

**“WHO IS INTERNATIONALLY DIVERSIFIED?
EVIDENCE FROM 296 401(K) PLANS”**

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MOTIVATION AND EMPIRICAL QUESTION

Is there a lot of variation in the degree of diversification across individual portfolios (focus on 401(k))?

If yes, is it related to
personal characteristics (age, salary, tenure at their firm),
the firm they work at (size, investment, profitability, private/public,
industry,...)
the characteristics of the area where they live
the quality and type of investment opportunities

We study this phenomenon at the individual investor level, by analyzing the degree of international diversification and its determinants for 3.8 million U.S. workers investing in their 401(k) across 296 different firms, spanning different industries, geographic locations, private/public,...

INTERNATIONAL DIVERSIFICATION LITERATURE

Country-level studies:

- Information barriers (Ahearne, Grier 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)
- Transaction costs (Glassman and Riddick, 2001)
- Real exchange rate risks (Fidora, Fratzscher and Thimann, 2006)
- The need to hedge local consumption streams (Aviat and Coerdacier, 2007)
- Investment restrictions (Bekaert, Spiegel, Wang, 2013)
- Lack of familiarity (Portes and Rey, 2005)

Individual-level studies:

- Calvet, Campbell, Sodini (2007), Karlsson and Norden (2007) on Swedish households
- Graham, Harvey and Huang (2009) UBS survey on 1,000 US investors

Table 1
International Under-Diversification in the US

	Diversified Firms	Underdiv. Firms		Diversified States	Underdiv. States
Cohort 1960			Cohort 1960		
Low	30.90	7.01	Low	22.48	13.22
Intermediate	28.10	4.90	Intermediate	19.94	11.25
High	28.74	7.59	High	19.27	13.52
Cohort 1980			Cohort 1980		
Low	35.60	12.95	Low	31.23	21.04
Medium	35.12	12.65	Medium	27.94	19.13
High	34.70	15.25	High	25.98	19.26

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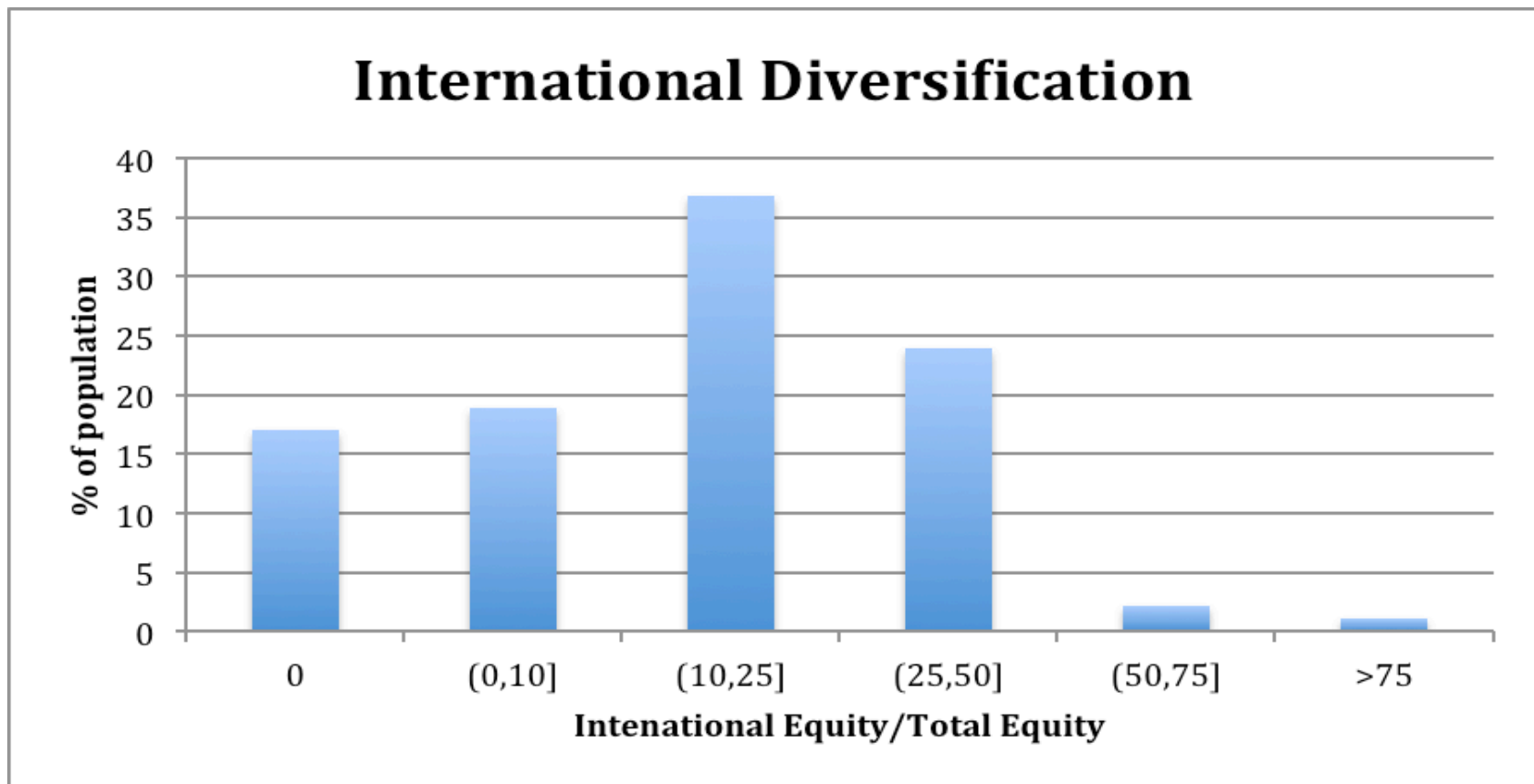
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POSSIBLE IMPLICATIONS

- 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 variation in international diversification for US individuals.
- 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.
- Other Determinants of International Under diversification: Age, Salary, Wealth, Location, Firm, Education levels, the quality of the investment options.

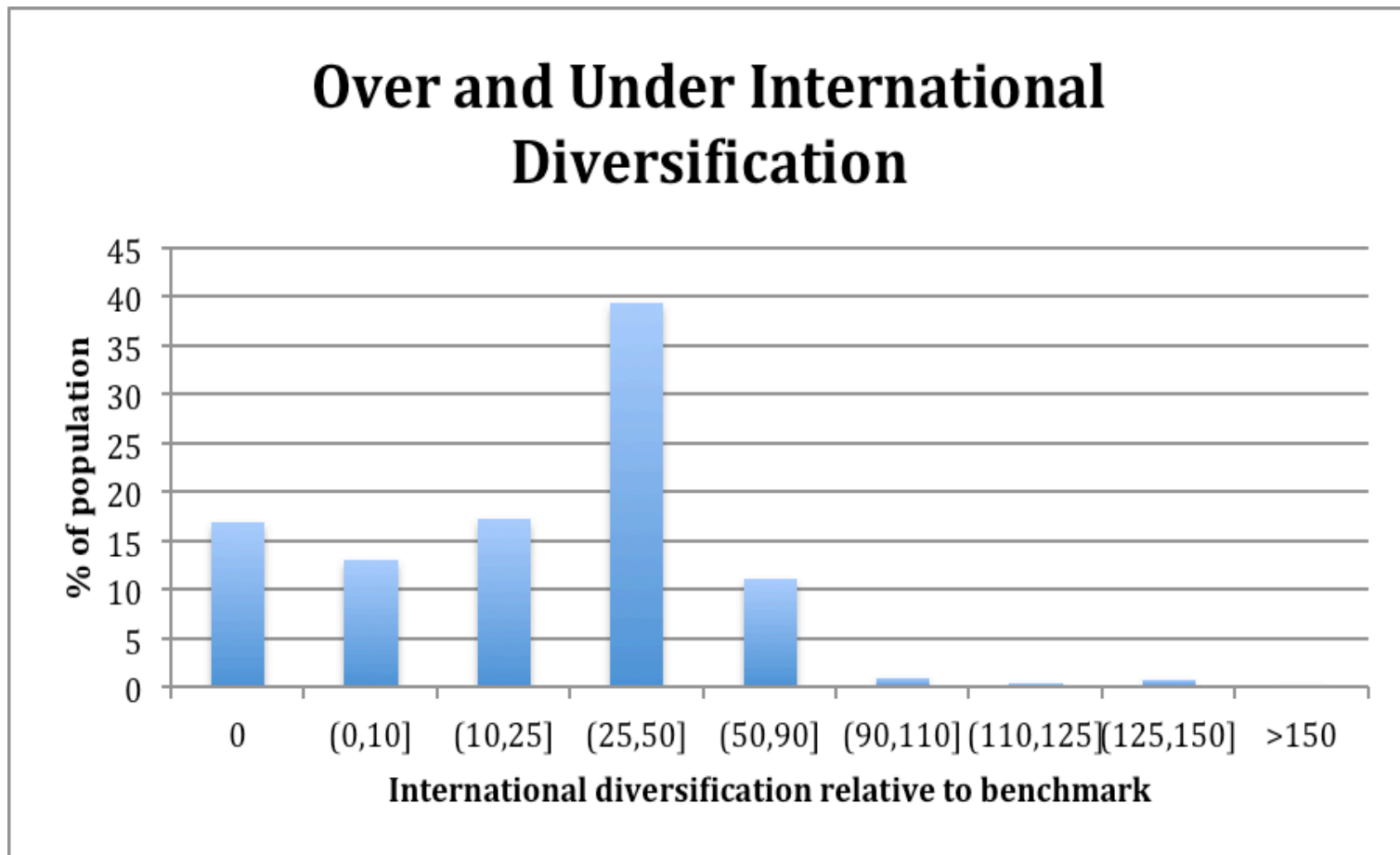
INTERNATIONAL DIVERSIFICATION ACROSS INDIVIDUALS

International Equity/Total Equity in Individual's Portfolio

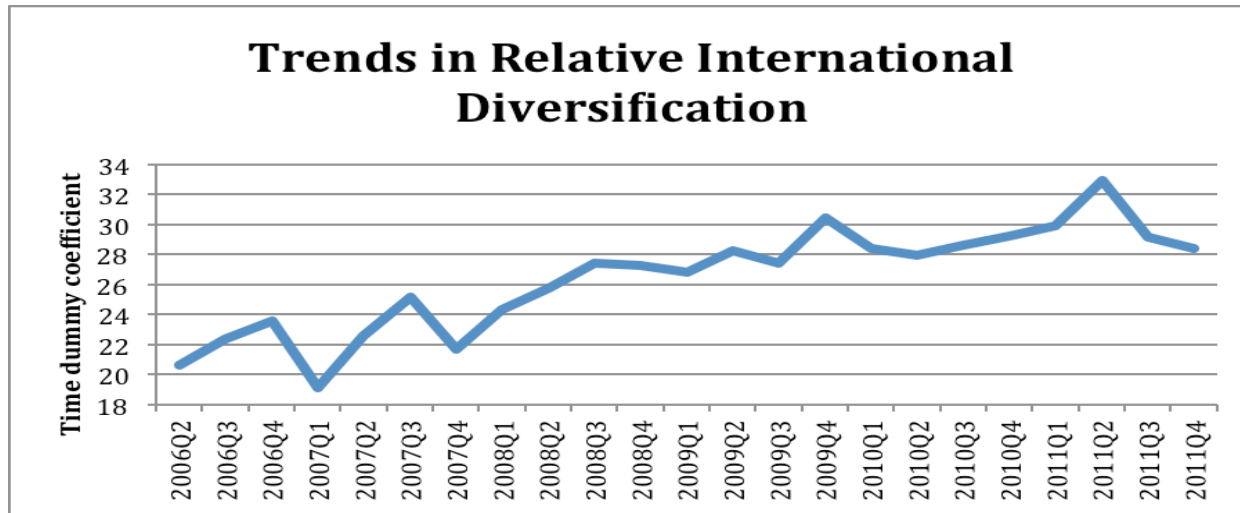
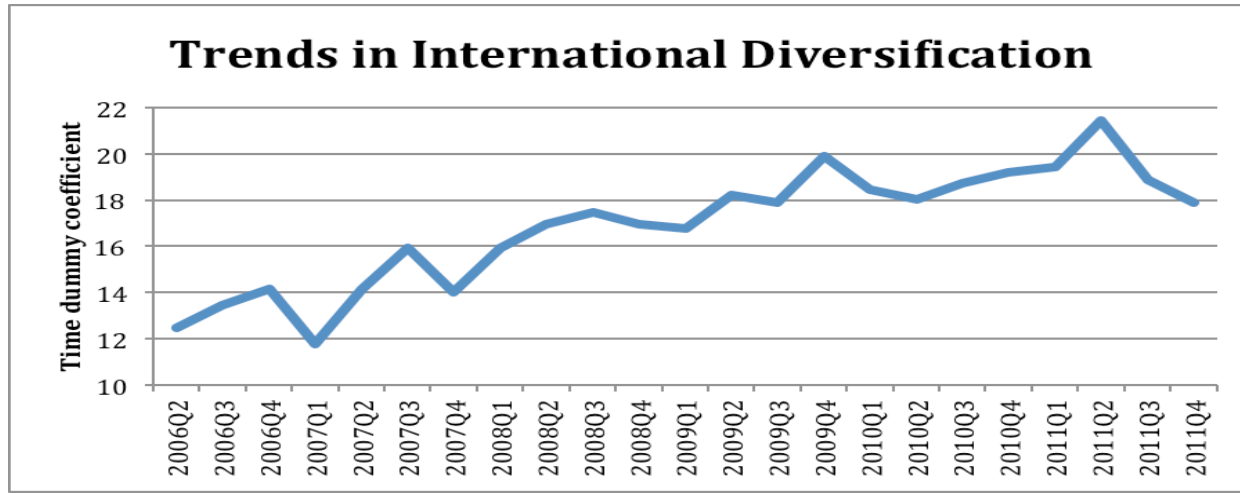


IN RELATIVE TERMS...

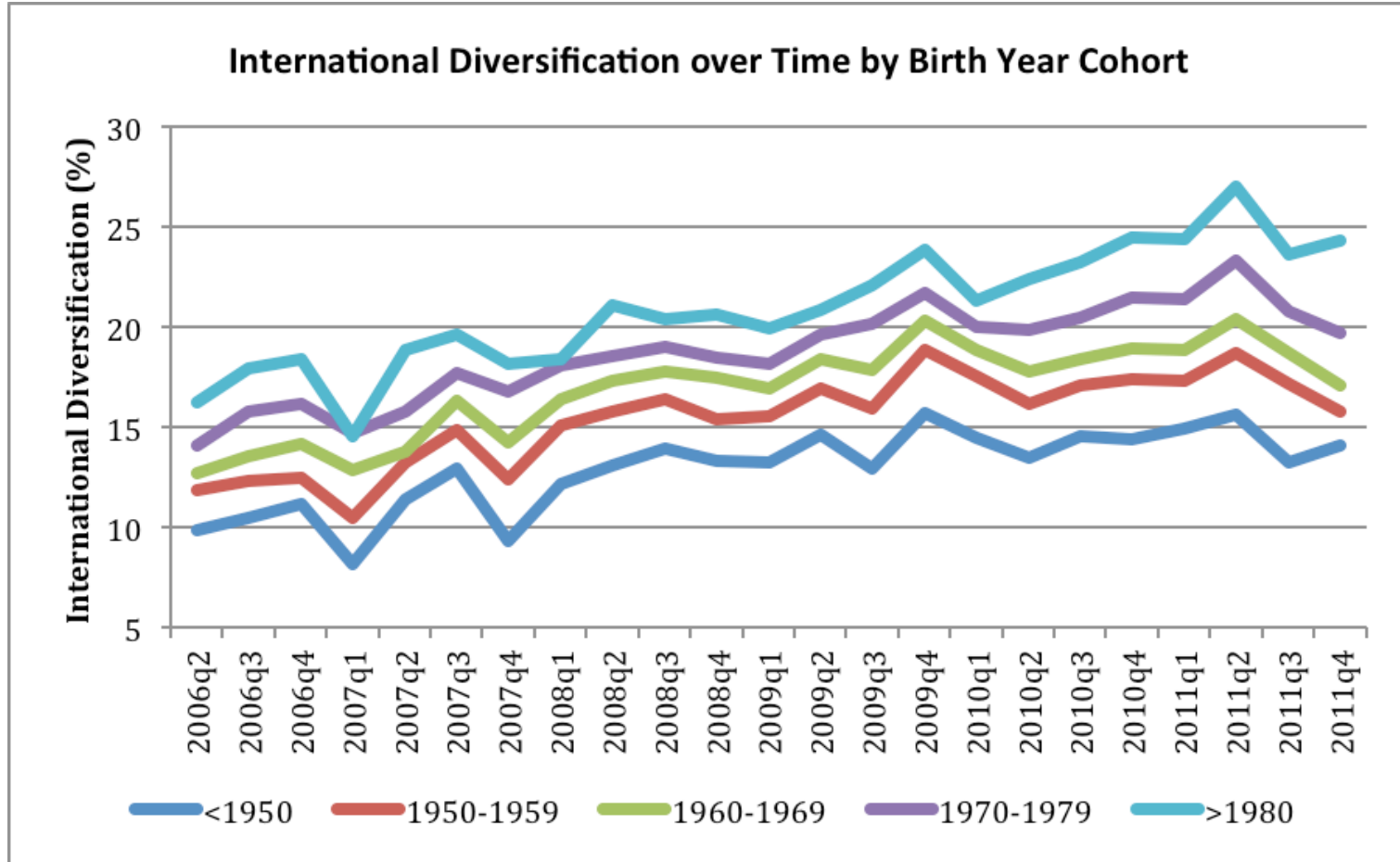
Benchmark: Proportion of Foreign Equity Markets in World Market Cap (MSCI data)



TREND IN INTERNATIONAL DIVERSIFICATION



EMPIRICAL RESULTS: ON AGE, COHORT AND TIME EFFECTS



THE SAMPLE

- Data from Financial Engines, market leader in online advice and asset management for 401(k) plans
- 296 firms; 3.8 million participants; representative; includes large firms with geographical diversification
- Sample: 2006-2011, but data sample grows over time
- Semi-annual snapshots for individuals; snapshots every quarter:
 - 1) Balance
 - 2) Age
 - 3) Salary
 - 4) Tenure
 - 5) “Style” asset classes, including various categories of equity (international, large cap domestic, small cap domestic, company stock)
 - 6) Target date fund allocation
- Lots of other information from variety of sources: IRS Form 5500; CRSP Compustat information on firms; Census data on socioeconomic characteristics of the zip code the households live in; house values.

Key Variable: $\text{idiv} = \text{international equity holdings} / \text{total equity holdings}$

- No bond data
- Conditional on stock market participation
- Minimizes asset location biases (Huang, 2008)
- We control for a benchmark, international market cap/world market cap, in the regressions $\sim 64.4\%$ over this period

COMPARISON WITH COMPUSTAT FIRMS AND CPS WORKERS

- Our **firms** are substantially larger than Compustat firms by asset, sales and employees
- They have higher ROA
- Similar leverage
- Both the private and public firms are established companies (median age is 65 yrs)

Average 401(k) **plan** is large (average is ~ \$1Billion), but there is a lot of variation (median is ~ \$300Millions)

Our **workers** have longer tenure at their firms (+5 years) and are about 4 years older and have higher salary (controlling for age and tenure) than the workers in the Current Population Survey

OUTLINE

Exploratory analysis of panel data on international diversification from 296 401(k) plans

- Explanatory factors:
 - 1) personal characteristics (R^2 approx. 5-6%)
 - 2) Location effects (zip codes) (R^2 approx. 8-9%)
 - 3) Firm effects (R^2 approx. 13%)

AGE, COHORT AND TIME EFFECTS

% target date fund	0.068***	0.059***	0.068***	0.068***	0.059***	0.068***
	[598]	[491]	[589]	[597]	[490]	[588]
Int'l div. bchmk	0.21***	0.20***	0.20***	0.21***	0.20***	0.20***
	[66.3]	[62.4]	[64.2]	[65.9]	[61.7]	[63.7]
Trend	0.066***	0.056***	-0.0013	0.11***	0.10***	0.044***
	[15.9]	[13.5]	[-0.31]	[27.5]	[23.9]	[10.8]
Trend ²	0.0056***	0.0033***	0.0074***	0.0054***	0.0032***	0.0072***
	[40.4]	[23.5]	[53.3]	[39.0]	[22.5]	[51.9]
Cohort	0.17***	0.16***	0.16***			
	[510]	[481]	[480]			
Age				-0.17***	-0.16***	-0.16***
				[-518]	[-488]	[-488]
Constant	-10.0***	-7.53***	-8.44***	7.47***	9.00***	8.38***
	[-51.3]	[-39.1]	[-43.6]	[38.3]	[46.9]	[43.5]
Firm Fixed Effects	N	Y	N	N	Y	N
Zip Code F.E.	N	N	Y	N	N	Y
Observations	17,426,447	17,426,447	17,412,265	17,426,447	17,426,447	17,412,265
Adjusted R ²	0.054	0.131	0.086	0.054	0.131	0.086

AGE, COHORT AND TIME EFFECTS

- Approach: time dummies, cohort dummies and age dummies are approximated by simple parametric functions. Ameriks and Zeldes (2004)
- Age effect is negative and seems implausible (allocation changes per individual are positive over time). Cohort Effect more plausible.
- Experience Variables:
 - Relative return wrong sign (although control for international benchmark trend)
 - Malmendier-Nagel (2011) “experience” variable on relative returns insignificant or the wrong sign
 - Malmendier-Nagel (2011) “experience” variable on absolute foreign returns (return chasing) is positive
 - flight to safety (Baele et al., 2014): not robust effect

SALARY AND WEALTH

Variables	(1) idiv	(2) idiv	(3) Idiv	(4) Idiv	(5) Idiv
% target date fund	0.066*** [394]	0.056*** [314]	0.065*** [494]	0.069*** [525]	0.057*** [408]
Int'l diversification benchmark	0.36*** [77.6]	0.31*** [67.5]	0.33*** [90.4]	0.34*** [91.1]	0.28*** [77.4]
Trend	-0.054*** [-9.35]	0.063*** [10.6]	-0.10*** [-22.9]	-0.081*** [-17.4]	0.019*** [4.03]
Trend ²	0.0084*** [42.8]	0.0028*** [14.0]	0.0099*** [64.4]	0.0095*** [60.7]	0.0043*** [26.6]
Cohort	0.14*** [276]	0.14*** [276]	0.14*** [328]	0.15*** [352]	0.14*** [349]
ln(annual salary)	-2.73*** [-83.5]	-2.51*** [-78.5]	-1.93*** [-78.9]	-2.50*** [-101]	-2.32*** [-96.7]
ln(annual salary) ²	0.20*** [112]	0.19*** [109]	0.15*** [114]	0.19*** [140]	0.18*** [138]
ln(account value)	0.80*** [50.9]	0.47*** [30.6]	0.76*** [61.7]	0.74*** [59.2]	0.41*** [33.9]
ln(account value) ²	-0.051*** [-57.1]	-0.032*** [-36.9]	-0.049*** [-70.3]	-0.046*** [-65.6]	-0.029*** [-42.8]
ln(house value Zillow)	0.63*** [71.9]	0.57*** [57.2]			
ln(house value census)				0.96*** [132]	0.82*** [98.7]
Constant	-20.5*** [-58.8]	-16.7*** [-48.1]	-13.2*** [-51.9]	-24.3*** [-88.7]	-18.6*** [-67.9]
Observations	8,553,859	8,553,859	13,338,002	13,149,891	13,149,891
Adjusted R-squared	0.047	0.118	0.086	0.053	0.130
Firm Fixed Effects	N	Y	N	N	Y
Zip Code Fixed Effects	N	N	Y	N	N

ECONOMIC MAGNITUDE

- House value (median ~ \$200,000): + \$50,000 \Rightarrow + 0.15%
- Salary (median ~ \$45,000): +\$10,000 \Rightarrow + 0.33%
- Account Balance (Median ~ \$20,000): +\$5,000 \Rightarrow -0.05%

Bachelor's or Higher	0.048***	0.050***
	[16.0]	[15.2]
Financial Literacy	3.50***	0.36
	[9.71]	[1.00]
Foreign Born Population	0.031***	0.028***
	[5.78]	[7.05]
Distance to International Cities	-1.19	-0.015
	[-1.24]	[-0.020]
Urban	-0.31***	-0.97***
	[-2.60]	[-4.00]
Large Rural	-0.40***	-1.26***
	[-2.73]	[-4.63]
Small Rural	-0.090	-1.16***
	[-0.57]	[-3.78]
Long Distance Minutes	-0.036***	0.029***
	[-3.07]	[2.81]
State Exports/GDP	0.091***	0.087***
	[5.71]	[6.02]
GDP per capita	-0.000017**	-0.000030***
	[-2.33]	[-4.74]
GDP Growth 2000-2005	0.0045	0.010
	[0.43]	[1.09]
GDP Growth 2006-2011	0.0075	0.033***
	[0.97]	[4.31]
ln(House Value Zillow)		0.041
		[0.39]
Constant	-22.0***	-16.7***
	[-15.9]	[-12.5]
Observations	28,547	8,773
R-squared	0.018	0.077

THE GEOGRAPHY OF INTERNATIONAL DIVERSIFICATION

Dependent Variable: Zip code coefficients

- No significant and robust effect of house values, distance, GDP growth (state level),...
- Strong Effect of Education and Financial Literacy (90% range changes):
 High school: + 1.67%
 Bachelor's degree: +2.21%
 Master or higher: 1.61%
 Financial Literacy (survey) +1.4%
- Strong Effect of Immigration (foreign born %): +0.78%
- Strong Effect of Trade Openness ((Exports+Imports)/GDP, State level data): +1%

INTERNATIONAL DIVERSIFICATION FIRM EFFECTS

Variables	Firm FE	Firm FE	Firm FE	Firm FE
In(Firm Age)	0.36 [0.60]	0.33 [0.56]	0.37 [0.62]	0.25 [0.42]
In(Total Employees)	0.21 [0.37]	0.12 [0.21]	0.39 [0.62]	0.20 [0.33]
In(Assets)	0.0037 [0.0069]	0.0014 [0.0027]	0.72 [1.20]	0.60 [1.00]
Leverage	-0.0077 [-0.29]	-0.0049 [-0.19]	0.0046 [0.14]	0.0053 [0.16]
Sales/Assets	-0.00098 [-0.072]	-0.0021 [-0.15]	0.0072 [0.51]	0.0053 [0.38]
Profitability	-0.16** [-2.19]	-0.15** [-2.08]	-0.13* [-1.78]	-0.13* [-1.73]
Investment Intensity	-0.034 [-0.21]	0.0036 [0.023]	-0.063 [-0.38]	-0.040 [-0.24]
Industry Openness	0.00043 [0.031]	-0.00056 [-0.043]	0.0041 [0.29]	0.0019 [0.14]
Private	3.54** [2.05]	3.53** [2.06]	3.50** [2.00]	3.53** [1.99]
Foreign Headq. Dummy	3.66 [0.96]	3.49 [0.93]	-1.68 [-0.32]	-1.24 [-0.23]
% Foreign Subsidiaries	0.015 [0.80]			
Foreign Subs. Dummy		2.46 [1.60]	2.30 [1.35]	2.58 [1.52]
In(Plan Assets – Total)			-1.14* [-1.97]	
In(Plan Assets – Average)				-0.87 [-1.53]
Constant	-21.2*** [-4.59]	-21.8*** [-4.76]	-8.47 [-0.96]	-11.0 [-1.21]
Observations	113	113	104	104
R-squared	0.103	0.120	0.162	0.148

ROBUSTNESS CHECKS

The Key Results are robust to:

- Age-tenure screens to eliminate older, low tenure people that might have multiple 401(k) accounts
- Salary-account balance screens to eliminate richer people, who likely have sizable taxable accounts
- Eliminate obs with bond allocations, as it might suggest an asset location strategy
- Measuring international diversification as international stock/total portfolio yields similar results

CONCLUSIONS

- Exploration of new panel data set on international equity allocations
- Enormous cross-individual dispersion of which only a small fraction can be explained by
 - a) Cohort effects
 - b) Salary and “wealth” proxies
 - c) Education
 - d) Location effects (Presence of foreigners; trade openness)
 - e) Firm effects

Caveats: Must control for quality and diversity of plan options

Education and Immigration effects worth exploring further