cohort, target date fund, international benchmark and the salary and account value coefficients become slightly larger, while the effect of house values stays approximately the same and the effect of signing up for online advice becomes smaller in absolute magnitude.

Finally, since we do not observe the actual holdings of our investors, it is possible that some of them may invest internationally by holding US portfolios (stocks) that have more exposure to international factors, e.g. multinationals, (Cai and Warnock, 2012). Both old research by Jaquillat and Solnik (1978) and newer results by Rowland and Tesar (2004) suggest that multinationals do not suffice to span the international diversification benefits

from investing in local foreign companies. Since we do not have information on multinational investments, and thus we cannot see directly whether investors use multinational companies as a substitute for international investments, we exploit the fact that our data set does split up the US equity portfolio in small and large companies. Given that multinational companies tend to be large, we calculate the correlation between the international equity allocation and the allocation to large US equities, and we actually find it to be positive at 12.6%. It is therefore unlikely investors use large US companies as substitutes for international diversification.

VII. Conclusions

We have examined the international equity allocations of 3.8 million individuals in 296 401(k) plans over the 2005-2011 period. A striking feature of the data is the enormous cross-individual variation in these allocations, with non-negligible fractions of individuals allocating 0% to international equities, but a minority also allocating more than 75%. We examine various sources of variation in these allocations: pure temporal trends, personal characteristics, such as salary and wealth, access to financial advice, zip code effects and firm effects, including the quality and amount of the international funds offered by the plans. We find a strong cohort effect, with younger cohorts investing more internationally, but each cohort also investing more internationally over time. Access to online advice and its recency are, all else equal, associated to sizably higher international allocations. The fraction of international funds offered by the plan, and their relative fees compared to the domestic funds in the plan and to the universe of similar international funds have effects of similar size. In addition, we find a positive salary and a negative account balance coefficient, but only the salary effect is economically meaningful. The level of education measured at the zip code level has a strong positive effect on international diversification, as does financial literacy. The fraction of foreign-born population at the zip code level is also associated with higher international allocations. In addition, individuals living in states with more exports, or working for companies that are private, have foreign subsidiaries and are less profitable, have higher international allocations.

The cohort effect coupled with more access to financial advice, education and better international fund options might lead the home bias phenomenon to slowly disappear over time. These results point to a potentially big role for public policy in correcting individual investment mistakes and improving retirement outcomes.

A number of our results are also consistent with the familiarity hypothesis stressed in the international finance literature, including the cohort effect, which may stem from globalization making younger people more comfortable with international investing.

However, there are clearly other forces at work as well and we only explain a small part of the total cross-individual variation.

Because we only have data on the 401(k) allocations, which for many individuals may not represent their full investment portfolio, it is conceivable that some people under-invest in international equity in their 401(k) plan, but have international allocations elsewhere. Taking taxes into account, asset location optimization would suggest skewing the 401(k) portfolio towards bonds. We accommodate this critique partially by focusing on the relative *equity* allocation. In addition, we have examined various subsamples that minimize the incomplete portfolio problem, excluding people with very low tenure but high age, and/or account balances and/or a salary, in order to focus on people for whom the 401(k) account we observe is likely the biggest, if not the only, part of their financial portfolio. We also investigate a sample excluding accounts with excessive bond allocations, which may also suggest an asset location strategy. Our results remain robust in all of these sub-samples.

So far, we have studied the international equity allocation conditional on equity market participation. It may also be interesting to study the decision to participate in the international equity market by itself, as international allocations are 0 in 17% of the observations. This behavior is only partly correlated with general stock market non-participation, and might be heavily correlated with other behavioral investment biases/mistakes, such as excessive allocations to money market instruments and/or to company stock. We defer analyzing this to future work.

Our results also have important implications for the international finance literature on home bias. First, many of our results confirm the importance of familiarity and information flow stories (Andrade and Chhaochharia, 2010; Van Nieuwerburgh and Veldkamp, 2009), which must be researched in more detail. Second, the large cross-individual variation linked to cohorts, education, financial literacy and access to financial advice should lead to additional analysis of cross-country home bias focusing on heterogeneity in investor population, which hitherto has not yet been fully examined.

References

Ahearne, A. G., W. L. Griever, and F. E. Warnock, 2004, "Information costs and home bias: an analysis of U.S. holdings of foreign equities", *Journal of International Economics*, 62, 313-336.

Ameriks, J., and S. Zeldes, 2004, "How Do Household Portfolio Shares Vary with Age?", Working Paper.

Andrade, S., and V. Chhaochharia, 2010, "Information immobility and foreign portfolio investment," *Review of Financial Studies*, 23, 2429-2463.

Aviat, A., and N. Coeurdacier, 2007, "The geography of trade in goods and asset holdings", *Journal of International Economics*, 71, 22–51.

Baele, L., G. Bekaert,, K. Inghelbrecht, and M. Wei, 2013, "Flights to Safety", Working Paper.

Balduzzi, P., And J. Reuter, 2013, "Heterogeneity in Target-Date-Funds: Optimal Risk Taking or Risk Matching?", Working Paper.

Becker, S.O., and M. Hoffmann, 2010, "Equity fund ownership and the cross-regional diversification of household risk," *Journal of Banking & Finance*, 34 (1), 90-102.

Bekaert, G., S. Siegel, and X. Wang, 2013, "Home Bias Revisited," Working Paper.

Bekaert, G., C. R. Harvey, C. Lundblad, and S. Siegel, 2011, "What Segments Equity Markets?" *Review of Financial Studies*, 24 (12), 3847-3890.

Bekaert, G., C. R. Harvey, C. Lundblad, and S. Siegel, 2014, "Stock Market Valuation across US States," Working Paper.

Bohn, H., and L. Tesar, 1996, "U.S. Equity investment in foreign markets: portfolio rebalancing or return chasing?," *American Economic Review: Papers and Proceedings*, 77-81.

Brennan, M. J. and H. H. Cao, 1997, "International portfolio investment flows", *Journal of Finance*, 52, 1851-1880.

Brown, J. R., J. M. Pollet, and S.J. Weisbenner, 2015, "The In-State Equity Bias of State Pension Plans, " Working Paper.

Cai, F. and F.E. Warnock, 2012, "Foreign exposure through domestic equities," *Finance Research Letters*, 8–20.

Calvet, L., J. Campbell, and P. Sodini, 2007, "Down or Out: Assessing the Welfare Cost of Household Investment Mistakes", *Journal of Political Economy*, 115(5), 707-747.

Calvet, L., J. Campbell, and P. Sodini, 2009, "Fight or Flight? Portfolio Rebalancing by Individual Investors," *Quarterly Journal of Economics*, 124, 301-348.

Calvet, L., J. Campbell, and P. Sodini, 2009, "Measuring the Financial Sophistication of Households", *American Economic Review, Papers & Proceedings, 99(2), 393-398.*

Campbell, J. Y., T. Ramadorai, and B. Ranish, 2013, "Getting Better: Learning to Invest in an Emerging Stock Market", Working Paper.

Cesarini, D., C. T. Dawes, M. Johannesson, P. Lichtenstein, and B. Wallace, 2009, "Genetic variation in preferences for giving and risk taking," *Quarterly Journal of Economics*, 124, 809-842.

Chan, K., V. Covrig, and L. Ng, 2005, "What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide", *The Journal of Finance*, 60, 1495-1534.

Cooper, J., and E. Kaplanis, 1994, "Home bias in Equity portfolios, inflation hedging and international capital market equilibrium," *Review of Financial Studies*, 7 (1), 45-60.

Coval, J., and T. Moskowitz, 1999, "Home Bias at Home: Local Equity Preferences in Domestic Portfolios", *The Journal of Finance*, 54, 2045- 2073.

Coval, J., and T. Moskowitz, 2001, "The Geography of Investment: Informed Trading and Asset Prices", *Journal of Political Economy*, 109, 811-841.

Curcuru, Stephanie, John Heaton, Deborah Lucas, and Damien Moore, "Heterogeneity and Portfolio Choice: Theory and Evidence," in Handbook of Financial Econometrics.

Dahlquist, M., L. Pinkowitz, R. M. Stulz, and R. Williamson, 2003, "Corporate governance and home bias", *Journal of Financial and Quantitative Analysis*, 38, 87-110.

Duflo, E., W. Gale, J. Liebman, P. Orszag, and E. Saez, 2006, "Saving Incentives for Low- and Middle-Income Families: Evidence from a Field Experiment with H&R Block", *Quarterly Journal of Economics*, 121(4), 1311-1346.

Elton, E., M. Gruber, and C. Blake, 2006, "The Adequacy of Investment Choices Offered By 401(k) Plans", *Journal of Public Economics*, 90 (6-7), 1299-1314.

Fidora, M., M. Fratzscher, and C. Thimann, 2007, "Home bias in global bond and equity markets: The role of real exchange rate volatility", *Journal of International Money and Finance*, 26, 631-655.

French, K., and J. Poterba, 1991, "International diversification and international equity markets," *American Economic Review Papers & Proceedings*, 81(2), 222-226.

Glassman, D., and L. Riddick, 2001, "What causes home asset bias and how should it be measured?", *Journal of Empirical Finance*, 8, 35-54.

Graham, J., C. Harvey, and H. Huang, 2009, "Investor Competence, Trading Frequency and Home Bias", *Management Science*, 55(7), 1094-1106.

Grinblatt, M., and M. Keloharju, 2001, "How Distance, Language and Culture Influence Stock Holdings and Trades", *The Journal of Finance*, 56 (3), 1053-1073.

Grinblatt, M., and M. Keloharju, 2001, "What Makes Investors Trade?", *The Journal of Finance*, 56 (2), 589-616.

Huang, J., 2008, "Taxable and Tax Deferred Investing: An Arbitrage Approach," *Review of Financial Studies*, 21, 2173-2207.

Huberman, G., 2001, "Familiarity breeds investment", *Review of Financial Studies*, 14, 659-680.

Jacquillat, B., and B Solnik, 1978, "Multinationals are poor tools for diversification," *Journal of Portfolio Management,* 4, 8-12.

Kang, JK, and R. Stulz, 1997, "Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan," *Journal of Financial Economics*, 46(1), 3-28.

Karlsson, A., and L. Norden, 2007, "Home sweet home: Home bias and international diversification among individual investors," *Journal of Banking and Finance*, 31, 2, 317-333.

Kézdi, G., 2004, "Robust standard error estimation in fixed-effects panel models," *Hungarian Statistical Review,* Special English Volume #9, 95-116.

Kho, B., R. Stulz, and F. Warnock, 2009, "Financial Globalization, Governance and the Evolution of the Home Bias," *Journal of Accounting Research*, 47 (2), 597-635.

Korniotis , G., and A. Kumar, 2013, "Do Portfolio Distortions Reflect Superior Information or Psychological Biases?, *Journal of Financial and Quantitative Analysis*, 48(1), 1-45.

Lewis, K, 1999, "Trying to Explain Home Bias in Equities and Consumption," *Journal of Economic Literature*, 37(2), 571-608.

Lusardi, A., and O. Mitchell, 2007, "Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth", *Journal of Monetary Economics*, 54(1), 205-224.

Madrian, B., and D. Shea, 2001, "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior," *Quarterly Journal of Economics*, 116(4), 1149-1187.

Malmendier, U., and S. Nagel, 2011, "Depression Babies: Do Macroeconomics Experiences Affect Risk-Taking?" *Quarterly Journal of Economics*, 126(1), 373-416.

Norden, Lars, 2010, "Individual Home Bias, Portfolio Churning and Performance", *European Journal of Finance*, 16(4), p. 329-351.

Obstfeld, M., and K. Rogoff, 2000, ""The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?" in Ben S. Bernanke and Kenneth Rogoff, editors, NBER Macroeconomics Annual 2000.

Portes, R., and H. Rey, 2005, "The determinant of cross-border equity flows", *Journal of International Economics*, 65, 269-296.

Rowland, P., and L. Tesar, 2004, "Multinationals and the Gains from International Diversification," *Review of Economic Dynamics*, 7, 789-826.

Sercu, P. and R. Vanpee, 2012, "The home bias puzzle in equity portfolios", International Finance: A Survey, 310-331.

Sharpe, W.F., 1992, "Asset allocation: Management style and performance measurement", *Journal of Portfolio Management*, 7-19.

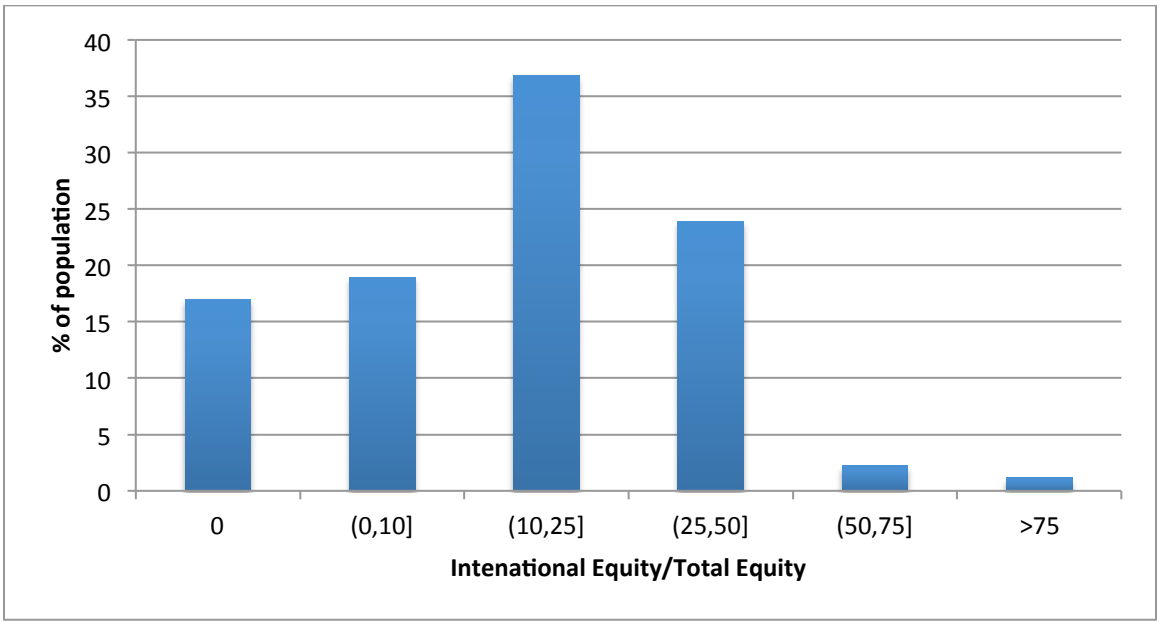
Van Nieuwerburgh, S., and L. Veldkamp, 2009, "Information Immobility and the Home Bias Puzzle", *Journal of Finance*, 64 (3), 1187-1215.

Van Wincoop, E., and F. Warnock, 2010, "Is Home Bias in Assets Related to Home Bias in Goods?" *Journal of International Money and Finance*, 29, 1108-1123.

Figure 1
International Diversification across Individuals

Panel A shows a histogram with the distribution of international equity allocations as a percent of total equity allocations across individuals' 401(k) portfolios. The figure in Panel B shows the distribution of this ratio relative to an international diversification benchmark. The sample in both figures is restricted to stock market participants (individuals with positive total equity allocations). All variables are defined in the Appendix.

Panel A – International Diversification



Panel B – Over and Under International Diversification

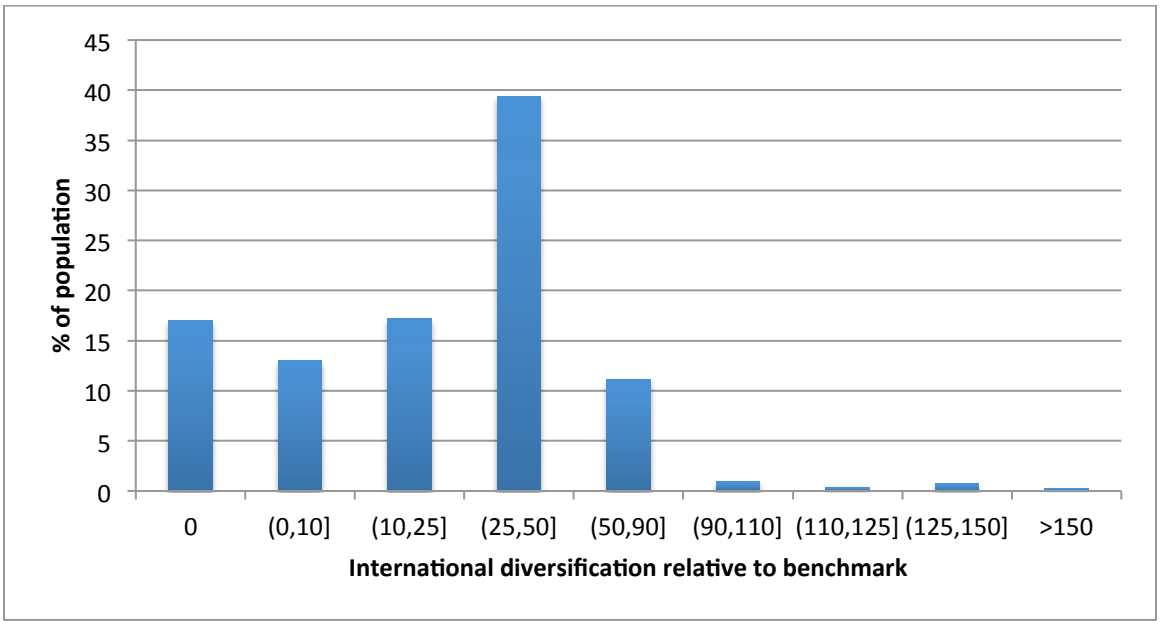
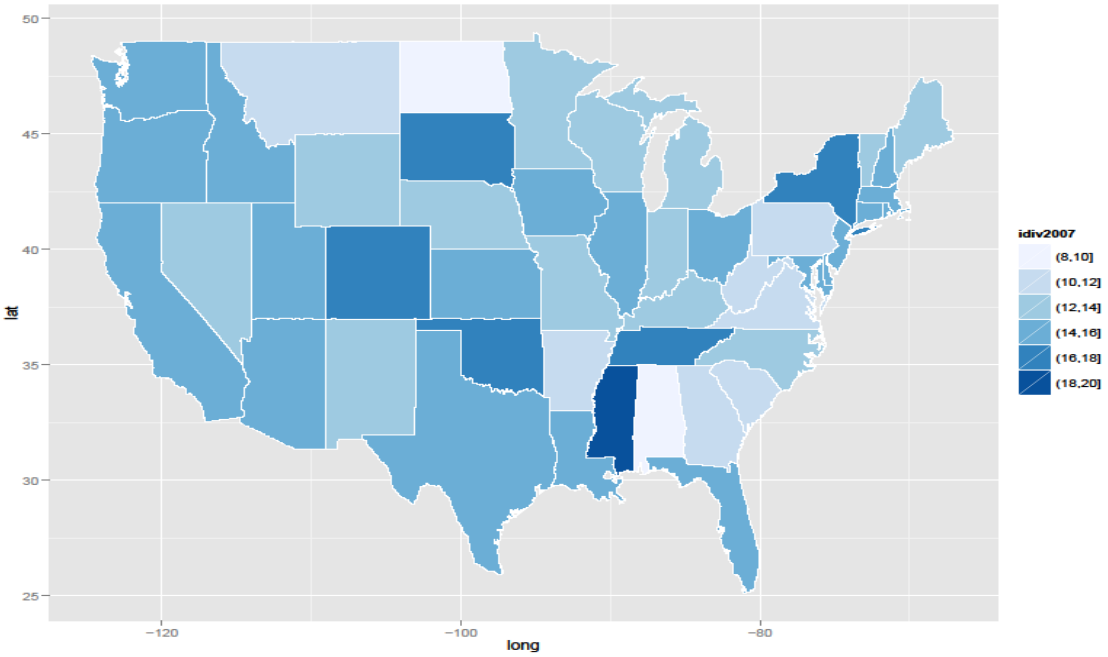


Figure 2
International Diversification across States

Figure 2 shows maps with the distribution of international equity allocations as a percent of total equity allocations across states at different points in time. State data averages ratios across individuals' 401(k) portfolios according to the zip code in which they reside.

Panel A - International Diversification across States in 2007



Panel B - International Diversification across States in 2010

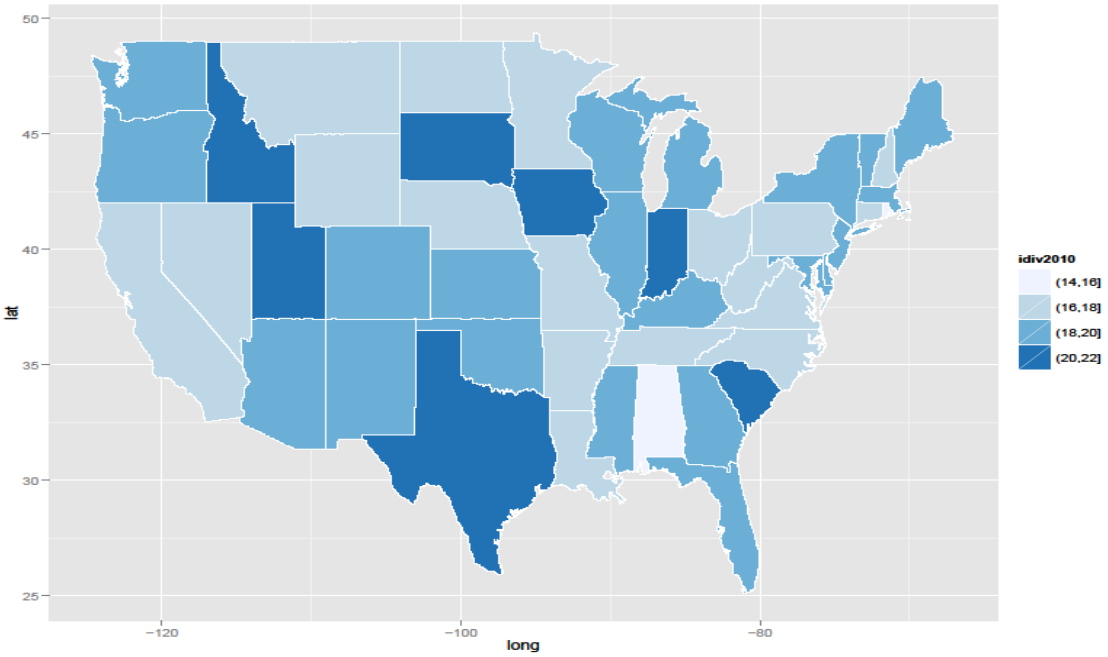
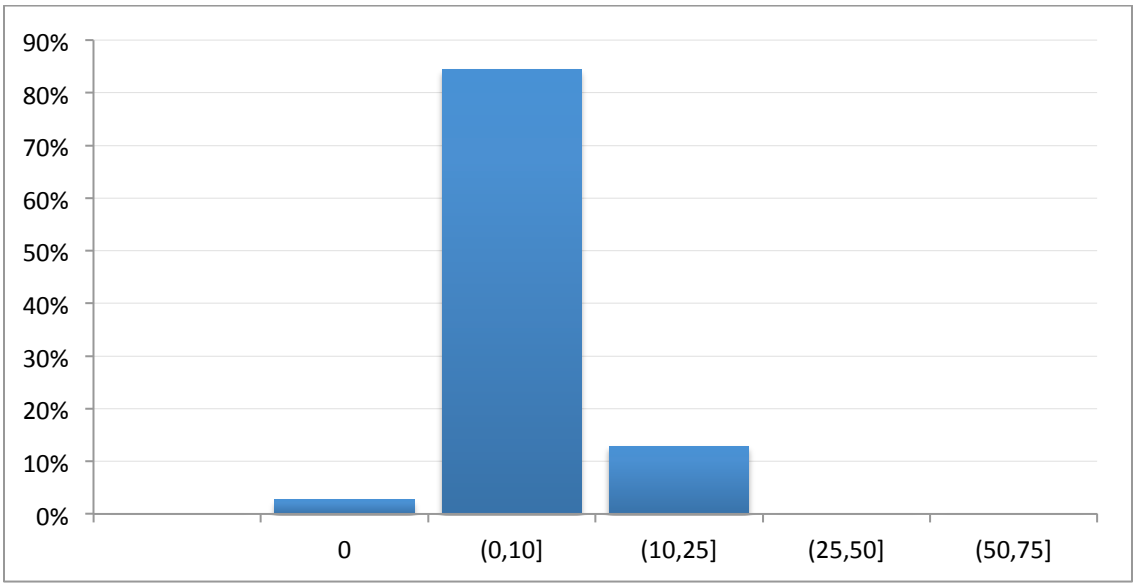


Figure 3
International Diversification across Firms

Panel A shows a histogram with the distribution of international equity allocations as a percent of total equity allocations across firms. The figure in Panel B shows the distribution of this ratio relative to an international diversification benchmark. The sample in both figures is restricted to stock market participants (individuals with positive total equity allocations). Firm data averages ratios across employees' 401(k) portfolios. All variables are defined in the Appendix.

Panel A – International Diversification



Panel B – Over and Under International Diversification

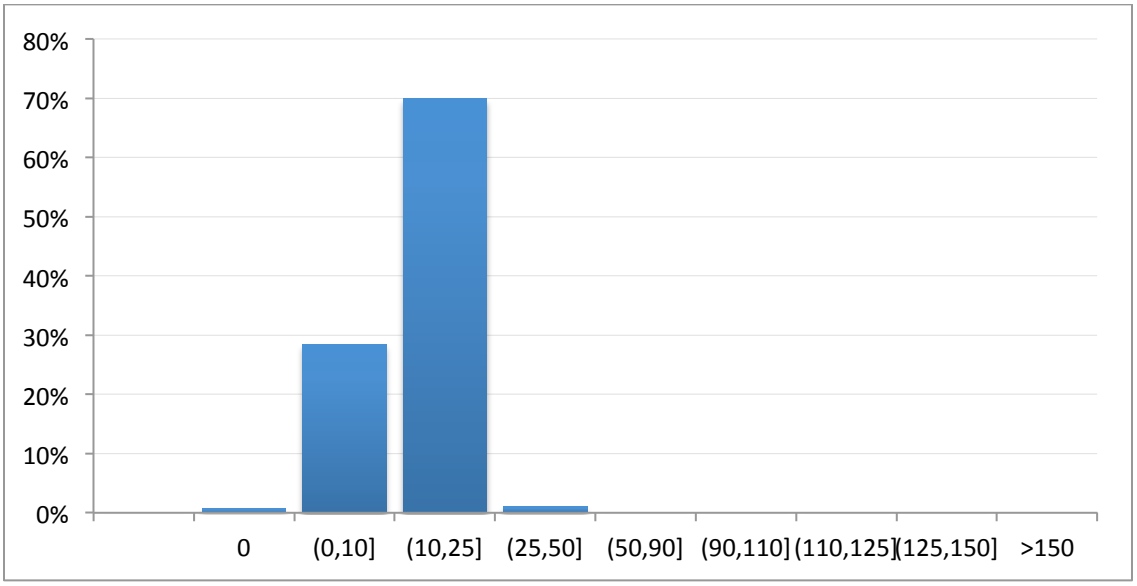
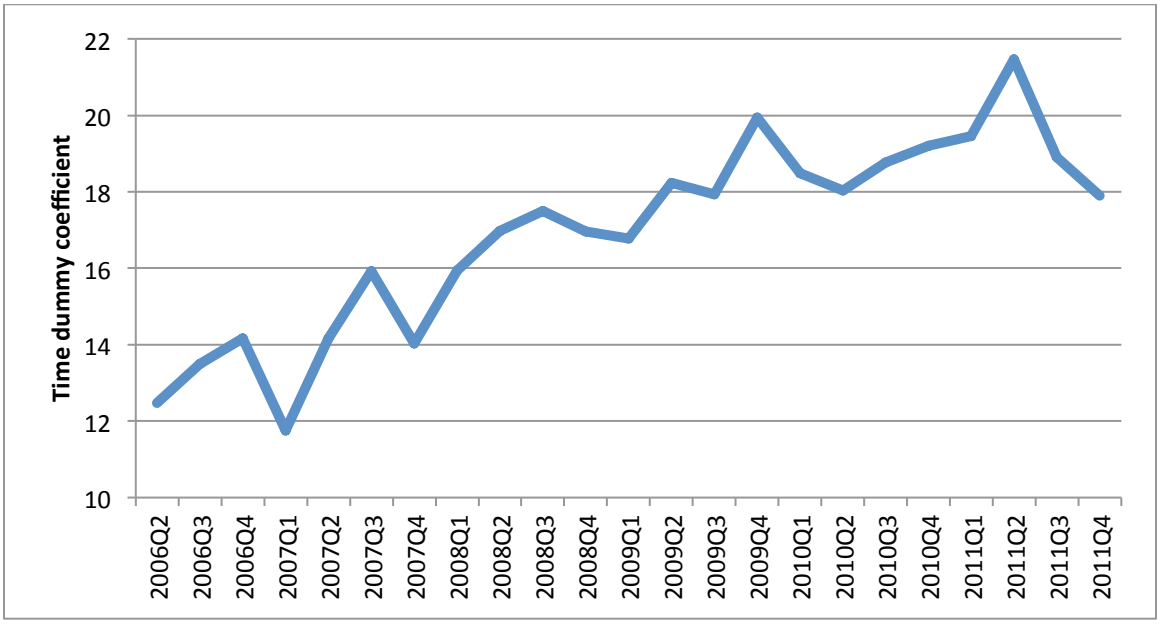


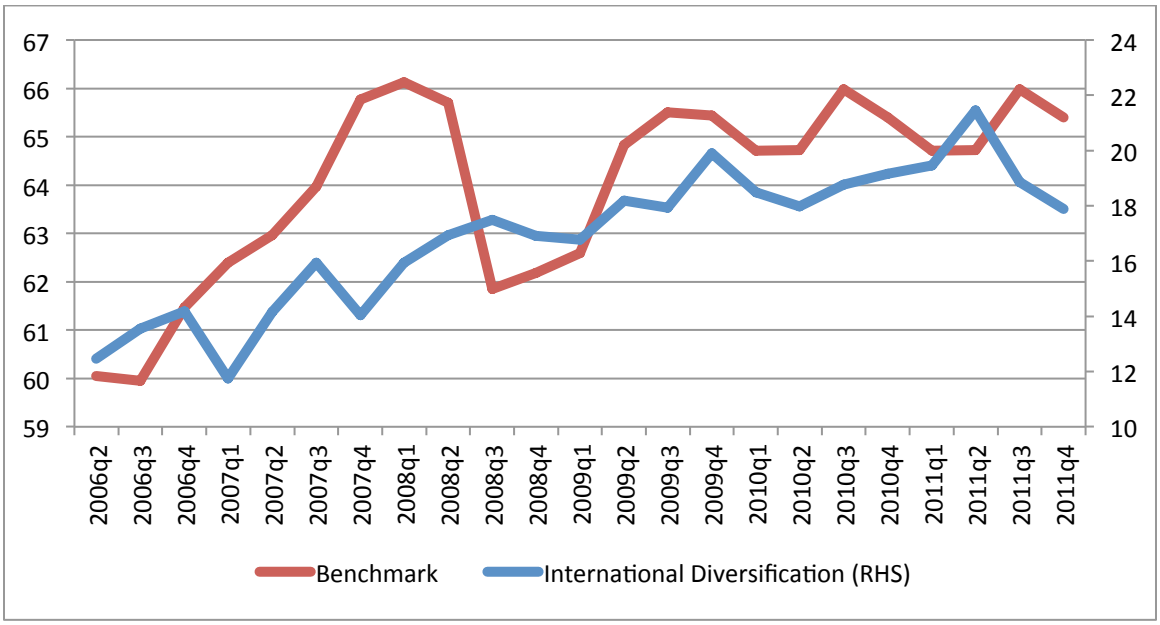
Figure 4
International Diversification over Time

Panel A shows the time fixed effects from an individual level regression of international diversification on quarterly time dummy variables. Panel B plots the same time effects together with the international diversification benchmark. Panel C shows the time fixed effects from an individual level regression of relative international diversification (the ratio of international diversification to the benchmark) on quarterly time dummy variables. The sample in all figures is restricted to stock market participants (individuals with positive total equity allocations). All variables are defined in the Appendix.

Panel A: Trends in International Diversification



Panel B: International Diversification versus Benchmark



Panel C: Trends in Relative International Diversification

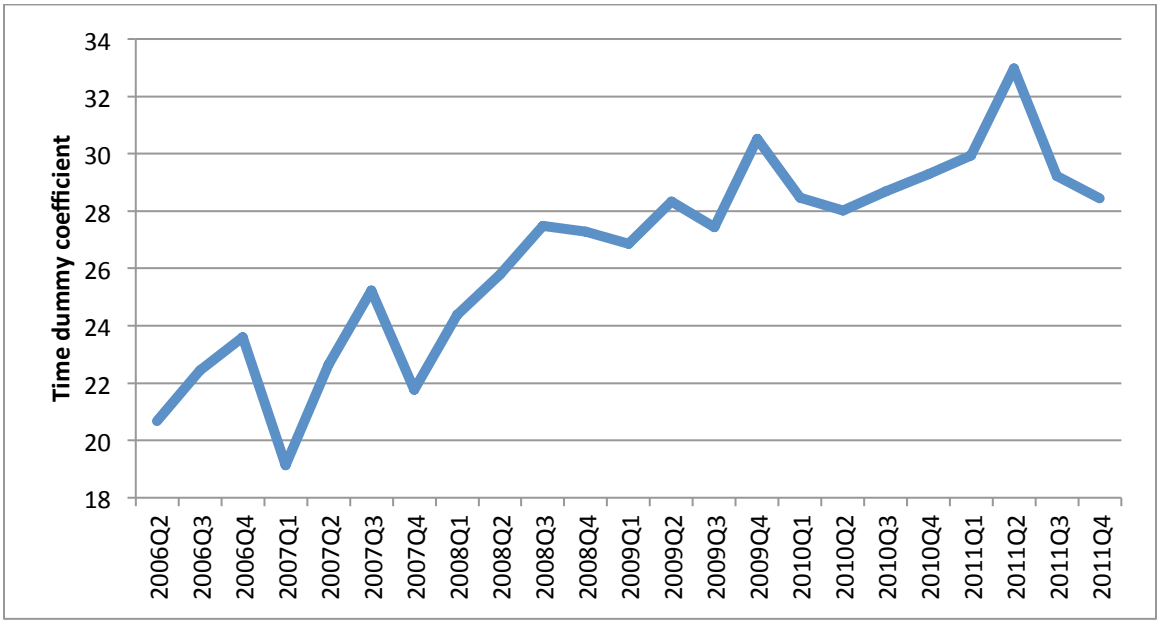


Figure 5
Cohorts and International Diversification

The graph shows international diversification allocations over time by cohort group (people born before 1950, between 1950 and 1959, between 1960 and 1969, between 1970 and 1979 and 1980 or later). The sample is restricted to stock market participants (individuals with positive total equity allocations).

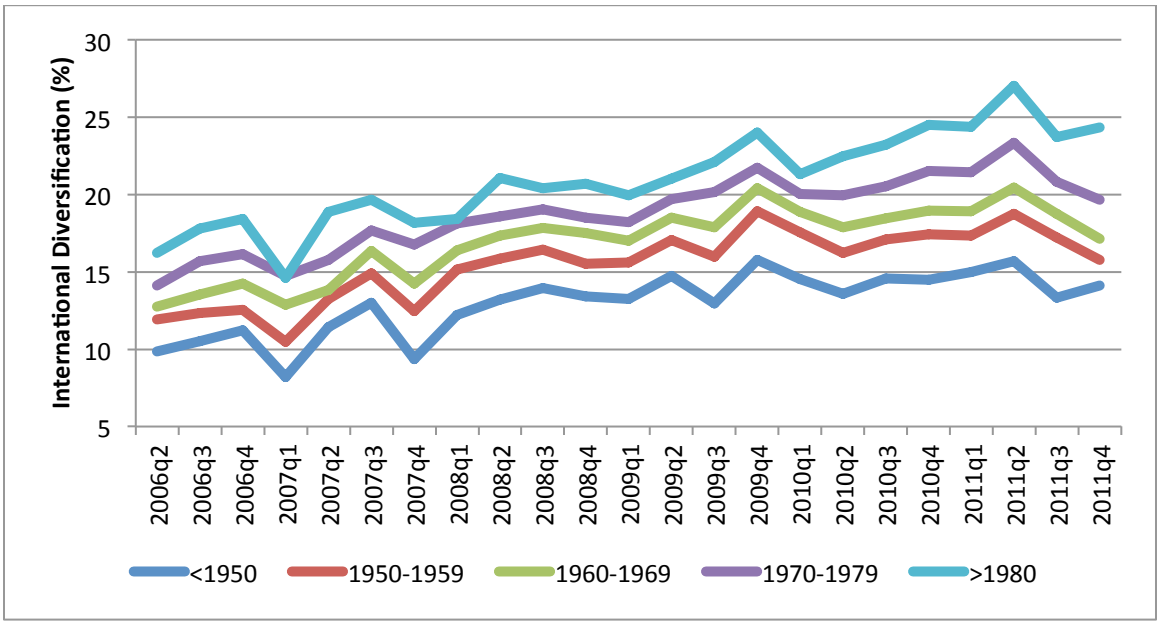


Figure 6
Malmendier and Nagel Experienced Returns

Following Malmendier and Nagel (2011), the experienced returns variable is the weighted average of past returns with weights that depend on an individual's age at time t, how many years ago the return was realized and a parameter lambda that controls for the shape of the weighting function. This paper defines past returns using international stock returns in excess of US stock returns. The figure below shows experienced returns for λ= 3.999.

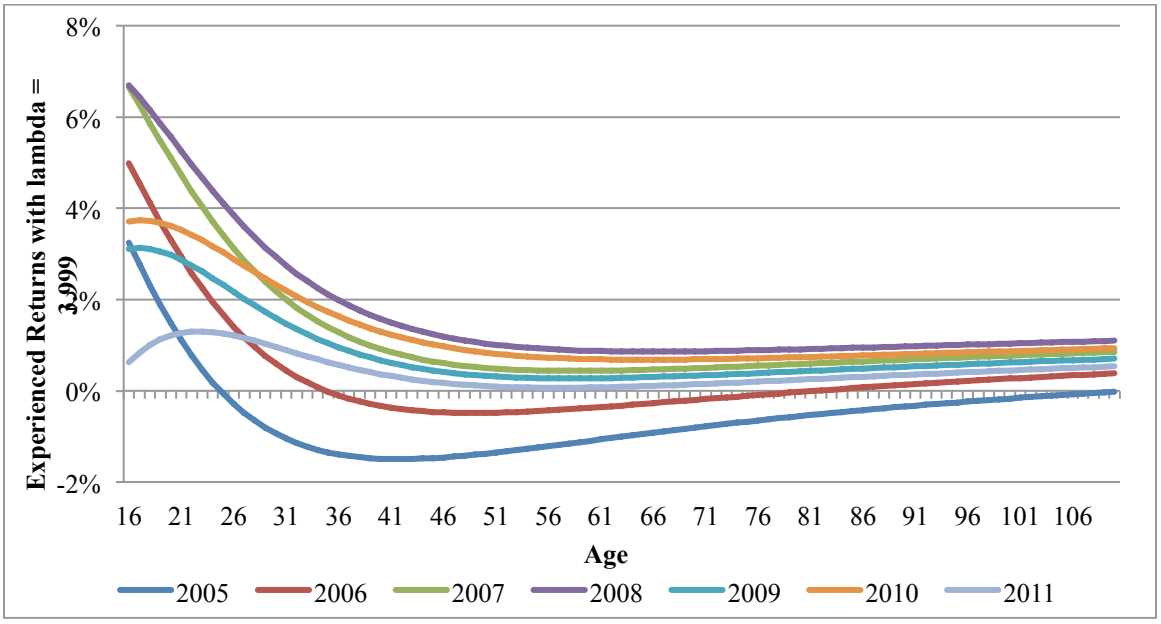


Table 1
International Under-Diversification in the US

This table reports statistics for the degree of international diversification, i.e. the international equity allocations as a percent of total stock allocations in individuals' 401(k) portfolios. Firms (states) are ranked according to the average international diversification: diversified firms (state) represent the 5 firms (1 state) with the highest average diversification and under-diversified firms represent the bottom 5 firms (1 state). This subsample is then split into older people (born in 1960 or earlier) and younger people (born 1980 or later). Finally, within each cohort, individuals are split in three groups (low salary, intermediate salary and high salary). The reported numbers are the average international diversification for each subset.

	Diversified Firms	**Under-diversified Firms**		**Diversified State**	**Under-diversified State**
Cohort 1960			**Cohort 1960**		
Low salary	33.1	3.70	Low salary	22.2	13.3
Intermediate salary	30.7	4.86	Intermediate salary	19.7	11.2
High salary	33.7	6.76	High salary	19.1	13.6
Cohort 1980			**Cohort 1980**		
Low salary	39.0	10.2	Low salary	31.2	21.0
Intermediate salary	36.3	11.8	Intermediate salary	27.7	19.1
High salary	37.4	13.7	High salary	25.8	19.3

Table 2
Summary Statistics for Stock Market Participants

This table reports the mean, median, std dev, 5th and 95th percentiles and number of observations for the individual level data. The sample includes individuals with a positive equity allocation in their 401(k) portfolio. All variables are defined in the Appendix. The sample period is 2005 to 2011.

Variable	Mean	Median	Std Dev	p5	p95	# Obs
International Div	17.736	17.073	15.959	0.000	44.681	17,082,302
% in Target Date Fund	16.077	0.000	33.774	0.000	100.000	17,082,302
International Div Benchmk	64.368	64.856	1.462	61.365	66.055	17,082,302
Cohort	(19)63	(19)63	11.683	(19)40	(19)83	17,082,302
Age	45.480	46.000	11.667	27.000	64.000	17,082,302
Annual Salary	58,017	47,625	47,772	15,150	127,440	13,105,091
Total Account Value	63,972	23,434	113,906	367	258,464	17,054,517
House Value	244,143	188,133	188,858	74,0780	592,909	13,984,030
MN Experienced Returns	0.96	0.819	0.837	0.074	2.756	17,082,302
MN Return Chasing	8.692	8.748	1.267	6.410	10.306	17,082,302
Relative Returns	0.001	0.000	0.061	-0.092	0.117	17,082,302
Flight to Safety Dummy	0.062	0.000	0.119	0.000	0.409	17,082,302
Tenure	12.82	10.21	10.35	1.13	32.98	9,170,900
Advice Dummy	0.088	0	0.284	0	1	17,082,302
Not Stale Advice Dummy	0.032	0	0.176	0	0	17,082,302

Table 3
On Time, Cohorts and Age

Panel A – Trends, Cohorts and Age Effects

Panel A reports the results for individual level regressions of international diversification on a quadratic time trend, birth year cohort and age, all controlling for the percent invested in a target date fund and the international diversification benchmark. Columns (2), (5) and (8) control for firm fixed effects, while columns (3), (6) and (9) control for zip code fixed effects. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

Variables	(1) Idiv	(2) Idiv	(3) Idiv	(4) Idiv	(5) Idiv	(6) Idiv	(7) Idiv	(8) Idiv	(9) Idiv
% Target Date Fund	0.0796***	0.0697***	0.0783***	0.0684***	0.0590***	0.0682***	0.0682***	0.0588***	0.0680***
	[695.7]	**[576.5]**	**[673.5]**	**[591.6]**	**[483.0]**	**[581.7]**	**[589.5]**	**[481.8]**	**[579.8]**
Int'l divers. bmk	0.196***	0.214***	0.193***	0.210***	0.214***	0.205***	0.208***	0.211***	0.203***
	[59.01]	**[65.69]**	[58.79]	[63.61]	**[66.02]**	[62.98]	[63.18]	**[65.11]**	[62.48]
Trend	0.0254***	0.0276***	-0.0442***	0.0573***	0.0395***	-0.0158***	0.102***	0.0808***	0.0268***
	[6.031]	[6.439]	[-10.55]	[13.72]	[9.287]	[-3.787]	[24.33]	[18.96]	[6.428]
$Trend^2$	0.00768***	0.00435***	0.00943***	0.00557***	0.00331***	0.00751***	0.00552***	0.00329***	0.00746***
	[54.19]	[30.01]	[66.90]	[39.61]	[22.95]	[53.58]	[39.27]	[22.83]	[53.29]
Cohort				0.167***	0.158***	0.161***			
				[508.0]	**[481.0]**	**[479.1]**			
Age							-0.170***	-0.159***	-0.163***
							[-516.8]	**[-486.5]**	**[-487.5]**
Constant	1.532***	1.302***	2.368***	-9.752***	-8.450***	-8.427***	8.040***	8.402***	8.693***
	[7.675]	[6.640]	[12.03]	[-48.92]	[-43.15]	[-42.81]	[40.52]	[43.02]	[44.36]
Observations	17,082,302	17,082,302	17,063,721	17,082,302	17,082,302	17,063,721	17,082,302	17,082,302	17,063,721
Adjusted R-squared	0.039	0.120	0.073	0.053	0.131	0.086	0.054	0.132	0.086
Firm Fixed Effects	N	Y	N	N	Y	N	N	Y	N
Zip Code F.E.	N	N	Y	N	N	Y	N	N	Y

Panel B – Quadratic Function Specifications

Panel B reports the results for individual level regressions of international diversification on a quadratic time trend, quadratic birth year cohort and quadratic age, controlling for the percent invested in a target date fund and the international diversification benchmark. Columns (2) and (5) control for firm fixed effects, while columns (3) and (6) control for zip code fixed effects. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

Variables	(1) idiv	(2) Idiv	(3) idiv	(4) idiv	(5) idiv	(6) idiv
% Target Date Fund	0.0690*** **[594.6]**	0.0592*** **[482.5]**	0.0687*** **[583.5]**	0.0689*** **[594.5]**	0.0593*** **[484.0]**	0.0686*** **[583.8]**
Int'l divers. bmk	0.211*** [64.02]	0.214*** **[66.09]**	0.206*** [63.33]	0.210*** [63.69]	0.211*** **[65.16]**	0.205*** [62.92]
Trend	0.0525*** [12.57]	0.0380*** [8.929]	-0.0196*** [-4.701]	0.0974*** [23.31]	0.0783*** [18.39]	0.0228*** [5.467]
$Trend^2$	0.00578*** [41.06]	0.00336*** [23.33]	0.00767*** [54.71]	0.00571*** [40.58]	0.00337*** [23.43]	0.00763*** [54.49]
Cohort	0.346*** **[113.9]**	0.212*** [71.55]	0.298*** [97.80]			
$Cohort^2$	-0.00142*** [-59.26]	-0.000428*** [-18.40]	-0.00109*** [-45.37]			
Age				0.0119*** [5.666]	-0.0650*** [-31.82]	-0.00387* [-1.840]
Age^2				-0.00196*** [-87.67]	-0.00102*** [-46.64]	-0.00172*** [-76.64]
Constant	-15.29*** [-69.46]	-10.11*** [-46.89]	-12.68*** [-58.15]	4.011*** [19.69]	6.360*** [31.78]	5.160*** [25.64]
Observations	17,082,302	17,082,302	17,063,721	17,082,302	17,082,302	17,063,721
Adjusted R-squared	0.053	0.131	0.086	0.054	0.132	0.086
Firm Fixed Effects	N	Y	N	N	Y	N
Zip Code Fixed Effects	N	N	Y	N	N	Y

Table 4
The Effect of Return Sensitive Variables

This table reports the regressions in columns (4)-(6) of Table 3 Panel A adding return sensitive variables (experienced returns, intnl stock returns relative to U.S. returns, and a flight to safety dummy). The specifications in Columns (1) and (2) were run using non-linear least squares, where lambda measuring how the effect of past returns decay with time. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 1% level are denoted by bold and underlined t-statistics, while significance at the 5 and 10% level is denoted by underlined t-statistics. The standard errors clustered at the firm level for columns (1) and (2) were calculated using OLS with the optimal λ. The sample period is 2005 to 2011.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Idiv	Idiv	Idiv	Idiv	Idiv	Idiv	Idiv	Idiv
% Target Date Fund	0.0688***	0.0686***	0.0687***	0.0608***	0.0690***	0.0683***	0.0591***	0.0681***
	[594.61]	**[591.51]**	**[532.1]**	**[444.4]**	**[526.6]**	**[590.0]**	**[483.2]**	**[579.7]**
Int'l divers. bmk	0.253***	0.201***	0.156***	0.294***	0.182***	0.151***	0.252***	0.138***
	[75.68]	[60.45]	[35.90]	**[67.61]**	[42.24]	[36.01]	**[60.21]**	[33.18]
Trend	0.155***	0.080***	0.0616***	-0.0881***	-0.0592***	0.114***	0.00110	0.0501***
	[35.53]	[18.41]	[11.20]	[-15.54]	[-10.80]	[23.39]	[0.219]	[10.28]
$Trend^2$	0.001***	0.005***	0.00551***	0.00642***	0.00854***	0.00379***	0.00452***	0.00545***
	[7.86]	[35.46]	[30.65]	[34.58]	[47.66]	[23.43]	[27.01]	[33.83]
Cohort	0.194***	0.167***	0.168***	0.156***	0.161***	0.167***	0.158***	0.161***
	[411.33]	**[504.69]**	**[452.9]**	**[421.8]**	**[424.9]**	**[508.2]**	**[480.9]**	**[479.3]**
MN Experienced Ret	-0.554***							
	[-79.34]							
Return Chasing		0.098***						
		[19.32]						
Relative returns			-0.243***	-1.260***	-0.441***			
			[-2.949]	[-15.57]	[-5.448]			
Flight to Safety						-0.930***	0.607***	-1.071***
						[-22.44]	[14.25]	[-26.00]
λ	3.99***	1.00***						
	[104]	[52.29]						
Constant	-14.046***	-10.332***	-6.581***	-12.49***	-6.701***	-6.342***	-10.63***	-4.513***
	[-68.01]	[-51.25]	[-24.73]	[-47.09]	[-25.45]	[-25.31]	[-42.76]	[-18.21]
Observations	17,426,447	17,426,477	13,761,372	13,761,372	13,747,036	17,082,302	17,082,302	17,063,721
Adjusted R-squared	0.054	0.054	0.050	0.128	0.086	0.053	0.131	0.086
Firm Fixed Effects	N	N	N	Y	N	N	Y	N
Zip Code Fixed Effects	N	N	N	N	Y	N	N	Y

Table 5
Income, Wealth and International Diversification

This table reports the results for individual level regressions of international diversification on a quadratic time trend, birth year cohort and wealth variables (annual salary, 401(k) account value and the house value corresponding to the individual's zip code), all controlling for the percent invested in a target date fund and the international diversification benchmark. House values are either from Zillow (columns (1) and (2), or from the Census (Columns (4) and (5)). All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

	(1)	(2)	(3)	(4)	(5)
Variables	Idiv	Idiv	Idiv	Idiv	Idiv
% Target Date Fund	0.0642***	0.0543***	0.0653***	0.0694***	0.0571***
	[429.4]	**[341.2]**	**[489.9]**	**[522.1]**	**[404.7]**
Int'l div bmk	0.378***	0.317***	0.329***	0.335***	0.300***
	[89.08]	**[75.54]**	**[88.80]**	[88.79]	**[80.58]**
Trend	-0.048***	0.059***	-0.119***	-0.088***	0.00590
	[-9.109]	[10.85]	[-25.59]	[-18.67]	[1.224]
$Trend^2$	0.00792***	0.00242***	0.0100***	0.00945***	0.00413***
	[44.71]	[13.27]	[63.96]	[59.69]	[25.38]
Cohort	0.147***	0.148***	0.140***	0.149***	0.147***
	[314.5]	**[321.3]**	**[331.4]**	**[355.3]**	**[353.9]**
ln(Annual Salary)	0.138***	0.185***	0.169***	0.0724***	0.185***
	[14.99]	[20.61]	[20.63]	[8.747]	[22.98]
$ln(Annual Salary)^2$	0.191***	0.186***	0.154***	0.189***	0.183***
	[129.9]	**[128.1]**	**[114.4]**	**[140.8]**	**[139.0]**
ln(Account Value)	0.117***	0.0551***	0.0930***	0.108***	0.0206***
	[28.03]	[13.46]	[25.09]	[28.94]	[5.641]
$ln(Account Value)^2$	-0.0511***	-0.0331***	-0.047***	-0.0438***	-0.0277***
	[-64.50]	**[-42.71]**	**[-66.43]**	[-61.54]	**[-39.87]**
ln(House Value Zillow)	0.697***	0.653***			
	[88.87]	**[74.76]**			
ln(House Value Census)				0.975***	0.838***
				[132.9]	**[99.81]**
Constant	-29.42***	-25.33***	-16.55***	-30.04***	-26.10***
	[-107.9]	**[-92.48]**	[-73.73]	**[-123.3]**	**[-106.1]**
Observations	10,621,481	10,621,481	13,068,893	12,883,608	12,883,608
Adjusted R-squared	0.047	0.120	0.086	0.053	0.131
Firm Fixed Effects	N	Y	N	N	Y
Zip Code Fixed Effects	N	N	Y	N	N

Table 6
International Diversification and Financial Advice

Panel A – Summary Statistics

This table reports the mean, median, std dev, 5th and 95th percentiles and number of observations for the individual level data divided by whether the individuals have signed the investor service agreement for online advice. The sample includes individuals with a positive equity allocation in their 401(k) portfolio. All variables are defined in the Appendix. The sample period is 2005 to 2011.

	Mean	Median	Std Dev	p5	p95	# Obs
Advice Dummy=0						
International Diversification	17.335	16.667	15.784	0	43.750	15,571,691
% Target Date Fund	16.834	0	34.586	0	100	15,571,691
Cohort	63.668	63	11.745	40	83	15,571,691
Age	45.471	46	11.735	26	64	15,571,691
Annual Salary	56,420	46,116	47,388	14,269	124,820	11,792,124
Total Account Value	58,735	21,184	107,211	327	238,235	15,548,551
House Value (Zillow)	243,629	186,651	189,469	73,341	594,190	12,697,864
House Value (Census)	239,545	186,923	164,297	77,809	581,671	15,332,097
Advice Dummy=1						
International Diversification	21.011	20.000	16.363	0	48.649	1,293,508
% Target Date Fund	7.739	0	21.516	0	61	1,293,508
Cohort	63.187	63	10.902	46	81	1,293,508
Age	45.855	46	10.842	28	63	1,293,508
Annual Salary	73,095	64,766	49,153	27,371	142,572	1,110,295
Total Account Value	124,977	71,811	161,535	2,826	422,695	1,288,957
House Value (Zillow)	242,834	199,792	170,824	83,094	550,808	1,095,710
House Value (Census)	247,129	207,414	153,304	87,339	558,531	1,274,765
Total						
International Diversification	17.617	16.981	15.859	0	44.262	16,865,199
% Target Date Fund	16.137	0	33.850	0	100	16,865,199
Cohort	63.631	63	11.683	40	83	16,865,199
Age	45.500	46	11.669	27	64	16,865,199
Annual Salary	57,855	47,498	47,772	15,014	127,094	12,902,419
Total Account Value	63,806	23,386	113,675	365	257,616	16,837,508
House Value (Zillow)	243,566	187,780	188,056	73,956	591,247	13,793,574
House Value (Census)	240,127	188,785	163,492	78,300	580,011	16,606,862

Panel B – Financial Advice, Its Recency, and Interactions with Individual Characteristics

This panel replicates the regressions in Panel A of Table 5, controlling for whether the individual has signed up for online financial advice from FE and how recent she has logged onto the online advice website. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

Variables	(1) Idiv	(2) Idiv	(3) Idiv	(4) Idiv	(5) Idiv	(6) Idiv
% in Target Date Fund	0.0557***	0.0557***	0.0668***	0.0669***	0.0554***	0.0667***
	[350.7]	**[350.8]**	**[502.4]**	**[503.0]**	**[348.5]**	[500.9]
Intl Div. Benchmark	0.321***	0.319***	0.316***	0.313***	0.322***	0.316***
	[76.72]	**[76.29]**	**[85.55]**	**[84.94]**	**[76.82]**	**[85.78]**
Trend	0.0213***	0.0357***	-0.126***	-0.116***	0.0200***	-0.127***
	[3.936]	[6.600]	[-27.06]	[-25.00]	[3.694]	[-27.44]
$Trend^2$	0.00345***	0.00313***	0.0101***	0.00980***	0.00349***	0.0102***
	[18.95]	**[17.17]**	[64.95]	[62.80]	[19.15]	[65.24]
Cohort	0.142***	0.142***	0.134***	0.135***	0.146***	0.140***
	[308.6]	**[308.7]**	**[318.0]**	**[319.1]**	**[303.9]**	**[317.9]**
Advice Dummy	4.273***	3.058***	4.376***	2.690***	7.396***	9.501***
	[262.1]	**[134.9]**	**[303.4]**	**[133.0]**	**[46.00]**	**[62.30]**
Non-Stale Advice Dummy		2.246***		3.152***		
		[77.16]		**[118.9]**		
Advice Dummy*Cohort					-0.0450***	-0.0675***
					[-28.73]	**[-45.98]**
ln(Annual Salary)	0.143***	0.143***	0.123***	0.120***	0.150***	0.127***
	[15.96]	[16.00]	[15.05]	[14.64]	[16.52]	[15.27]
$ln(Annual Salary)^2$	0.182***	0.181***	0.148***	0.147***	0.185***	0.147***
	[125.7]	**[125.0]**	**[110.1]**	**[109.8]**	**[124.3]**	**[107.3]**
Adv. Dmy*ln(Annual Salary)					-0.0793	-0.120**
					[-1.632]	[-2.512]
Adv. Dmy*$ln(Annual Salary)^2$					-0.0285***	0.0125*
					[-4.322]	[1.934]
ln(Account Value)	0.0246***	0.0229***	0.0703***	0.0758***	0.0135***	0.0679***
	[6.037]	[5.618]	[19.05]	[20.54]	[3.220]	[17.92]
$ln(Account Value)^2$	-0.0465***	-0.0451***	-0.0622***	-0.0607***	-0.0468***	-0.0586***
	[-60.17]	**[-58.35]**	**[-88.09]**	**[-85.90]**	**[-57.76]**	**[-79.33]**
Adv. Dmy*ln(Account Value)					0.323***	0.115***
					[17.38]	[6.721]
Adv. Dmy*$ln(Account Value)^2$					-0.0356***	-0.0557***
					[-11.74]	[-19.79]
ln(House Value Zillow)	0.700***	0.699***			0.700***	
	[80.30]	**[80.24]**			**[80.38]**	
Constant	-25.43***	-25.43***	-15.19***	-15.13***	-25.76***	-15.64***
	[-93.15]	**[-93.18]**	[-67.90]	[-67.66]	**[-94.24]**	[-69.83]
Observations	10,621,481	10,621,481	13,068,893	13,068,893	10,621,481	13,068,893
Adjusted R-squared	0.126	0.126	0.093	0.094	0.126	0.093
Firm Fixed Effects	Y	Y	N	N	Y	N
Zip Code Fixed Effects	N	N	Y	Y	N	Y

Table 7
The Geography of International Diversification

Panel A - Summary statistics

Panel A presents the mean, median, standard deviation, 5th and 95th percentiles and number of observations for the zip code level data. All variables are defined in the Appendix.

Variables	Mean	Median	Std Dev	p5	p95	# Obs
Bachelor's Degree or Higher	21.8	17.4	16.0	3.1	55.4	32,746
Less than College Degree	63.4	65.6	14.2	36.7	81.9	32,746
College Degree	14.0	11.9	9.8	0.0	32.5	32,746
Advanced Degree	7.8	5.4	8.4	0.0	24.0	32,746
Financial Literacy	2.9	2.9	0.1	2.7	3.1	42,107
Foreign Born Population	5.8	2.2	9.2	0.0	26.0	32,751
Foreign Born Population - Latin America	2.936	0.421	6.622	0.0	15.376	32,751
Foreign Born Population - Europe	0.955	0.295	2.077	0.0	3.990	32,751
Foreign Born Population - Asia	1.462	0.182	3.830	0.0	6.896	32,751
Distance to International Cities	13,070	12,801	790	12,272	14,565	41,631
Distance to Tokyo	6,323	6,515	624	5,121	6,987	41,631
Distance to London	4,210	4,143	596	3,350	5,322	41,631
Distance to Mexico City	1,647	1,655	451	924	2,273	41,631
Distance to Toronto	890	705	647	223	2,165	41,631
Rural	2.0	1.0	1.2	1.0	4.0	41,982
Long Distance Minutes	47	46	7	42	57	42,107
State Exports/GDP	7.2	6.6	3.2	3.0	14.4	42,107
State Openness	20.4	17.8	9.2	8.7	38.6	42,107
GDP per capita	41,861	40,451	10,525	31,715	51,714	42,107
GDP Growth 2000-2005	11.4	11.3	5.4	3.5	24.0	42,107
GDP Growth 2006-2011	2.9	2.6	6.2	-7.1	13.7	42,107
House Value – Zillow	203,117	156,350	166,527	62,953	490,047	12,446
House Value – Census	172,967	125,900	145,372	52,100	454,800	31,921

Panel B - International Diversification Results

The regressions in this table examine the zip code fixed effects extracted from an individual level regression of international diversification on the percent invested in a target date fund, the international diversification benchmark, a quadratic time trend, birth year cohort, quadratic annual salary, quadratic account value advice variable and their interactions with salary and account values. Columns (2) and (4) include house values from the Zillow sample; Column (5) replicates Column (4) including house values from the 2010 Census, Columns (1), (3) and (6) do not include house values and are based on all the zip codes in our sample. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Zip Code FE	Zip Code FE	Zip Code FE	Zip Code FE	Zip Code FE	Zip Code FE
Bachelor's or Higher	0.0471***	0.0473***				
	[15.57]	[15.96]				
High School Degree			0.0318***	0.0349***	0.0345***	0.0405***
			[5.417]	[5.089]	[5.432]	[5.866]
Bachelor's Degree			0.0634***	0.0640***	0.0639***	0.0702***
			[8.901]	[8.317]	[7.627]	[9.106]
Advanced Degree			0.0633***	0.0791***	0.0772***	0.0892***
			[7.199]	[8.247]	[7.424]	[9.205]
Financial Literacy	4.051***	2.357***	2.644***	4.387***	2.439***	4.202***
	[11.22]	[6.983]	[5.298]	[9.882]	[4.872]	[9.044]
Foreign Born Population	0.0290***	0.0239***				
	[5.489]	[6.869]				
Foreign Born - LatAm			0.0339***	0.0462***	0.0414***	0.0463***
			[4.415]	[7.575]	[5.144]	[7.562]
Foreign Born - Europe			0.0985***	0.0966***	0.0893***	0.0952***
			[3.765]	[5.116]	[3.231]	[5.020]
Foreign Born - Asia			0.0465***	0.0186**	0.0259*	0.0133*
			[3.613]	[2.379]	[1.945]	[1.691]
Distance to Intl Cities (,000 miles)	-0.124*	0.000104				
	[-1.845]	[0.00198]				
Distance to Tokio (,000 miles)			-0.622***	0.833***	-0.695***	0.686***
			[-3.103]	[5.503]	[-3.418]	[4.517]
Distance to London (,000 miles)			-0.837*	2.605***	-0.974**	1.169***

			[-1.911]	[7.312]	[-2.200]	[3.527]
Distance to Mexico (,000 miles)			-0.591**	1.369***	-0.665**	0.543***
			[-2.170]	[6.343]	[-2.355]	[2.691]
Distance to Toronto (,000 miles)			0.289	-1.851***	0.393	-0.484*
			[0.817]	[-6.183]	[1.100]	[-1.767]
Urban	-0.374***	-0.234	-0.394***	-0.327*	-0.430***	-0.211
	[-3.116]	[-1.290]	[-3.247]	[-1.796]	[-3.473]	[-1.158]
Large Rural	-0.336**	-0.237	-0.344**	-0.309	-0.342**	-0.278
	[-2.286]	[-1.122]	[-2.332]	[-1.462]	[-2.326]	[-1.313]
Small Rural	-0.136	-0.497**	-0.107	-0.522**	-0.120	-0.481**
	[-0.861]	[-2.058]	[-0.676]	[-2.166]	[-0.764]	[-1.989]
Long Distance Minutes	-0.0495***	0.0372***	-0.0358***	0.0350***	-0.0370***	0.0243***
	[-4.418]	[4.896]	[-2.760]	[4.068]	[-2.860]	[2.829]
State Exports/GDP	0.0947***	0.143***	0.0892***	0.190***	0.0883***	
	[7.130]	[12.78]	[6.239]	[14.61]	[6.185]	
State Openness						0.0531***
						[10.42]
GDP per Capita	-3.15e-05***	-4.50e-05***	-3.12e-05***	-4.16e-05***	-3.57e-05***	-4.30e-05***
	[-5.422]	[-9.973]	[-5.363]	[-9.174]	[-6.130]	[-9.355]
GDP Growth 2000-2005	5.179***	2.319***	5.052***	2.630***	5.111***	1.122
	[6.065]	[2.849]	[5.783]	[2.953]	[5.865]	[1.272]
GDP Growth 2006-2011	0.830	2.804***	0.420	3.534***	0.304	4.105***
	[1.613]	[7.609]	[0.787]	[8.745]	[0.571]	[9.869]
ln(House Value Zillow)		0.174*		0.140		-0.0924
		[1.918]		[1.396]		[-0.924]
ln(House Value Census)					-0.0260	
					[-0.220]	
Constant	-24.97***	-27.67***	-17.40***	-53.24***	-15.45***	-42.26***
	[-18.51]	[-21.99]	[-4.675]	[-15.94]	[-4.035]	[-13.30]
Observations	28,525	12,297	28,525	12,297	28,136	12,297
Adjusted R-squared	0.020	0.085	0.022	0.092	0.022	0.084

Table 8

The Firm and International Diversification

Panel A - Summary statistics on firm characteristics

Panel A presents the mean, median, standard deviation, 5th and 95th percentiles and number of observations for the firm level data. For the private, foreign headquarter, foreign subsidiary dummies and the % of foreign subsidiaries variable, we substitute the median with the average of the 49th-51st percentiles, the 5th percentile with the average of the 4th- 6th percentiles, and the 95th percentile with the average of the 94th-96th percentiles. All variables are defined in the Appendix.

Variables	Mean	Median	Std Dev	p5	p95	# Obs
Private Dummy	0.62	1.00	0.48	0.00	1.00	290
Foreign Headquarter Dummy	0.16	0.00	0.37	0.00	1.00	290
Foreign Subsidiary Dummy	0.56	1.00	0.50	0.00	1.00	289
Foreign Subsidiaries (%)	28.6	10.5	33.5	0.0	87.3	289
Industry Openness	24.0	0.0	35.9	0.0	118	264
Firm Age	69	65	45	9	147	268
# Employees	18,623	4,650	48,093	220	70,000	265
Assets (USD mn)	38,693	3,674	200,300	48	79,980	156
Leverage (%)	30.6	27.9	20.6	4.9	65.3	126
Sales/Assets (%)	106	78.3	120	8.05	293	152
Profitability (%)	2.84	2.74	9.67	-14.30	14.7	156
Investment Intensity (%)	4.18	3.53	3.28	0.12	10.6	125
Fraction of Intnl Eq Funds	21.47%	20.00%	7.57%	10.53%	33.33%	297
Expense Ratio of Intnl/Domestic	1.294	1.121	1.063	0.489	2.394	296
Turnover of Intnl/Domestic Eq Funds	0.896	0.734	0.611	0.158	2.016	294
Alpha of Intnl- Alpha of Domestic Eq Funds	-0.004	-0.004	0.009	-0.019	0.012	296
Fund Age of Intnl/Domestic Eq Funds	0.932	0.854	0.584	0.315	1.900	291
Peer Exp Ratio IntnlEq Funds	89.97	95.50	11.91	62.50	100	296
Total Plan Assets (USD mn)	456.93	332.79	720.04	40.35	1,081	296

Panel B - Firm characteristics and diversification

The regressions in this table examine the firm fixed effects extracted from an individual level regression of international diversification on the percent invested in a target dated fund, the international diversification benchmark, a quadratic time trend, birth year cohort, advice dummy, and quadratic annual salary, quadratic account value, interacted with the advice dummy, and the house value corresponding to the individual's zip code. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Firm FE	Firm FE	Firm FE	Firm FE	Firm FE	Firm FE	Firm FE
Private	3.922***	3.911*	5.347**	3.918*		3.894*	3.723
	[6.017]	[1.808]	[2.239]	[1.797]		[1.818]	[1.657]
Public Parent	-2.239**	0.112	-2.395	0.126		-0.765	-0.481
	[-2.326]	[0.0315]	[-0.637]	[0.0349]		[-0.215]	[-0.130]
Foreign Headquarters Dummy	1.341	3.981	-4.683	3.966		4.636	2.038
	[1.332]	[1.059]	[-0.859]	[1.046]		[1.232]	[0.500]
Foreign Subsidiaries Dummy		3.591**	3.936**	3.571**		2.864*	3.182*
		[2.241]	[2.194]	[2.142]		[1.728]	[1.898]
ln(Firm Age)		0.538	0.673	0.542	0.322	0.833	0.715
		[0.900]	[1.016]	[0.891]	[0.544]	[1.366]	[1.113]
ln(# Employees)		0.620	0.899	0.618	0.230	0.462	0.779
		[0.985]	[0.975]	[0.976]	[0.406]	[0.736]	[1.100]
ln(Assets)		-0.397	-0.580	-0.390	-0.134	-0.410	-0.460
		[-0.678]	[-0.694]	[-0.645]	[-0.255]	[-0.690]	[-0.735]
Leverage		-0.00476	-0.00507	-0.00452	0.00470	-0.00488	0.000277
		[-0.162]	[-0.146]	[-0.151]	[0.175]	[-0.164]	[0.00881]
Sales/Assets		-0.0106	-0.00400	-0.0106	0.00220	-0.00986	-0.0141
		[-0.738]	[-0.265]	[-0.726]	[0.161]	[-0.689]	[-0.901]
Profitability		-0.172**	-0.138*	-0.172**	-0.157**	-0.164**	-0.175**
		[-2.241]	[-1.678]	[-2.226]	[-2.120]	[-2.163]	[-2.223]
Investment Intensity		-0.0196	-0.215	-0.0206	-0.110	0.0274	0.0493
		[-0.110]	[-0.864]	[-0.114]	[-0.708]	[0.151]	[0.251]

Industry Openness				0.000625	0.00219	0.00218	-0.000875
				[0.0464]	[0.172]	[0.162]	[-0.0601]
Fraction of Intnl Eq Funds						9.390	6.221
						[1.248]	[0.737]
Expense Ratio of Intnl/Expense Ratio of Domestic Eq Funds						-1.021**	-1.080**
						[-2.178]	[-2.195]
Turnover of Intnl/Domestic Eq Funds							-0.481
							[-0.481]
Alpha of Intnl/Domestic Eq Funds							48.21
							[0.891]
Fund Age of Intnl/Domestic Eq Funds							0.381
							[0.493]
Peer Exp Ratio Intnl Eq Funds							-0.110*
							[-1.930]
Total Plan Assets							3.62e-07
							[0.318]
Constant	-27.40***	-33.98***	-31.68***	-34.05***	-29.04***	-33.90***	-25.23***
	[-58.11]	[-7.453]	[-4.093]	[-6.989]	[-6.437]	[-6.864]	[-3.954]
Observations	286	109	109	109	113	108	103
R-squared	0.120	0.165	0.345	0.165	0.057	0.215	0.280
Industry Fixed Effects	N	N	Y	N	N	N	N

Table 9

Panel A – Controlling for the Quarter the Worker Joined the Firm, the Firm's Identity and the Quarter-Year of Observation

Panel A reports the results of including fixed effects based on the quarter the worker joined the firm, the firm's identity and the quarter-year of observation in the regressions in Column (4) of Table 3, Columns (2) and (5) of Table 5 and of Table 6. Panel B repeats the same regressions controlling directly for the number and quality of the international funds offered by the plan in a more recent subsample. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

Variables	(1) Idiv	(2) Idiv	(3) Idiv	(4) Idiv	(5) Idiv
% in Target Date Fund	0.0324***	0.0304***	0.0322***	0.0321***	0.0315***
	[172.7]	**[134.7]**	**[156.1]**	**[142.3]**	**[139.6]**
Intl Div. Benchmark	0.257***	0.312***	0.275***	0.315***	0.315***
	[50.16]	**[49.41]**	**[47.44]**	**[50.04]**	**[49.96]**
Trend	0.156***	0.207***	0.197***	0.186***	0.172***
	[22.19]	[24.24]	[24.94]	[21.74]	[20.16]
$Trend^2$	-0.0023***	-0.0058***	-0.0049***	-0.0052***	-0.0049***
	[-9.843]	[-20.27]	[-18.57]	[-18.23]	[-17.18]
Cohort	0.0478***	0.0566***	0.0572***	0.0543***	0.0569***
	[84.97]	**[83.60]**	**[91.54]**	**[80.42]**	**[81.04]**
Advice Dummy				2.415***	4.593***
				[79.06]	**[18.16]**
Non-Stale Advice Dummy				1.638***	
				[43.81]	
Advice Dummy*Cohort					-0.0264***
					[-12.92]
ln(Annual Salary)		0.283***	0.284***	0.257***	0.269***
		[20.04]	[22.00]	[18.25]	[18.90]
$ln(Annual\ Salary)^2$		0.0726***	0.0774***	0.0697***	0.0706***
		[32.48]	**[37.65]**	**[31.26]**	**[30.99]**
Adv Dmy*ln(Annual Salary)					-0.295***
					[-3.082]
Adv Dmy*$ln(Annual\ Salary)^2$					0.0171
					[1.360]
ln(Account Value)		0.248***	0.213***	0.233***	0.226***
		[40.22]	**[37.67]**	**[37.75]**	**[35.89]**
$ln(Account\ Value)^2$		0.0603***	0.0642***	0.0503***	0.0428***
		[51.42]	**[59.80]**	**[42.95]**	**[35.45]**
Adv Dmy*ln(Account Value)					0.271***
					[9.652]
Adv Dmy*$ln(Account\ Value)^2$					0.0263***
					[5.792]
ln(House Value Zillow)		0.238***		0.260***	0.257***
		[20.75]		[22.64]	[22.41]

ln(House Value Census)			0.348***		
			[30.57]		
Constant	-2.664***	-12.78***	-12.02***	-13.03***	-12.96***
	[-8.560]	[-31.47]	[-31.84]	[-32.15]	[-31.94]
Observations	9,170,900	6,040,811	7,038,080	6,040,811	6,040,811
Adjusted R-squared	0.136	0.134	0.136	0.138	0.138
Quarter Joined *Quarter-Year *Firm Fixed Effects	Y	Y	Y	Y	Y

Panel B – Controlling for the International Funds offered and their Quality

	(1)	(2)	(3)	(4)	(5)
Variables	Idiv	Idiv	Idiv	Idiv	Idiv
% in Target Date Fund	0.0644***	0.0601***	0.0646***	0.0614***	0.0613***
	[543.2]	**[391.3]**	**[473.9]**	**[401.4]**	**[399.4]**
Intl Div. Benchmark	0.158***	0.253***	0.244***	0.236***	0.240***
	[46.69]	[57.34]	[62.54]	[53.71]	[54.66]
Trend	0.134***	0.0303***	-0.0263***	0.0107*	0.00176
	[30.96]	[5.454]	[-5.369]	[1.940]	[0.319]
$Trend^2$	0.00294***	0.00550***	0.00750***	0.00608***	0.00640***
	[20.22]	[29.60]	[45.46]	[32.84]	[34.55]
Cohort	0.163***	0.146***	0.146***	0.141***	0.145***
	[487.2]	**[308.1]**	**[342.1]**	**[298.1]**	**[293.5]**
Advice Dummy				2.586***	9.097***
				[103.8]	**[42.63]**
Non-Stale Advice Dummy				3.276***	
				[102.1]	
Advice Dummy*Cohort					-0.0557***
					[-32.47]
ln(Annual Salary)		0.00977	-0.0355***	-0.0378***	-0.0249**
		[0.812]	[-3.380]	[-3.159]	[-2.054]
$ln(Annual Salary)^2$		0.223***	0.220***	0.218***	0.219***
		[115.8]	**[129.3]**	**[113.4]**	**[111.4]**
Advice Dummy*ln(Annual Salary)					-0.430***
					[-5.114]
Advice Dummy*$ln(Annual Salary)^2$					0.0573***
					[5.064]
ln(Account Value)		0.121***	0.0994***	0.0981***	0.0802***
		[28.67]	[26.40]	[23.38]	[18.64]
$ln(Account Value)^2$		-0.0518***	-0.0434***	-0.0633***	-0.0604***
		[-64.06]	**[-59.82]**	**[-78.33]**	**[-71.61]**
Advice Dummy*ln(Account Value)					0.286***
					[14.50]
Advice Dummy*$ln(Account Value)^2$					-0.0804***
					[-24.41]
ln(House Value Zillow)		0.624***		0.629***	0.644***
		[77.26]		**[78.26]**	**[79.97]**
ln(House Value Census)			0.760***		
			[0.23]		
Fraction of Intnl Eq Funds	21.30***	22.49***	22.78***	21.87***	22.12***
	[388.3]	**[318.9]**	**[364.7]**	**[311.0]**	**[314.4]**
Expense Ratio of Intnl/Domestic	-1.505***	-1.566***	-1.509***	-1.574***	-1.556***

	[-381.5]	**[-308.9]**	**[-347.4]**	**[-311.7]**	**[-307.9]**
Turnover of Intnl/Dom Eq Funds	-0.368***	-0.235***	-0.219***	-0.251***	-0.294***
	[-45.38]	[-23.32]	[-24.57]	[-24.97]	[-29.25]
Alpha Intnl- Alpha Dom Eq Funds	-14.05***	-27.91***	-6.934***	-33.19***	-33.38***
	[-27.87]	[-40.08]	[-11.82]	[-47.82]	[-48.05]
Fund Age of Intnl/Dom Eq Funds	0.0718***	0.204***	0.103***	0.194***	0.204***
	[16.26]	[37.77]	[21.17]	[36.10]	[37.94]
Peer Exp Ratio Intnl Eq Fds	-0.178***	-0.180***	-0.171***	-0.184***	-0.184***
	[-356.3]	**[-273.7]**	**[-306.3]**	**[-281.2]**	**[-280.6]**
Total Plan Assets	4.72e-07***	-5.6e-08***	9.42e-08***	1.21e-07***	9.78e-08***
	[127.6]	[-7.976]	[18.24]	[17.33]	[14.05]
Constant	6.767***	-7.811***	-9.349***	-5.802***	-6.569***
	[32.25]	[-27.07]	[-36.54]	[-20.18]	[-22.82]
Observations	16,299,381	9,983,354	12,163,670	9,983,354	9,983,354
Adjusted R-squared	0.073	0.068	0.074	0.075	0.074

Table 10
Subsamples

This table reports the results for individual level regressions of international diversification on the percent invested in a target dated fund, the international diversification benchmark, a quadratic time trend and birth year cohort for different subsamples. Panel B reports the results of these same regressions, controlling for salary, wealth and access to advice effects. Column (2) excludes observations with (a) tenure 0-3, age>35, (b) tenure 4-5, age>40, (c) tenure 6-10, age>45, (d) tenure 11-15, age>50, (e) tenure 16-20, age>55, (f) those with missing tenure. Column (3) excludes observations with salaries>=100,000 and account balances>=200,000, along with those that have missing information for either variable. Column (4) is a combination of the exclusion rules specified in columns (2) and (3). Column (5) excludes observations with bond allocations over 50% and Column (6) uses international stocks as the dependent variable. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 1% level are denoted by bold and underlined t-statistics, while significance at the 5 and 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Idiv	Idiv	Idiv	Idiv	Idiv	Int'l Stock
% Target Date Fund	0.0590***	0.0481***	0.0539***	0.0445***	0.0560***	0.0709***
	[483.0]	**[292.9]**	**[409.9]**	**[258.8]**	**[458.2]**	**[725.5]**
Int'l div. bmk	0.214***	0.188***	0.245***	0.243***	0.209***	0.278***
	[66.02]	[41.53]	**[67.14]**	**[48.75]**	**[63.33]**	**[110.8]**
Trend	0.0395***	0.133***	-0.00786*	0.0287***	0.0815***	-0.318***
	[9.287]	[21.29]	[-1.654]	[4.247]	[18.56]	**[-96.93]**
$Trend^2$	0.00331***	-0.000275	0.00532***	0.00419***	0.00178***	0.0128***
	[22.95]	[-1.303]	[33.04]	[18.27]	[12.04]	**[114.7]**
Cohort	0.158***	0.158***	0.152***	0.147***	0.161***	0.211***
	[481.0]	**[335.4]**	**[406.6]**	**[283.8]**	**[477.2]**	**[840.9]**
Constant	-8.450***	-5.691***	-9.492***	-7.922***	-8.439***	-18.90***
	[-43.15]	[-20.58]	[-43.07]	[-26.10]	[-42.20]	**[-124.8]**
Observations	17,082,302	9,169,875	13,550,869	7,603,024	15,940,134	19,017,474
Adjusted R-squared	0.131	0.097	0.128	0.099	0.138	0.142
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Subsample	Whole Sample	Age-Tenure Screen	Salary-Account Screen	Age/Tenure and Salary/Account	Exclude High Bond Allocations	Int'l Stock as dependent var.

Appendix

1: Firm Characteristics

Panel A presents the mean, median, standard deviation and 5th and 95th percentiles for firms in our sample between 2006 and 2011. The 5th percentile is an average of the 4th, 5th and 6th percentiles, the median is the average of the 49th, 50th, and 51st percentiles and the 95th percentile is the average of the 94th, 95th, and 96th percentile. Panels B and C present these same statistics for all firms in Compustat and the S&P 500 between 2006 and 2011, respectively. Note that firm age in these two cases is calculated as number of years in Compustat.

Panel A - Sample Firms

Variables	mean	median	sd	p5	p95
Assets (USD mn)	46,286	4,378	254,441	152	88,847
Debt (USD mn)	26,376	1,616	227,237	32	16,042
Net Income (USD mn)	167	132	4,481	-642	2,935
Sales (USD mn)	9,337	3,122	17,619	133	43,044
Capex (USD mn)	694	161	1,156	3	3,596
Leverage (%)	31	29	21	5	66
Sales/Assets (%)	95	77	87	11	234
Profitability (%)	1.9	2.9	11.2	-14.4	13.0
Investment Intensity (%)	4.5	3.5	3.8	0.1	12.3
ROA	2.1	3.0	9.3	-13.9	13.1
ROE	-111.3	5.8	1405.9	-52.2	13.8
Annual Return (%)	14.9	5.6	104.9	-61.6	79.6
Number of Employees	17,095	4,483	42,969	232	66,633
Firm Age (years)	69	65	45	9	148
Plan Assets – Total per firm (USD mn)	925	297	2,055	22	4,342
Defined Benefit Dummy	69	65	45	9	148
Default Investment Dummy	688	247	1,271	24	3,164

Panel B - Compustat Firms

Variables	mean	median	sd	p5	p95
Assets (USD mn)	4,578	558	16,748	8	20,959
Debt (USD mn)	1,174	99	4,100	0	5,595
Net Income (USD mn)	150	6	595	-96	912
Sales (USD mn)	2,275	254	6,508	3	11,622
Capex (USD mn)	171	11	549	0	890
Leverage (%)	32	22	62	1	81
Sales/Assets (%)	86	66	82	5	248
Profitability (%)	-12.6	1.4	91.0	-70.5	15.3
Investment Intensity (%)	5.3	2.8	7.5	0.1	20.6
ROA	-9.4	1.6	68.3	-62.2	16.4
ROE	-8.4	3.9	45.4	-71.1	15.9
Annual Return (%)	5.6	0.0	51.5	-68.3	94.2
Number of Employees	7,576	951	20,404	24	38,945
Firm Age (years in Compustat)	14	9	14	0	47

Panel C - S&P 500 Firms

Variables	mean	median	sd	p5	p95
Assets (USD mn)	53,556	12,524	186,742	2,145	176,675
Debt (USD mn)	16,236	2,921	74,226	6	34,558
Net Income (USD mn)	1,281	573	3,976	-617	5,768
Sales (USD mn)	18,365	7,819	35,079	1,336	71,725
Capex (USD mn)	1,034	285	2,396	4	3,946
Leverage (%)	25	23	18	0	56
Sales/Assets (%)	84	67	73	7	234
Profitability (%)	5.8	5.5	8.1	-3.5	17.2
Investment Intensity (%)	4.3	3.1	4.6	0.0	12.2
ROA	5.8	5.5	8.1	-4.3	18.0
ROE	3.4	6.0	16.3	-11.9	12.1
Annual Return (%)	8.3	7.5	41.5	-54.5	71.1
Number of Employees	48,038	19,283	113,816	2,115	194,120
Firm Age (years in Compustat)	35	35	19	8	60

Panel D Sample Firms – Private versus Public

Panel D presents the mean, median, standard deviation, 5th and 95th percentiles and number of firm-year observations in our sample between 2006 and 2011. The 5th percentile is an average of the 4th, 5th and 6th percentiles, the median is the average of the 49th, 50th, and 51st percentiles and the 95th percentile is the average of the 94th, 95th, and 96th percentile. Summary statistics are decomposed into private firms and public firms. There are 178 private firms, 108 public firms and 4 firms who switch from public to private or private to public in the sample.

Public Firms

Variable	# Obs	Mean	Median	Std Dev	p5	p95
Assets (USD mn)	403	50,464	5,895	282,944	439	70,368
Debt (USD mn)	403	28,513	1,627	237,620	31	16,509
Net Income (USD mn)	403	255	200	5,010	-515	3,112
Sales (USD mn)	403	10,923	3,730	19,154	551	50,853
Capex (USD mn)	403	700	166	1,178	3	3,651
Leverage (%)	403	30	28	21	4	59
Sales/Assets (%)	403	82	72	52	14	183
Profitability (%)	403	1.9	3.2	11.0	-15.1	12.7
Investment Intensity (%)	403	4.4	3.4	3.8	0.1	11.7
ROA	401	2.4	3.3	9.4	-14.7	13.4
ROE	399	-111.3	5.8	1405.9	-52.2	13.8
Annual Return (%)	397	15.8	6.8	105.8	-61.6	82.8
Number of Employees	406	30,394	10,204	61,706	1,400	142,833
Firm Age (years)	388	76	74	47	9	152
Plan Assets –						
Total per firm (USD mn)	271	1,284	457	2,760	44	5,207
Defined Benefit Dummy	104	0.673	0.917	0.416	0	1
Default Investment Dummy	104	0.118	0.167	0.126	0	0.200

Private Firms

Variable	# Obs	mean	median	sd	p5	p95
Assets (USD mn)	111	31,117	1,176	95,164	15	263,255
Debt (USD mn)	38	3,712	1,448	4,312	282	13,668
Net Income (USD mn)	109	-159	10	1,208	-1,990	735
Sales (USD mn)	98	2,814	1,225	5,131	13	18,048
Capex (USD mn)	37	622	68	889	9	2,416
Leverage (%)	38	45	45	22	6	84
Sales/Assets (%)	96	152	106	156	5	384
Profitability (%)	107	2.0	1.4	11.8	-12.1	13.7
Investment Intensity (%)	35	5.2	4.1	3.9	0.2	12.9
ROA	66	0.3	1.1	8.0	-10.9	7.7
ROE	0					
Annual Return (%)	9	-22.2	0.0	33.3	-95.5	0.8
Number of Employees	549	7,260	2,433	13,122	151	31,826
Firm Age (years)	574	63	62	42	7	142
Plan Assets –						
Total per firm (USD mn)	370	672	217	1,277	19	3,663
Defined Benefit Dummy	169	0.524	0.750	0.460	0	1
Default Investment Dummy	169	0.156	0.167	0.167	0	0.500

2: Employee Characteristics

Panel A Employee Characteristics across Firms

Panel A presents the mean, median, standard deviation and 5th and 95th percentiles for all individuals in the sample between 2005 and 2011 (the data include both stock market participants and non-stock market participants).

Variables	Mean	Median	Std Dev	p5	p95
Salary	46,205	39,687	48.014	0	118,183
Total Account Value	62,798	22,255	113,850	279	256,085
Contribution Rate	5.89%	5.00%	6.16%	0%	17.00%
Tenure	10.55	7.25	10.64	0.08	32.02
Age	46	46	12	27	65
Cohort	1963	1963	12	1940	1983

Panel B Current Population Survey (CPS)

Panel B presents the mean, median, standard deviation and 5th and 95th percentiles for individual statistics in the Current Population Survey between 2006 and 2011. In order to extract tenure data, we use the January CPS Displaced Worker, Employee Tenure and Occupational Mobility Supplement for years 2006, 2008, and 2010, while 2007, 2009, and 2011 data come from the January CPS. The summary statistics reported in this table are the average of the annual statistics.

Variables	Mean	Median	Std Dev	p5	p95
Salary	45,437	37,175	30,045	14,685	109,840
Tenure	7.7	5.0	8.2	0.3	25.7
Age	41	42	12	23	62

Panel C - Summary Statistics for Managed Accounts

This table reports the mean, median, std dev, 5th and 95th percentiles and number of observations for the individual level data. The sample includes individuals with a managed account. All variables are defined in the Appendix. The sample period is 2005 to 2011.

Variable	Mean	Median	Std Dev	p5	p95	# Obs
Cohort	1962	1961	11	1946	1981	1,611,453
Age	46	47	11	28	63	1,611,453
Annual Salary	56,160	47,625	42,147	19,919	114,689	1,363,806
Total Account Value	59,639	27,735	91,565	1,220	224,215	1,611,552
House Value (Census)	234,266	178,300	159,756	82,300	575,800	1,587,840
Tenure	8.1	3.7	9.2	0.4	27.6	1,476,011
Contribution Rate (%)	7	6	6	0	17	1,363,806

Appendix 3: Controlling for the Firm's Identity and the Quarter-Year of Observation in Table 9

This table reports the results of including fixed effects based on the firm's identity and the quarter-year of observation in the regressions in Column (4) of Table 3, Columns (2) and (5) of Table 5 and of Table 6. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

Variables	(1) Idiv	(2) Idiv	(3) Idiv	(4) Idiv	(5) Idiv
% in Target Date Fund	0.0369***	0.0331***	0.0362***	0.0344***	0.0340***
	[243.6]	**[176.6]**	**[216.0]**	**[183.8]**	**[181.4]**
Intl Div. Benchmark	0.188***	0.268***	0.243***	0.270***	0.271***
	[48.63]	**[55.10]**	**[55.38]**	**[55.69]**	**[55.89]**
Trend	0.0508***	0.0398***	0.00746	0.0231***	0.00755
	[9.003]	[5.776]	[1.186]	[3.352]	[1.097]
$Trend^2$	0.00232***	0.00161***	0.00301***	0.00204***	0.00240***
	[12.26]	[6.935]	[14.21]	[8.802]	[10.38]
Cohort	0.0649***	0.0698***	0.0702***	0.0675***	0.0696***
	[142.2]	**[121.1]**	**[134.3]**	**[117.2]**	**[116.7]**
Advice Dummy				2.333***	4.334***
				[84.50]	**[20.16]**
Non-Stale Advice Dummy				1.701***	
				[49.59]	
Advice Dummy*Cohort					-0.0238***
					[-12.66]
ln(Annual Salary)		0.191***	0.184***	0.168***	0.177***
		[16.91]	[18.45]	[14.91]	[15.59]
$ln(Annual Salary)^2$		0.116***	0.120***	0.113***	0.116***
		[62.83]	**[72.65]**	**[61.66]**	**[61.97]**
Advice Dummy*ln(Annual Salary)					-0.121
					[-1.604]
Advice Dummy*$ln(Annual Salary)^2$					-0.0247**
					[-2.454]
ln(Account Value)		0.242***	0.196***	0.224***	0.215***
		[45.81]	**[41.37]**	**[42.54]**	**[40.13]**
$ln(Account Value)^2$		0.0242***	0.0279***	0.0149***	0.00882***
		[24.21]	[30.90]	[14.93]	[8.553]
Advice Dummy*ln(Account Value)					0.336***
					[13.39]
Advice Dummy*$ln(Account Value)^2$					0.0135***
					[3.328]
ln(House Value Zillow)		0.332***		0.351***	0.350***
		[32.40]		**[34.34]**	**[34.23]**

ln(House Value Census)			0.487***		
			[48.84]		
Constant	0.502**	-11.68***	-11.92***	-11.84***	-11.87***
	[2.108]	[-36.21]	[-40.42]	[-36.79]	[-36.84]
Observations	11,902,112	7,641,430	9,079,957	7,641,430	7,641,430
Adjusted R-squared	0.149	0.141	0.147	0.144	0.144
Quarter-Year *Firm Fixed Effects	Y	Y	Y	Y	Y

Appendix 4: Subsamples – Income, Wealth, Access to Advice and International Diversification

Panel A reports the results for individual level regressions of international diversification on the percent invested in a target dated fund, the intnl div benchmark, a quadratic time trend and birth year cohort for different subsamples, salary and wealth on various subsamples. Panel B adds access to online advice. See Table 10 for more details on this table.

Panel A

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	idiv	idiv	idiv	idiv	idiv	Int'l Stock
% target date fund	0.0543***	0.0417***	0.0538***	0.0412***	0.0509***	0.0743***
	[341.2]	**[204.3]**	**[335.6]**	**[200.5]**	**[319.0]**	**[581.8]**
Int'l diversification benchmark	0.317***	0.322***	0.297***	0.295***	0.312***	0.347***
	[75.54]	**[57.80]**	**[69.46]**	**[52.09]**	**[72.94]**	**[104.8]**
Trend	0.0589***	0.0588***	0.0504***	0.0486***	0.109***	-0.321***
	[10.85]	[7.839]	[9.119]	[6.357]	[19.35]	**[-75.19]**
Trend^2	0.00242***	0.00221***	0.00306***	0.00310***	0.000616***	0.0125***
	[13.27]	[8.716]	[16.48]	[11.97]	[3.271]	**[86.63]**
Cohort	0.148***	0.121***	0.150***	0.122***	0.148***	0.224***
	[321.3]	**[191.3]**	**[321.6]**	**[191.8]**	**[311.2]**	**[619.6]**
ln(annual salary)	0.185***	0.292***	0.182***	0.293***	0.187***	0.222***
	[20.61]	[20.78]	[20.29]	[20.91]	[20.57]	[31.90]
ln(annual salary)^2	0.186***	0.149***	0.187***	0.148***	0.181***	0.165***
	[128.1]	**[67.29]**	**[126.5]**	[65.31]	**[123.1]**	**[145.1]**
ln(account value)	0.0551***	-0.170***	0.0660***	-0.156***	0.0697***	0.252***
	[13.46]	[-29.79]	[15.98]	[-27.10]	[16.80]	[81.84]
ln(account value)^2	-0.0331***	-0.0416***	-0.0403***	-0.0498***	-0.0413***	-0.00535***
	[-42.71]	[-39.01]	[-49.17]	[-44.24]	[-52.65]	[-9.074]
ln(house value Zillow)	0.653***	0.684***	0.653***	0.689***	0.643***	0.637***
	[74.76]	**[59.64]**	**[73.34]**	**[59.15]**	**[72.06]**	**[92.58]**
Constant	-25.33***	-21.88***	-24.07***	-20.29***	-24.80***	-35.56***
	[-92.48]	[-59.78]	**[-86.35]**	[-54.50]	**[-88.69]**	**[-164.7]**
Observations	10,621,481	6,040,610	10,216,034	5,813,961	9,898,960	11,642,469
Adjusted R-squared	0.120	0.094	0.122	0.096	0.126	0.138
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Subsample	Whole	Age-Tenure Screen	Salary-Account Screen	Age/Tenure and Salary/Account Screen	ex-High Bond Allocations	Int'l Stock as dependent variable

Panel B

Variables	(1) Idiv	(2) Idiv	(3) Idiv	(4) Idiv	(5) Idiv	(6) Itnl Stock
% in Target Date Fund	0.0554***	0.0427***	0.0550***	0.0422***	0.0519***	0.0754***
	[348.5]	**[208.7]**	**[343.2]**	**[205.0]**	**[325.6]**	**[591.2]**
Intl Div. Benchmark	0.322***	0.326***	0.301***	0.299***	0.316***	0.351***
	[76.82]	**[58.71]**	**[70.75]**	**[52.99]**	**[74.05]**	**[106.2]**
Trend	0.0200***	0.0225***	0.0121**	0.0125	0.0687***	-0.349***
	[3.694]	[2.999]	[2.191]	[1.642]	[12.28]	**[-82.07]**
$Trend^2$	0.00349***	0.00317***	0.00412***	0.00407***	0.00172***	0.0132***
	[19.15]	[12.51]	[22.24]	[15.76]	[9.156]	**[92.30]**
Cohort	0.146***	0.122***	0.147***	0.123***	0.147***	0.218***
	[303.9]	**[184.3]**	**[303.5]**	**[184.4]**	**[296.5]**	**[578.9]**
Advice Dummy	7.396***	5.783***	7.116***	5.653***	8.194***	2.961***
	[46.00]	**[22.63]**	**[43.57]**	**[21.97]**	**[49.58]**	[23.02]
Advice Dummy*Cohort	-0.0450***	-0.0399***	-0.0422***	-0.0388***	-0.0563***	0.0118***
	[-28.73]	[-19.53]	**[-26.34]**	**[-18.66]**	**[-34.89]**	[9.420]
ln(Annual Salary)	0.150***	0.289***	0.149***	0.292***	0.157***	0.193***
	[16.52]	[20.44]	[16.34]	[20.66]	[17.00]	[27.38]
$ln(Annual Salary)^2$	0.185***	0.146***	0.185***	0.143***	0.181***	0.161***
	[124.3]	**[64.52]**	**[122.0]**	**[62.13]**	**[120.0]**	**[138.6]**
Adv Dmy*ln(Salary)	-0.0793	-0.535***	-0.0843*	-0.584***	-0.139***	-0.144***
	[-1.632]	[-5.502]	[-1.732]	[-5.952]	[-2.811]	[-3.665]
Adv Dmy*$ln(Salary)^2$	-0.0285***	0.0569***	-0.0209***	0.0717***	-0.0329***	0.0168***
	[-4.322]	[4.462]	[-3.088]	[5.434]	[-4.912]	[3.155]
ln(Account Value)	0.0135***	-0.198***	0.0213***	-0.189***	0.0272***	0.208***
	[3.220]	[-34.10]	[5.054]	[-32.20]	[6.408]	[65.93]
$ln(Account Value)^2$	-0.0468***	-0.0562***	-0.0528***	-0.0627***	-0.0558***	-0.00938***
	[-57.76]	**[-50.45]**	**[-61.87]**	**[-53.48]**	**[-67.85]**	[-15.23]
Adv Dmy*ln(Acct Val)	0.323***	0.530***	0.355***	0.597***	0.351***	0.322***
	[17.38]	[18.82]	**[18.68]**	**[20.45]**	**[18.72]**	[22.34]
Ad Dy*$ln(ActVl)^2$	-0.0356***	-0.0355***	-0.0413***	-0.0492***	-0.0324***	-0.0711***
	[-11.74]	[-7.902]	[-12.58]	[-10.04]	[-10.52]	**[-30.04]**
ln(House Value Zillow)	0.700***	0.703***	0.697***	0.706***	0.690***	0.670***
	[80.38]	**[61.44]**	**[78.49]**	**[60.71]**	**[77.63]**	**[97.52]**
Constant	-25.76***	-22.25***	-24.43***	-20.61***	-25.27***	-35.57***
	[-94.24]	[-60.84]	**[-87.85]**	[-55.40]	**[-90.58]**	**[-165.1]**
Observations	10,621,481	6,040,610	10,216,034	5,813,961	9,898,960	11,642,469
Adjusted R-squared	0.126	0.098	0.128	0.100	0.132	0.143
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Subsample	Whole Sample	Age-Tenure Screen	Salary-Acct Value Screen	Age/Tenure & Salary/Acct	Exclude High Bond Alloc.	Intl Stock as Dep Var

Appendix 5 – Tobit Regressions. The table repeats the regressions in Column (4) of Table 3, Columns (2) and (5) of Table 5 and of Table 6 using a tobit specification. All variables are defined in the Appendix. T-statistics are in brackets. The superscript *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. Standard errors clustered at the firm level significant at the 5% level are denoted by bold and underlined t-statistics, while significance at the 10% level is denoted by underlined t-statistics. The sample period is 2005 to 2011.

	(1)	(2)	(3)	(4)	(5)
Variables	Idiv	Idiv	Idiv	Idiv	Idiv
% in Target Date Fund	0.0885***	0.0833***	0.0898***	0.0851***	0.0849***
	[655.2]	**[488.7]**	**[588.7]**	**[501.0]**	**[499.1]**
Intl Div. Benchmark	0.184***	0.402***	0.356***	0.371***	0.374***
	[47.06]	[82.30]	[81.37]	[76.39]	[76.96]
Trend	0.224***	0.0573***	0.0202***	0.0766***	0.0673***
	[44.91]	[9.393]	[3.688]	[12.62]	[11.07]
$Trend^2$	0.00162***	0.00526***	0.00684***	0.00454***	0.00492***
	[9.667]	[25.72]	[37.19]	[22.31]	[24.18]
Cohort	0.229***	0.197***	0.202***	0.188***	0.196***
	[585.1]	**[366.2]**	**[414.3]**	**[350.6]**	**[348.5]**
Advice Dummy				3.217***	12.01***
				[127.2]	**[63.19]**
Non-Stale Advice Dummy				3.600***	
				[107.8]	
Advice Dummy*Cohort					-0.0990***
					[-53.49]
ln(Annual Salary)		0.148***	0.0687***	0.0835***	0.0877***
		[14.11]	[7.226]	[7.993]	[8.244]
$ln(Annual Salary)^2$		0.222***	0.218***	0.213***	0.212***
		[132.2]	**[141.6]**	**[127.2]**	**[122.9]**
Advice Dummy*ln(Annual Salary)					0.0102
					[0.177]
Advice Dummy*$ln(Annual Salary)^2$					0.0234***
					[3.020]
ln(Account Value)		0.231***	0.228***	0.206***	0.195***
		[47.45]	[52.10]	[42.50]	[39.20]
$ln(Account Value)^2$		-0.0497***	-0.0399***	-0.0684***	-0.0642***
		[-54.16]	[-47.99]	**[-74.57]**	**[-66.64]**
Advice Dummy*ln(Account Value)					0.169***
					[7.563]
Advice Dummy*$ln(Account Value)^2$					-0.0921***
					[-25.27]
ln(House Value Zillow)		0.836***		0.858***	0.875***
		[92.47]		[95.38]	[97.16]
ln(House Value Census)			1.266***		
			[148.7]		
Constant	-15.69***	-39.43***	-41.97***	-37.13***	-38.03***
	[-66.30]	**[-125.6]**	**[-148.6]**	**[-118.8]**	**[-121.4]**
Observations	17,082,302	10,621,481	12,883,608	10,621,481	10,621,481

Appendix 6: Variable Description

Individual Level Variables	Description
International Diversification (idiv)	Allocation to international equities over allocation to all equities. The total equity allocation is defined as the combination of investments in Large Cap Stocks, Small and Mid Cap Stocks, Individual Stocks, Company Stock and International Stocks. This series is individual specific. Source: Financial Engines.
Cohort	The cohort variable is defined as the individual's birth year minus 1900. The cohort is set to 1993 if the individual is born after 1990 and to 1940 if the individual is born before 1945. This data is individual specific. Source: Financial Engines.
Age	Age is defined as the difference between the observation date and the individual's birth date. Source: Financial Engines.
Total Account Value (log)	Total account values represent the balance in the 401(k) account. This value is first deflated to 2005 prices using the Consumer Price Index for All Urban Consumers and then the natural logarithm is taken. Source: Financial Engines and U.S. Department of Labor: Bureau of Labor Statistics.
House Value - Zillow (log)	The natural logarithm of house values deflated to 2005 prices using the Consumer Price Index for All Urban Consumers. We match the Zillow average house value in a zip code to each individual based on the zip code they live in according to Financial Engines. Source: Zillow, U.S. Department of Labor: Bureau of Labor Statistics, Financial Engines.
House Value - Census (log)	The natural logarithm of median house values in dollars at the zip code level. This variable is matched to the individual data using the zip code where the user lives. Source: U.S. Census Bureau, 2008-2012 American Community Survey - Table B25077: Median Housing Value of Owner-Occupied Housing Units (Dollars).
Annual Salary (log)	Annual Salary represents the dollar amount an individual is paid by the company. The dollar amount is first deflated to 2005 prices using the Consumer Price Index for All Urban Consumers and then the natural logarithm is taken. Source: Financial Engines and U.S.

	Department of Labor: Bureau of Labor Statistics.
% Target Date Fund	Amount allocated to target dated funds as a percentage of the individual's total account value. This data is individual specific. Source: Financial Engines.
International Diversification Benchmark	The ratio of international market cap (MSCI Market Cap All Countries ex-US) to the sum of international and domestic market cap (MSCI Market Cap All Countries). We obtain daily data from MSCI and match the ratio of market caps to the date on which the individual's data point is drawn. Source: MSCI and Financial Engines.
Relative Returns	International stock returns (MSCI All Countries ex-US returns) in excess of US stock returns (MSCI US) between the period t-1 and t. For each individual, we calculate the cumulative international stock return between t-1 and t, the cumulative return for US stocks between t-1, and t and take the difference. Note that t is defined as the day on which the individual is observed, while t-1 is the previous observation (in annualized percent). Source: MSCI and Financial Engines.
MN Experienced Returns	Following the methodology proposed by Malmendier and Nagel (2011), the experienced returns measure is the weighted average of past returns with weights that depend on an individual's age at time t, how many years ago the return was realized and a parameter that controls for the shape of the weighting function. This paper builds experienced returns based on international stock returns in excess of US stock returns (in annualized percent).
Return Chasing	This variable is constructed using the same methodology as MN Experienced Returns, but uses international stock returns as the relevant past returns.
Flight to Safety	We borrow the flight to safety (FTS) dummy variable for the United States from Baele et al. (2013). They use data on bond and stock returns to measure the occurrence of stress periods in which stock markets decline and liquid benchmark bonds increase in value.
Advice Dummy	Dummy variable equal to 1 if the individual has signed

	the investor service agreement to obtain online advice from Financial Engines. Source: Financial Engines.
Not Stale Advice Dummy	Dummy variable equal to 1 if the individual has accessed the online advice website within the past year. Source: Financial Engines.
Total Equity	Allocation to equities in the overall 401(k) portfolio. The total equity allocation is defined as the combination of investments in Large Cap Stocks, Small and Mid Cap Stocks, Individual Stocks, Company Stock and International Stocks. This series is individual specific. Source: Financial Engines.
International Equity	Allocation to international equity in the overall 401(k) portfolio. This series is individual specific. Source: Financial Engines.

Zip Code Variables	**Description**
Bachelor's Degree or Higher	Bachelor's degree or higher as a percentage of population over 25 years old. Bachelor's degree or higher is the sum of people with a bachelor's degree (hd01_vd22), master's degree (hd01_vd23), professional school degree (hd01_vd24) and doctorate degree (hd01_vd25). This is divided by the total population 25 years and over in the area (hd01_vd01). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2008-2012 American Community Survey - Table B15003: Educational attainment for the population over 25 years and over.
Advanced Degree	Master's degree or higher as a percentage of population over 25 years old. Master's degree or higher is the sum of people with a master's degree (hd01_vd23), professional school degree (hd01_vd24) and doctorate degree (hd01_vd25). This is divided by the total population 25 years and over in the area (hd01_vd01). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2008-2012 American Community Survey - Table B15003 - Educational attainment for the population over 25 years and over.

Less than college degree	Less than college degree as a percentage of population over 25 years old. Less than college degree is the sum of people with a regular high school diploma (hd01_vd17), GED high school diploma (hd01_vd18), some college - less than 1 year (hd01_vd19), some college - more than 1 year (hd01_vd20) and associate's degree (hd01_vd21). This sum is divided by the total population 25 years and over in the area (hd01_vd01). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2008-2012 American Community Survey - Table B15003: Educational attainment for the population over 25 years and over.
Bachelor's Degree	Bachelor's degree as a percentage of population over 25 years old. This variable is defined as people with a bachelor's degree (hd01_vd22) divided by the total population 25 years and over in the area (hd01_vd01). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2008-2012 American Community Survey - Table B15003: Educational attainment for the population over 25 years and over.
Foreign Born Population	Foreign-born population over total population. This variable is defined as Total Foreign Born Population (hd01_vd01) over total population in the area (hc01_vc03). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2007-2011 American Community Survey - Tables B05007: Place of birth by year of entry by citizenship status for the foreign-born population and DP05: ACS demographic and housing estimates.
Foreign Born Population - Latin America	Foreign-born population from Latin America over total population. This variable is defined as the Latin American born population (hd01_vd28) over total population in the area (hc01_vc03). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2007-2011 American Community Survey - Tables B05007: Place of birth by year of entry by citizenship status for the foreign-born population and DP05: ACS demographic and housing estimates.
Foreign Born Population - Europe	Foreign-born population from Europe over total population. This variable is defined as the European

	born population (hd01_vd02) over total population in the area (hc01_vc03). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2007-2011 American Community Survey - Tables B05007: Place of birth by year of entry by citizenship status for the foreign-born population and DP05: ACS demographic and housing estimates.
Foreign Born Population - Asia	Foreign-born population from Asia over total population. This variable is defined as the Asian born population (hd01_vd15) over total population in the area (hc01_vc03). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2007-2011 American Community Survey - Tables B05007: Place of birth by year of entry by citizenship status for the foreign-born population and DP05: ACS demographic and housing estimates.
Foreign Born Population - Other	Foreign-born population from a region other than Asia, Europe and Latin America over total population. This variable is defined as the "Other" born population (hd01_vd82) over total population in the area (hc01_vc03). Census labels are in parentheses. Data is at a zip code level. Source: U.S. Census Bureau, 2007-2011 American Community Survey - Tables B05007: Place of birth by year of entry by citizenship status for the foreign-born population and DP05: ACS demographic and housing estimates.
State Exports/GDP	Export of goods measured as a share of gross domestic product at the state level (ratio is average of 2008-2011 annual data). Source: U.S. Census Bureau and Bureau of Economic Analysis.
State Openness	The sum of exports and imports of goods measured as a share of gross domestic product at the state level (ratio is average of 2008-2011 annual data). Source: U.S. Census Bureau and Bureau of Economic Analysis.
GDP per capita	Per capita real GDP by state (chained 2005 dollars), 2005 to 2011 average. Data is annual. Source: Bureau of Economic Analysis.
GDP growth	Real GDP by state (millions of chained 2005 dollars). We take the 2000 to 2005 and 2006 to 2011 growth rates. Data is annual. Source: Bureau of Economic Analysis.

Rural	Rural is a categorical variable that takes values 1 to 4 in integer units, with 1 representing the most urban areas and 4 the most isolated. The variable is constructed from the RUCA 2.0 variable in the Zip RUCA Code dataset. More specifically, a zip code is classified in the following way: (i) urban if RUCA2.0 is 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, or 10.1, (ii) large rural city/town if RUCA2.0 is 4.0, 4.2, 5.0, 5.2, 6.0, or 6.), (iii) small rural town if RUCA2.0 is 7.0, 7.2, 7.3, 7.4, 8.0, 8.2, 8.3, 8.4, 9.0, 9.1, 9.2, and isolated if RUCA2.0 is 10.0, 10.2, 10.3, 10.4, 10.5, or 10.6. Source: RUCA Rural Health Research Center.
Urban	The variable Urban is a dummy variable equal to 1 if RUCA2.0 is equal to 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, or 10.1 (these are the metropolitan areas in the Zip RUCA Code dataset). Data is at the zip code level. Source: RUCA Rural Health Research Center.
Large Rural	The variable Large Rural is a dummy variable equal to 1 if RUCA2.0 is equal to 4.0, 4.2, 5.0, 5.2, 6.0, or 6.1 (these are the large rural city/town areas in the Zip RUCA Code dataset). Data is at the zip code level. Source: RUCA Rural Health Research Center.
Small Rural	The variable Small Rural is a dummy variable equal to 1 if RUCA2.0 is equal to 7.0, 7.2, 7.3, 7.4, 8.0, 8.2, 8.3, 8.4, 9.0, 9.1, 9.2 (these are the small rural town areas in the Zip RUCA Code dataset). Data is at the zip code level. Source: RUCA Rural Health Research Center.
Isolated	The variable Isolated is a dummy variable equal to 1 if RUCA2.0 is equal to 10.0, 10.2, 10.3, 10.4, 10.5, or 10.6 (these are the isolated small rural areas in the Zip RUCA Code dataset). Data is at the zip code level. Source: RUCA Rural Health Research Center.
Long distance minutes	Number of long distance hours from land lines and mobile phones scaled by total population. Data is at the state level and is the average of the annual data between 2000-2011. Source: FCC.
Distance to International Cities	Distance to international cities is the cumulative distance from each zip code to London, Tokyo, Toronto and Mexico City (in miles). To calculate the distance from a zip code to each city, we apply the haversine formula using the latitude and longitude of each point.

	This formula calculates the great-circle distance between two points (the shortest distance over the earth's surface), giving an 'as-the-crow-flies' distance between the zip code and the city. We then add the four distances to produce the zip code's distance to international cities. Source: federalgovernmentzipcodes.us.
Financial Literacy	Mean number of correct quiz answers in financial knowledge survey. Multiple choice quiz questions include calculations involving interest rates and inflation, the relationship between bond prices and interest rates, risk and diversification, and the impact of short-term rates on life of a mortgage. Data is at the state level. Source: 2012 National Financial Capability Study Data Tables.
House Value - Zillow (log)	The natural logarithm of house values at the zip code level deflated to 2005 prices using the Consumer Price Index for All Urban Consumers. We take the average of the deflated monthly data for the period that the zip code is in the sample (ranges between 2006-2011). Source: Zillow and U.S. Department of Labor: Bureau of Labor Statistics.
House Value - Census (log)	The natural logarithm of median house values in dollars at the zip code level. Source: U.S. Census Bureau, 2008-2012 American Community Survey - Table B25077: Median Housing Value of Owner-Occupied Housing Units (Dollars).

Firm Variables	**Description**
Private	Dummy variable that takes the value of 1 if the firm is private and 0 if the firm is public. Source: Capital IQ.
Foreign Headquarter Dummy	Dummy variable that takes the value of 1 if firm's ultimate parent is based in a country outside of the United States. Source: Capital IQ.
Foreign Subsidiary Dummy	Dummy variable equal to 1 if firm has a subsidiary in a country outside of the United States. Source: Orbis.
% Foreign Subsidiaries	Number of foreign subsidiaries over the total number of subsidiaries in the firm. If company has no subsidiaries, this variable takes the value of zero. Source: Orbis.

Industry Openness	The sum of exports and imports of goods measured as a share of gross output by industry (ratio is average of 2000-2011 annual data). Industry is classified at the 3-digit NAICS level. Source: U.S. Census Bureau and Bureau of Economic Analysis.
Firm Age (log)	Firm age is calculated as the difference between the current fiscal year and the year the firm was founded. Source: Capital IQ.
Number of Employees (log)	Number of employees in the firm. Use data from Capital IQ only when Compustat data is missing. Given that Compustat reports number of employees in thousands, we multiply the data item "emp" by 1000 in order to be consistent with Capital IQ. We take the average of the annual data for the period that the firm is in the sample (ranges between 2005 and 2011). Source: Compustat and Capital IQ.
Assets (log)	Firm assets in USD million, data item "at" in Compustat, deflated to 2005 prices using the Consumer Price Index for All Urban Consumers. Use data from Capital IQ only when Compustat data is missing. We take the average of the annual data for the period that the firm is in the sample (ranges between 2005 and 2011). Source: Compustat, Capital IQ and U.S. Department of Labor: Bureau of Labor Statistics.
Leverage	Firm total debt over assets, data items (dlc + dltt)/at in Compustat. Use data from Capital IQ only when Compustat data is missing. We take the average of the annual data for the period that the firm is in the sample (ranges between 2005 and 2011). Source: Compustat and Capital IQ.
Sales/Assets	Firm sales over assets, data items "sales" and "at" in Compustat. Use data from Capital IQ only when Compustat data is missing. We take the average of the annual data for the period that the firm is in the sample (ranges between 2005 and 2011). Source: Compustat and Capital IQ.
Profitability	Firm net income over assets, data items "ni" and "at" in Compustat. Use data from Capital IQ only when Compustat data is missing. We take the average of the annual data for the period that the firm is in the sample (ranges between 2005 and 2011). Source: Compustat

	and Capital IQ.
Investment Intensity	Firm capex over assets, data items "capx" and "at" in Compustat. Use data from Capital IQ only when Compustat data is missing. We take the average of the annual data for the period that the firm is in the sample (ranges between 2005 and 2011). Source: Compustat and Capital IQ.

Plan Variables	**Description**
Fraction of International Equity Funds	Number of international over Domestic equity funds. The funds are classified as international based on the Lipper categories covering international equity funds, emerging market funds, area or country specific funds. Source: Financial Engines.
Expense Ratio of Intnl/Expense Ratio of Domestic Eq Funds	Ratio of the median expense ratio of the international funds and the median expense ratio of the domestic fund offered by the company's plan(s). Source: Financial Engines.
Turnover of Intnl/ Domestic Eq Funds	Ratio of the median turnover of the international funds and the median turnover of the domestic fund offered by the company's plan(s). Source: Financial Engines.
Alpha of Intnl/ Domestic Eq Funds	Difference between the median alpha of the international funds and the median alpha of the domestic fund offered by the company's plan(s). Alphas are calculated relative to a benchmark computed using style analysis with 15 asset classes. Source: Financial Engines.
Fund Age of Intnl/ Domestic Eq Funds	Ratio of the median age of the international funds and the median age of the domestic fund offered by the company's plan(s). Source: Financial Engines.
Peer Expense Ratio of Intnl Funds	Median relative standing among peers in terms of expense ratio for the international funds offered by the company's plan(s). Source: Financial Engines.
Total Plan Assets	Total asset aggregated across all the plans offered by the firm (USD mn). Source: Financial Engines.