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Social Interaction and Stock-Market Participation

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ABSTRACT

We propose that stock-market participation is influenced by social interaction. In our model, any given "social" investor finds the market more attractive when more of his peers participate. We test this theory using data from the Health and Retirement Study, and find that social households—those who interact with their neighbors, or attend church—are substantially more likely to invest in the market than non-social households, controlling for wealth, race, education, and risk tolerance. Moreover, consistent with a peer-effects story, the impact of sociability is stronger in states where stock-market participation rates are higher.

IN 1998, 48.9 PERCENT OF AMERICAN HOUSEHOLDS owned stock, either directly, or through mutual funds or various retirement vehicles such as 401(k) plans or IRAs.[1] While this number may appear low in an absolute sense—particularly in light of the historically high returns to investing in the stock market—it actually represents an all-time peak in the United States, and a dramatic increase from prior years. For example, less than a decade earlier, in 1989, the participation rate stood at only 31.6 percent; even as late as 1995 it was at just 40.4 percent.

What are the underlying determinants of the stock-market participation rate? This question is an important one, for a number of reasons. First, as argued by, for example, Mankiw and Zeldes (1991), Heaton and Lucas (1999), Vissing-Jorgensen (1999), and Brav, Constantinides, and Gezcy (2002), the participation rate can have a direct effect on the equity premium; thus an understanding of what drives participation can help shed light on the equity-premium puzzle of Mehra and Prescott (1985).

Second, certain policy debates hinge crucially on one's view of why so many households opt not to participate in the stock market. Consider proposals which would have the government invest some portion of social security tax proceeds

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[1] The numbers in this paragraph are from the Survey of Consumer Finances, as reported by Bertaut and Starr-McCluer (2000).

in the stock market. On the one hand, if one takes the perspective of a full-information, frictionless model with optimizing households—in which those who sit out do so simply because they find the market's risk-return profile unattractive—standard arguments suggest that there is nothing to be gained by having the government invest in the market on their behalf. On the other hand, if households do not participate because of a lack of information about market opportunities, or because other frictional costs deter them from doing so, the case for these proposals can, at a minimum, begin to make logical sense.[2]

A few basic facts about the determinants of household participation in the stock market are already well known.[3] First, participation is strongly increasing in wealth. This can be understood by thinking of participation as involving fixed costs; wealthier households have more to invest, and so the fixed cost is less of a deterrent to them. Vissing-Jorgensen (2000) builds a model in which fixed costs of participation are incurred on a per-period basis, and estimates that such costs have to be on the order of $200 per year to explain observed participation rates. Of course, such large numbers beg the questions of what these black-box fixed costs actually represent, and whether one should think of them as being similar across different types of households.

Stock-market participation has also been found to be increasing in household education. One interpretation is that education reduces the fixed costs of participating, by making it easier for would-be investors to understand the market's risk–reward trade-offs, to deal with the mechanics of setting up an account, and executing trades, etc.[4] Finally, there is also a pronounced link between race and participation, with white, non-Hispanic households having much higher participation rates, controlling for wealth and education.

In this paper, we add to this line of work by considering the possibility that stock-market participation is influenced by social interaction. A priori, this would seem to be a promising hypothesis, given the growing body of empirical research that speaks to the importance of peer-group effects in a variety of other contexts.[5] Notably, some of this work finds evidence of peer effects in financial settings that are suggestively close to the one we have in mind—for example, Madrian and Shea (2000) and Duflo and Saez (2002) demonstrate that an individual's decision of whether or not to participate in particular employer-sponsored retirement plans is influenced by the choices of his co-workers.

[2] See Abel (2001) and Campbell et al. (1999) for explicit analyses along these lines.

[3] These facts are documented by, for example, Vissing-Jorgensen (2000) and Bertaut and Starr-McCluer (2000).

[4] Bernheim and Garrett (1996) and Bayer, Bernheim, and Scholz (1998) find that financial education in the workplace increases participation in retirement plans.

[5] Examples include Case and Katz (1991), Glaeser, Sacerdote, and Scheinkman (1996), and Bertrand, Luttmer, and Mullainathan (2000). Glaeser and Scheinkman (2000) provide a survey with more references.

In the specific setting of the stock market, there are at least two broad channels through which social interaction might influence participation. The first is word-of-mouth or observational learning (Banerjee (1992), Bikchandani, Hirshleifer, and Welch (1992), Ellison and Fudenberg (1993, 1995)).[6] For example, potential investors may learn from one another either about the high returns that the market has historically offered, or about how to execute trades. Second, in the spirit of Becker (1991), a stock-market participant may get pleasure from talking about the ups and downs of the market with friends who are also fellow participants, much as he might enjoy similar conversations about restaurants, books, movies, or local sports teams in which there is a shared interest.

We develop a model that captures these ideas in a simple way. Our model has two types of investors: (1) "non-socials" and (2) "socials." The non-socials are similar to the investors in Vissing-Jorgensen (2000): They each face fixed costs of participation, but these fixed costs are not influenced by the behavior of others. In contrast, any given social investor finds it more attractive to invest in the market—that is, his fixed costs are lower—when the participation rate among his peers is higher.

The model's most basic and unambiguous prediction is that there will be higher participation rates among social investors than among non-socials, all else being equal. The model also suggests that the participation rate among socials can be more sensitive to changes in other exogenous parameters—that is, there can be "social multiplier" effects. Consider the consequences of a change in technology (e.g., web-based trading) that makes the direct physical costs of participation lower for all investors. In many cases, this technological change will have a greater impact on the participation of socials than on that of non-socials because of the positive externalities that socials confer on one another. Indeed, when these positive externalities are strong enough, they can generate multiple equilibria among social investors.

In an effort to test the theory, we draw on data from the Health and Retirement Study (HRS). This survey of roughly 7,500 households has a variety of information on wealth, asset holdings, demographics, etc. But most relevant for our purposes, it also asks respondents several questions which allow us to create empirical analogs to our model's notion of "non-social" and "social" households. In particular, the survey asks whether households interact with their neighbors, or attend church.

We find that more social households—defined as those who answer "yes" to these questions—are indeed more likely to invest in the stock market, controlling for other factors like wealth, race, and education. The effects of sociability are both strongly statistically significant, as well as economically important.

[6] See also Routledge (1999) and DeMarzo, Vayanos, and Zwiebel (2001) for other models of learning in financial markets. Shiller and Pound (1989) present survey data on the diffusion of information among stock-market investors by word-of-mouth. Kelly and Grada (2000) find evidence that, during banking panics, bad news about banks spreads via word-of-mouth in neighborhoods.

Across the entire sample, households that either know their neighbors or attend church have roughly a 4 percent higher probability of participating in the stock market, all else being equal. Among white, educated households with above-average wealth—those who are typically most likely to be on the cusp of the participation decision—the marginal effect of sociability is substantially stronger, reaching 8 percent in some specifications.

While the HRS data allow us to address our theory in a straightforward way, they also suffer from an important drawback. The measures of sociability that we take from the HRS—whether households know their neighbors or attend church—reflect endogenous choices, and hence may capture information not just about the degree of social interaction per se, but also about other personality traits that may be associated with the propensity to invest in the stock market. For example, sociable people may be more bold, and hence less risk-averse when it comes to investing. Or they may be more optimistic, and hence have higher expectations for future stock-market returns.

We attempt to address these possibilities in two ways. First, we are fortunate in that the HRS data allow us to construct proxies for other potentially relevant personality traits such as risk tolerance and optimism. When entered as additional controls in the stock-market participation regressions, these proxies tend to come in significantly, and with the expected signs—suggesting that they are doing a good job of measuring what they are supposed to measure—but they have little effect on our sociability variables.

Second, we take advantage of the fact that our theory has further implications that are not shared by the alternative hypothesis that sociability is a surrogate for personality. In particular, if social households invest more because of their interactions with other investors, then the marginal effect of sociability ought to be more pronounced in areas where there is a high density of stock-market participants.[7] To take an extreme example, if a social household lives in a state where nobody else invests in the stock market (and it does not interact with anybody out-of-state) then according to our theory we should not see any effect of sociability on participation for this household. In contrast, if our social variables are simply proxies for, for example, individual risk tolerance, then one might expect these variables to attract the same positive coefficients in participation regressions regardless of what kind of state the household lives in.

Consistent with our theory, we document that the impact of household sociability is indeed stronger in states where stock-market participation rates are higher. The cross-state differentials are very substantial. In "high-participation" states (those with average participation rates in the top one-third of the sample) sociability generates an increase in the participation rate that averages roughly 7 to 9 percent across all demographic groups; in "low-participation" states the sociability effect is close to zero. Moreover, this cross-state pattern distinguishes our social variables from our measure of risk-tolerance—the risk-tolerance

[7] This logic parallels that of Bertrand, Luttmer, and Mullainathan (2000), who find that being surrounded by others who speak the same language increases welfare use more for those from high-welfare-using groups.

variable shows no differential effect across states. These results help to allay concerns that our proxies for sociability are picking up other personality attributes that have nothing to do with social interaction.[8]

The remainder of the paper is organized as follows. We begin in Section I by discussing a model that illustrates the link between social interaction and stock market participation, and that forms the basis for our subsequent tests. In Section II, we describe our data set, and in Section III we present our empirical results. Section IV concludes.

I. The Model

The key implications of our model can be sketched verbally. For a more formal treatment, see our NBER working paper (Hong, Kubik, and Stein (2001)). We distinguish between two classes of investors: (1) non-socials and (2) socials. Each non-social investor faces a fixed cost of participating in the market. This cost can have both an idiosyncratic component (e.g., the investor has a difficult time understanding financial matters), as well as a common component (e.g., the investor lives in an area where there are few brokerage offices per capita). But importantly, for a non-social investor, the fixed cost is unrelated to the participation decisions of all other investors. Consequently, each non-social investor makes his participation decision independently, by trading off the benefits of participation—which will typically be increasing in wealth—against the fixed cost.[9]

Social investors differ from non-socials in that their net cost of participating in the market is influenced by the choices of their peers. Specifically, the cost for any social investor in a given peer group is reduced—relative to the value for an otherwise identical non-social—by an amount that is increasing in the number of others in the peer group that are participating. Or said differently, any one social finds it more attractive to participate in the market when more of his peers do. In the limiting case where none of a social's peers are participating, he faces the same fixed cost as an otherwise identical non-social.

As noted earlier, there are several concrete interpretations that can be attached to this formulation. And depending on the specific story being told, the actual social interaction may take place either before or after the decision to participate in the market is made. For example, in the case of word-of-mouth

[8] There is a more subtle version of the endogeneity critique that we cannot address. It may be, for example, that socials have a higher participation rate not because they have a greater number of informative interactions with their peers, but rather because they are better listeners and hence learn more from a given level of interaction. Thus one cannot draw the same kind of causal conclusions that one might from a randomized experiment (as in Sacerdote (2001)). Specifically, it does not follow from our results that if a non-social household were somehow forced to spend more time with its neighbors it would be more likely to participate in the market. We do not think this caveat makes our findings less interesting from a positive-economics perspective. But it matters when thinking about their normative implications.

[9] In our NBER working paper, we show that in a constant-relative-risk-aversion (CRRA) framework the benefit to participating in the market is simply a fixed proportion of initial wealth.

learning about the market's risk/return characteristics, the interaction takes place before any investment. However, in the case of getting utility from talking with friends about the market, one can imagine that a social would invest based just on the prospect of future interactions.

This set-up leads to the following three implications. First, controlling for wealth, risk tolerance, and measures of participation costs, we should see a higher participation rate among social investors than among non-socials. Second, there will be social multiplier effects with respect to changes in exogenous parameters like wealth, risk tolerance, and participation costs. That is, the participation rate for socials should respond more sensitively to changes in these parameters than the participation rate for non-socials. And third, our model admits the possibility of multiple equilibria among social investors. When the positive externalities across members of a peer group are strong enough, either a relatively high or relatively low participation rate can be self-sustaining.

In the empirical work below, much of our focus will be on testing the first of these three implications—that socials have a higher participation rate than non-socials—and on ensuring that the results of these tests are not contaminated by endogeneity biases. Nevertheless, it is worth briefly highlighting how the model's implications for social multipliers and multiple equilibria might manifest themselves in the data.

The notion of social multipliers may be especially helpful in thinking about changes in aggregate stock-market participation over time. As noted above, the participation rate has increased dramatically over the last decade or so. One candidate explanation for this phenomenon is that the growing prominence of mutual funds, along with the introduction of web-based trading, have together led to a systematic decline in average costs of participation.[10] If so, social-interaction effects may have helped to give this cost shock much more kick than it otherwise would have had. This hypothesis can in principle be tested by looking to see if the participation rate of socials has increased more rapidly in recent years than has the participation rate of non-socials. We make an effort in this direction, though data limitations prevent us from going as far as we would like.

To the extent that people tend to interact disproportionately with members of their own racial/ethnic groups, the multiple-equilibrium feature of the model could potentially shed some light on the puzzle of why black and Hispanic households tend to be stuck at much lower participation rates, even when they are wealthy and highly educated. Loosely speaking, the multiple equilibria suggest that an ethnic group's past history with respect to participation may—by affecting which equilibrium is chosen—exert an important influence on current outcomes, above and beyond the effects of any current conditions such as wealth and education.[11]

[10] Choi, Laibson, and Metrick (2002) present direct evidence on the consequences of web-based trading.

[11] With regard to the role of history, Chiteji, and Stafford (1999) document that young adults are much more likely to participate in the stock market if their parents did.

II. Data

Our data come from Health and Retirement Study (HRS) administered by the Institute for Social Research at the University of Michigan.[12] This survey was first conducted in 1992 (this is referred to as Wave 1 of the survey), and covers approximately 7,500 households who have a member born during the period 1931 through 1941.[13] Thus the average age of target respondents at the time of Wave 1 is roughly 56 years. Follow-up Waves 2, 3, and 4, covering the same households, were conducted in 1994, 1996, and 1998, respectively. Our analysis focuses primarily on the data from Wave 1 of the HRS. We have re-run all our tests using the data from the later waves; as might be expected, given that these later waves cover the same households, they contain very little independent information, and lead to virtually identical results.[14]

Beginning in 1998, the HRS also added a new cohort to the survey, composed of households with a member born during the period 1942 through 1947, and dubbed the "war-baby" cohort. The average age of the war babies in 1998 is approximately 54 years, very similar to that of the original HRS sample in 1992. This 1998 war-baby sample is of obvious interest, for two reasons. First, we would like some out-of-sample verification of our results from the 1992 survey. And second, it would be interesting to test the model's intertemporal social-multiplier prediction—to see if, as the overall participation rate has increased over the 1990s, the differential between socials and non-socials has widened.

Unfortunately, the war-baby sample is much smaller, covering only around 1,400 households, which seriously limits our statistical power. Even more problematic, this version of the survey omits several of the questions that are most crucial for us, leaving us able to create only one of the three measures of social interaction that we use in the original 1992 HRS sample, and forcing us to drop other controls. Thus our analysis of the war-baby sample is restricted to just a couple of very basic regressions; unless explicitly noted otherwise, everything else we discuss from now on refers to the 1992 wave of the original HRS sample.

The HRS includes information on place of residence (by state, along with an urban/rural indicator), age, years of education, race, wealth, income, and marital status. For age, years of education, and race, we may have two responses per household—one for the man and one for the woman of the house. We take the "age" and "education" of a household to be the higher of the two values. For race, we classify a household as non-white if either member is.[15] With respect to stock-market participation, the survey asks whether households own stocks,

[12] The data set, along with all the survey questions and supporting documentation, is available at: www.umich.edu/~hrswww/.

[13] The HRS is a representative sample within this age group, except that blacks, Hispanics, and Florida residents are 100 percent oversampled.

[14] One reason to focus on the first (1992) wave is that there is some attrition among respondents in the later follow-up surveys. (The first-wave interviews are done in person, the others by phone.) Moreover, the rate of attrition is correlated with our key variables—there is more attrition among non-social households.

[15] None of our results is sensitive to how we choose to handle these details.

either directly or through mutual funds. However, it should be noted that this question only pertains to *non-retirement-account* assets. The data set has very little information on assets held in retirement accounts, so these are omitted in our measure of participation. While there is no reason to expect that this should bias our inferences about the role of social interactions, it does mean that the average participation rates that we report are significantly lower than those obtained from other data sets (e.g., the Survey of Consumer Finances) that include retirement assets.

To create our measures of social interaction, we focus on three questions in the survey. A single member of the household, typically the woman, answers each of these questions.[16] The first is: "Of your closest neighbors, how many do you know?," to which 92.9 percent of respondents answer either "all," "most," or "some." Our *Know Neighbors* dummy variable takes on the value one for these households, and zero for the remainder who answer "none." The second question is: "How often do you visit with your neighbors?," to which 63.9 percent of respondents answer either "daily," "several times a week," "several times a month," or "several times a year." Our *Visit Neighbors* dummy is set to one for these households, and to zero for the remainder who answer "hardly ever."[17] Finally, the third question is: "How often do you attend religious services?," to which 76.0 percent of respondents answer either "more than once a week," "once a week," "two or three times a month," or "one or more times a year." Our *Attend Church* dummy is one for these households, and zero for the remainder who answer "never."

A large body of work in sociology supports the premise of using these sorts of variables as measures of the extent to which households have informative interactions with one another. Granovetter (1983) surveys much of this work, emphasizing "the strength of weak ties"—that is, the substantial amount of information that people obtain through interactions with neighbors and casual acquaintances. For example, there is a lot of evidence to the effect that people learn about new jobs through such informal connections, rather than through more formal channels.[18]

As mentioned above, we also use the survey questions to create proxies for other personality traits. Risk aversion is the most straightforward, since there is a question designed by Barsky et al. (1997, page 540) to measure this attribute: "... you are given the opportunity to take a new and equally good job, with a 50-50 chance it will double your (family) income and a 50-50 chance it will cut your (family) income by a third. Would you take that new job?" In contrast to

[16] In our regressions, we include a dummy for the sex of the respondent to the social questions.

[17] We are bypassing another similar question, "Do you have good friends in your neighborhood?" because it seems more ambiguous as a measure of social interaction. In particular, we worry that a respondent who interacts regularly with his or her neighbors, but whose *best* friends live elsewhere, might be inclined to say "no" to this question.

[18] The work surveyed in Granovetter (1983) is more directly applicable to the interpretation of our model in which socials communicate real information about the stock market to one another. It has less to say about the interpretation in which socials simply derive utility from investing when their friends invest.

the sociability questions, this—like the other "personality-related" questions—is asked *separately* of each member of a household. Our *Risk Tolerant* dummy is one for the 32.5 percent of households with at least one member who responds "yes," and zero for the remainder where both members answer "no."[19]

Sociability might also be related to optimism, which could in turn influence stock-market participation. The best we can do on this score is to use the following question: "During the past week, I felt depressed. (All or almost all of the time, most of the time, some of the time, or none or almost none of the time?)" Our premise is that there is likely to be a link between depression and pessimism. In any case, our *Depressed* dummy takes on the value one in the 8.3 percent of cases where at least one household member responds "all or almost all of the time;" in the remaining cases the dummy is set to zero.

It is important to stress however, that while we are using this variable in the hopes that it will control for a purely individual characteristic—namely pessimism—that might be related to participation, it is also plausible that it contains further independent information about the extent of social interaction, since depressed people may well spend less time interacting with others. In this sense, the *Depressed* dummy differs from the *Risk Tolerant* dummy, which seems to be more cleanly interpretable as being strictly about an individual trait, and not about anything having to do with social interaction.

Finally, one might speculate that sociable people are simply more open-minded and more willing to try new things. The only question that comes close to allowing us to address this idea is: "How difficult is it for you to use a computer or word processor?" Our *Low Tech* dummy is one for the 30.9 percent of households in which both members answer, "don't do," and zero for the remainder of households. An obvious problem in interpreting any coefficient on this *Low Tech* variable is that unlike risk tolerance or depression, computer use represents an outcome, not a personality trait. And as with the *Depressed* dummy, there is also the qualification that even if it contains some information about the personality trait of open-mindedness, it may also capture information about social interaction, to the extent that there are peer effects in the adoption of computers.

Tables I and II provide an overview of some basic facts about the data. Panel A of Table I breaks down participation rates across different demographic groups. Overall, in the whole HRS sample, 26.7 percent of households participate in the stock market. (Recall that this is 1992, and that our measure of participation does not include assets held in retirement accounts.) Participation increases sharply with wealth, going from 3.4 percent in the lowest quintile of the wealth distribution to 55.0 percent in the highest wealth quintile.[20] There are also

[19] Our results are essentially unchanged if we require both members to respond "yes" in order to classify a household as risk-tolerant. A similar comment applies to our other personality-trait proxies.

[20] We measure wealth as the value of all assets excluding non-retirement stockholdings. With this measure, the inter-quintile cutoff values are: $11,000; $55,000; $116,000; and $240,000. Our principal results are unchanged if we include stockholdings in our wealth measure, and they are also not sensitive to whether or not we include retirement wealth.

Table I
Stock-Market Participation Rates for Different Categories of Households

The entries are the stock-market participation rates for different categories of households in the Health and Retirement Study conducted in 1992. Stock-market participation rates pertain only to non-retirement-account assets. Panel A reports these rates by race, education, and wealth of households. Household wealth is defined as the value of all assets excluding non-retirement stockholdings. Panel B reports these rates by three household sociability measures (Know Neighbors, Visit Neighbors, and Attend Church) and wealth. For Know Neighbors, households who say they do not know neighbors are Not Social; the rest are Social. For Visit Neighbors, households who say they do not visit neighbors are Not Social; the rest are Social. For Attend Church, households who say they never attend church are Not Social; the rest are Social. There are 7,465 household observations.

Panel A: Stock-Market Participation Rates by Race, Education, and Wealth

		Racial Groups		Education Levels	
	All (1)	White and Non-Hispanic (2)	Non-White or Hispanic (3)	College Graduate (4)	No College Degree (5)
All Households	26.70%	34.28%	9.21%	49.53%	19.97%
1st Quintile of wealth distribution	3.41%	6.39%	1.17%	6.36%	3.17%
2nd Quintile of wealth distribution	11.34%	15.28%	5.37%	27.01%	9.28%
3rd Quintile of wealth distribution	24.10%	27.81%	13.32%	36.36%	20.91%
4th Quintile of wealth distribution	39.84%	43.73%	21.32%	50.11%	35.42%
5th Quintile of wealth distribution	55.03%	57.45%	35.93%	68.38%	44.39%

Panel B: Stock-Market Participation Rates by Sociability and Wealth

	Know Neighbors		Visit Neighbors		Attend Church	
	Not Social (1)	Social (2)	Not Social (3)	Social (4)	Not Social (5)	Social (6)
All Households	12.33%	27.79%	22.77%	28.92%	23.52%	27.70%
1st Quintile of wealth distribution	2.05%	3.67%	3.63%	3.22%	4.05%	3.16%
2nd Quintile of wealth distribution	11.40%	11.34%	11.46%	11.27%	12.24%	11.02%
3rd Quintile of wealth distribution	14.29%	24.52%	22.20%	25.05%	23.59%	24.25%
4th Quintile of wealth distribution	30.91%	40.18%	37.03%	41.17%	37.14%	40.56%
5th Quintile of wealth distribution	41.18%	55.52%	50.86%	56.92%	50.49%	56.21%

strong differences between white, non-Hispanic households and other racial groups, as well as between college graduates and non-graduates. These differences remain stark even controlling for wealth. For example, in the fourth quintile of the wealth distribution, the participation rate is 43.7 percent for white, non-Hispanic households, and only 21.3 percent for other races. Similarly, in the same wealth quintile, the participation rate is 50.1 percent for college graduates, and only 35.4 percent for non-graduates.

In Panel B of Table I, we take a crude first look at the effect of social interaction on participation, with a two-way sort based on wealth and each of our three measures of sociability. Although this approach is obviously not a substitute for the more carefully controlled regressions that follow, it makes it clear that the

Table II

Means and Correlations of Sociability Measures and Other Independent Variables

The entries are summary statistics on various characteristics of households in the Health and Retirement Study conducted in 1992. Know Neighbors equals zero for the households who say they do not know any neighbors, and one otherwise. Visit Neighbors equals zero for the households who say they do not visit neighbors, and one otherwise. Attend Church equals zero for the households who say they never attend church, and one otherwise. Additional household characteristics include indicator variables for whether one of the respondents is risk tolerant (Risk Tolerant), for whether the household has one member who suffers from depression (Depressed), and for whether the household avoids using computers or word processors (Low Tech). Other characteristics include an indicator for whether the household's reported race is White and Non-Hispanic, Years of Education (of the most educated person in the household), and Wealth (household wealth excluding non-retirement stockholdings). There are 7,465 household observations.

	Know Neighbors (1)	Visit Neighbors (2)	Attend Church (3)	Risk Tolerant (4)	Depressed (5)	Low Tech (6)	White Non-Hispanic (7)	Years of Education (8)	Wealth (9)
Mean of sample	92.94%	63.87%	76.02%	32.53%	8.33%	30.92%	69.75%	12.65	$196,405
Correlations:									
Know Neighbors	1.000								
Visit Neighbors	0.3665	1.000							
Attend Church	0.0792	0.0942	1.000						
Risk Tolerant	−0.0118	−0.0213	0.0035	1.000					
Depressed	−0.0683	−0.0689	−0.0305	−0.0034	1.000				
Low Tech	−0.0589	−0.0242	−0.0228	0.0505	0.0920	1.00			
White Non-Hispanic	0.0872	0.0511	−0.1472	−0.0016	−0.0917	−0.2050	1.00		
Years of Education	0.0832	0.0585	0.0171	0.0345	−0.1587	−0.3785	0.3226	1.00	
Wealth	0.0537	0.0352	0.0310	0.0114	−0.0641	−0.0900	0.1481	0.1845	1.00

basic patterns emerge in even the simplest tabulations of the data. Using the *Know Neighbors* measure of interaction, 12.3 percent of non-social households participate in the market, while 27.8 percent of social households do. With *Visit Neighbors*, the corresponding figures are 22.8 percent and 28.9 percent, while with *Attend Church* they are 23.5 percent and 27.7 percent, respectively. In addition, when the sample is stratified based on wealth, it appears that the differences between social and non-social households become more pronounced as wealth increases—indeed, virtually all of the action in this respect comes from the top three wealth quintiles.

In Table II, we look at the correlations between our three measures of sociability, as well as between these measures and the other independent variables that will enter our specifications. Not surprisingly, *Know Neighbors* and *Visit Neighbors* are highly correlated, with a correlation coefficient of 0.37. On the other hand, both of these measures are more weakly correlated with *Attend Church*, with coefficients of only 0.08 and 0.09, respectively. Thus it seems that *Attend Church* offers relatively independent information on sociability above and beyond that contained in the first two variables.

None of the sociability measures is all that highly correlated with the other personality proxies, though there are some noteworthy differences. On the one hand, *Risk Tolerant* is essentially uncorrelated with all the social variables. In contrast, both *Depressed* and *Low Tech* have statistically significant correlations of -0.07 and -0.06, respectively with *Know Neighbors*. This suggests that social people may indeed be happier (and perhaps more optimistic) as well as more open to new experiences. It also reinforces the point made above, namely that unlike the *Risk Tolerant* variable, *Depressed* and *Low Tech* may themselves be proxies for the degree of social interaction.

Finally, there are some modest correlations between our sociability measures and the demographic variables. White, educated, and wealthy households are all somewhat more likely to both know their neighbors and visit them, with pairwise correlation coefficients in the range of 0.04 to 0.09. On the other hand, white households are markedly less churchgoing—the correlation between the indicator for white/non-Hispanic and *Attend Church* is -0.15.

III. Empirical Results

A. *Baseline Effect of Social Interaction on Stock-Market Participation*

Table III presents our baseline results. All regressions are run by OLS, with the dependent variable an indicator that takes on the value one when a household owns stock, and zero otherwise.[21] There are nine columns, corresponding to three different specifications with each of our three sociability measures—*Know Neighbors, Visit Neighbors*, and *Attend Church*. In columns (1), (4), and (7), the social variable enters along with the *Risk Tolerant* dummy, years of education, age, a white/non-Hispanic dummy, an urban dummy, a marital-status

[21] Given the dichotomous nature of our left-hand-side variable, we have redone all our tests using probit and logit specifications, with very similar results.

Table III

Baseline Effect of Sociability on Whether a Household Owns Stocks

The sample comprises households in the Health and Retirement Study conducted in 1992. The dependent variable is an indicator that the household owns stock. The independent variables are: a Sociability indicator (either Know Neighbors, Visit Neighbors, or Attend Church), Risk Tolerant indicator, Years of Education, Age, White/Non-Hispanic indicator, an Urban indicator, Depressed indicator, Low Tech indicator, marital status dummies (not shown), and a sex-of-respondent dummy (not shown). The specifications in columns (1), (4), and (7) include dummies for wealth quintiles. The others include dummies for every 5 percent of the wealth distribution, and in some cases, dummies for every year of age and education, for every 5 percent of the income distribution and for each state. Robust standard errors are in parentheses. There are 7,465 observations. (Numbers with * are significant at 10-percent level. Numbers with ** are significant at 5-percent level. Numbers with *** are significant at 1-percent level.)

	Know Neighbors			Visit Neighbors			Attend Church		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sociability indicator	0.0411***	0.0406***	0.0405***	0.0215**	0.0218**	0.0247***	0.0369***	0.0355***	0.0268**
	(0.0141)	(0.0142)	(0.0141)	(0.0093)	(0.0093)	(0.0093)	(0.0109)	(0.0109)	(0.0109)
Risk Tolerant indicator	0.0367***	0.0369***	0.0311***	0.0369***	0.0371***	0.0314***	0.0364***	0.0366***	0.0307***
	(0.0099)	(0.0099)	(0.0099)	(0.0099)	(0.0099)	(0.0099)	(0.0099)	(0.0099)	(0.0099)
Years of Education	0.0231***	0.0230***		0.0231***	0.0229***		0.0230***	0.0228***	
	(0.0015)	(0.0015)		(0.0015)	(0.0015)		(0.0015)	(0.0015)	
Age	0.0005	0.0005		0.0005	0.0005		0.0005	0.0005	
	(0.0010)	(0.0010)		(0.0010)	(0.0010)		(0.0010)	(0.0010)	
White/Non-Hispanic indicator	0.0995***	0.1003***	0.0990***	0.0998***	0.1005***	0.0988***	0.1069***	0.1075***	0.1044***
	(0.0096)	(0.0096)	(0.0105)	(0.0096)	(0.0097)	(0.0105)	(0.0099)	(0.0100)	(0.0108)

(*continued*)

Table III—*Continued*

	Know Neighbors			Visit Neighbors			Attend Church		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Urban indicator	0.0605***	0.0622***	0.0481***	0.0599***	0.0616***	0.0477***	0.0600***	0.0616***	0.0476***
	(0.0166)	(0.0166)	(0.0168)	(0.0166)	(0.0166)	(0.0168)	(0.0166)	(0.0166)	(0.0168)
Depressed indicator			−0.0302**			−0.0292**			−0.0306**
			(0.0126)			(0.0127)			(0.0126)
Low Tech indicator			−0.0349***			−0.0352***			−0.0350***
			(0.0098)			(0.0098)			(0.0098)
2nd Quintile of wealth distribution	0.0281***			0.0298***			0.0302***		
	(0.0099)			(0.0099)			(0.0099)		
3rd Quintile of wealth distribution	0.1156***			0.1177***			0.1176***		
	(0.0130)			(0.0129)			(0.0129)		
4th Quintile of wealth distribution	0.2455***			0.2476***			0.2462***		
	(0.0149)			(0.0149)			(0.0149)		
5th Quintile of wealth distribution	0.3757***			0.3776***			0.3760***		
	(0.0160)			(0.0159)			(0.0160)		
19 Wealth dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Age dummies	No	No	Yes	No	No	Yes	No	No	Yes
Years of Education dummies	No	No	Yes	No	No	Yes	No	No	Yes
19 Income dummies	No	No	Yes	No	No	Yes	No	No	Yes
State dummies	No	No	Yes	No	No	Yes	No	No	Yes

dummy, a sex-of-respondent dummy, and four dummies corresponding to the second, third, fourth, and fifth quintiles of the wealth distribution.

In columns (2), (5), and (8), the only modification is that we use 19, rather than four wealth dummies, which means that we have now chopped up the wealth distribution into 5-percent increments. This allows us to get a tighter wealth control, but makes it impractical to display the individual coefficients on all these dummies. Finally, in columns (3), (6), and (9), we add several further controls: 19 income dummies; dummies for each year of age and education (which go in place of the linear age and education terms and represent a more conservative approach to controlling for these factors); state dummies; and the *Depressed* and *Low Tech* variables.

As can be seen, the results paint a consistent picture. Consider first the *Know Neighbors* measure of social interaction. The coefficients on this variable are very close to 0.040 in all three regressions, implying that social households have a 4 percent higher probability of participating in the stock market, all else being equal. Moreover, in each case the coefficients are statistically significant at the 1-percent level. The *Visit Neighbors* variable looks to be a weaker version of *Know Neighbors*, with coefficients that range between 0.022 and 0.025, but that are still statistically significant. Finally, the *Attend Church* variable delivers coefficients that are comparable to those on *Know Neighbors* in the first two regressions—of the order of 0.036—but that tail off a bit, to a value of 0.027, when the full set of controls is added.

The coefficients on some of the other controls are worth a brief mention. To begin with, we confirm earlier work by finding very powerful effects of education, race, and wealth on stock-market participation. For example, our estimates suggest that white, non-Hispanic households have about a 10 percent greater participation rate than other groups, all else being equal. The *Risk Tolerant* dummy has the expected positive sign, and with a value of around 0.037 across most of the specifications, it appears to be economically as well as strongly statistically significant. The *Depressed* and *Low Tech* indicators are both negative, as anticipated, and significantly so.

However, we caution against attaching the same kind of causal interpretation to the *Low Tech* proxy that one might naturally lend to, for example, the *Risk Tolerant* variable. As discussed above, with *Low Tech*, we are in effect running one type of endogenous outcome (stock-market participation) on another (computer use). The goal in this case is not to make a structural inference, but rather to illustrate that, to the best of our ability to control for a personality trait like open-mindedness, this control does not seem to affect the coefficients on our key sociability indicators.

The results in Table III speak to the average effects of sociability across all demographic groups. In Table IV, we investigate how the marginal effect of social interaction varies with race, education, and wealth. Based on our model, there are two distinct reasons to expect that the coefficients on the social variables would be higher among white, educated, and wealthy households.[22] First, to the

[22] Moreover, the simple two-way sorts in Panel B of Table I suggest that the effect of sociability is much stronger among wealthier households.

Table IV

Interactions of Sociability with Wealth, Education, and Race

The sample comprises households in the Health and Retirement Study conducted in 1992. The dependent variable is an indicator that the household owns stock. The independent variables are the Sociability indicator (either Know Neighbors, Visit Neighbors, or Attend Church) and the Sociability indicator interacted with the White, Educated, and Wealthy indicator. The White, Educated, and Wealthy indicator equals one for households who are white/non-Hispanic, who have at least one high-school graduate and who have wealth above the sample median. The regression specifications also include all of the control variables used in column (2) of Table III (Risk Tolerant indicator, Years of Education, Age, White and Non-Hispanic indicator, Urban indicator, dummies for every 5 percent of the wealth distribution, marital status dummies, and a sex-of respondent dummy). There are 7,465 household observations. (Numbers with * are significant at 10-percent level. Numbers with ** are significant at 5-percent level. Numbers with *** are significant at 1-percent level.)

	Know Neighbors (1)	Visit Neighbors (2)	Attend Church (3)
Sociability indicator	0.0254**	−0.0034	0.0038
	(0.0127)	(0.0095)	(0.0114)
Sociability indicator × White, Educated, and Wealthy indicator	0.0546	0.0628***	0.0673***
	(0.0519)	(0.0215)	(0.0240)

extent that households interact with others having similar demographic characteristics, peer effects should be stronger among those groups with high participation rates. To take an extreme example, no amount of interaction is likely to foster much information-sharing about the stock market if it takes place among non-white/Hispanic households in the first quintile of the wealth distribution, where the overall participation rate is only 1.2 percent (see Table I).

Second, even if social interaction did somehow lead to the same informational (or other) benefit across all demographic groups, this benefit would be less likely to cause a shift from non-participation to participation among those groups for whom the gains from participation are so small relative to the non-social-related component of fixed cost that they tend to be well below the participation threshold. For example, if we look at groups with very low wealth, we are on average so far from the participation/non-participation cusp that any benefits from social interaction do not have much impact on behavior. Note that in this case, an exactly identical argument applies to other participation-enhancing variables, such as risk tolerance: It is unlikely that increases in risk tolerance will have much effect on stock-market participation among the lowest-wealth groups.

Table IV confirms these predictions. In this table, everything is a variation on the specifications in columns (2), (5), and (8) of Table III. That is, the regressions include—in addition to the displayed terms involving the social variables—the *Risk Tolerant* dummy, years of education, age, a white/non-Hispanic dummy, an urban dummy, a marital-status dummy, a sex-of-respondent dummy, and 19 wealth dummies, all of which are suppressed for compactness. Each social variable now enters not only alone, but also interacted with the *White*, *Educated,*

and Wealthy indicator, which takes on the value 1 for those households who are white and non-Hispanic, who are at least high-school graduates and who have wealth above the sample median. These households represent 39.1 percent of the total sample, and have an average participation rate of 49.1 percent, as compared to the remaining households, who have an average participation rate of only 12.3 percent.

The interaction terms are large in magnitude, and statistically significant in two out of three cases. By summing the raw social coefficient with the interaction coefficient, one obtains an estimate of the size of the social effect among white, educated, and wealthy households. For the *Know Neighbors* variable, this number is 0.080, implying that social households in this demographic group have an 8 percent greater participation rate than non-social households. For the *Visit Neighbors* and *Attend Church* variables, the corresponding numbers are 0.059 and 0.071, respectively. In each case, the effect of the social variable among white, educated, and wealthy households appears to be roughly double the size of the unconditional effect across all demographic groups reported in Table III.

Beyond what is displayed in Tables III and IV, we have also experimented with a number of variations on our baseline specifications, in order to further check the robustness of our results. First, we have redone everything with alternative definitions of stock-market participation that require a household to have some minimal level invested in the market (we have tried thresholds of $2,500, $5,000, $10,000, and $25,000) as opposed to just anything over zero, in order to be counted as a participant.[23] This is an effort to address the possibility that small stakes in the market may reflect activities like investment clubs, which could be correlated with social interaction in a relatively mechanical and uninteresting way. As it turns out, these alternative definitions of participation lead to results that are very similar to those reported in Tables III and IV. Thus these results do not appear to be driven by investors with only trivial stakes in the market.

Second, we have also tried adding several further controls (beyond those shown in columns (3), (6), and (9) of Table III) to our specifications. These controls include: whether or not the household owns its home; whether the household takes regular vacations; employment status; number of people in the household (i.e., how many children there are at home); and various measures of health. Several of these controls can be motivated as attempts to capture how busy a household is dealing with other things, and hence how little free time it has to devote to stock-market investing. For example, a household that has five children, two parents with full-time jobs, and that never takes vacations may simply be too overwhelmed either to interact with its neighbors, or to invest in stocks. And we want to be sure that such a lack-of-free-time effect is not inducing a spurious correlation between our sociability measures and stock-market participation. However, we find that none of the additional controls

[23] Among those households who participate in the market, the median amount invested is $20,000. The 25^{th} percentile of the distribution is $5,000, and the 75^{th} percentile is $65,000.

has any noticeable impact on the coefficients associated with the sociability measures.

B. *Effect of Social Interaction in High-Participation and Low-Participation States*

While the results thus far are consistent with our theory, the worry remains that our social variables are not picking up the effect of social interaction per se, but rather an individual personality trait that is correlated with stock-market participation and that is somehow not adequately captured by either our *Risk Tolerant*, *Depressed*, or *Low Tech* proxies, or by any of the other controls we have tried. In an effort to address this concern, we exploit the fact that our theory has subsidiary implications that the alternative hypothesis does not. In particular, if social households invest more because of their interactions with other investors, then the marginal effect of sociability ought to be more pronounced in areas where there is a high density of stock-market participants.

The best we can do to operationalize this idea is to look at the states in which households live, since the HRS does not provide more detailed address data. Table V presents some information on stock-market participation at the state level. We group states into low, medium, and high participation categories, where a state's participation level is measured in one of two ways. In Panel A, we look at the raw participation rate, which for any state is simply the fraction of resident households that own stock. In Panel B, we look at the abnormal participation rate, which for any state corresponds to the state-average-value of the residual in a regression of household participation against: the *Risk Tolerant* dummy, years of education, age, a white/non-Hispanic dummy, an urban dummy, a marital status dummy, a sex-of-respondent dummy, and four wealth dummies.

As can be seen in Table V, many of the same states show up as outliers according to either the raw or abnormal measure. Perhaps most strikingly, several largely rural southern states—Alabama, Louisiana, Arkansas, Tennessee, Mississippi, and West Virginia—are classified as having low participation rates on either score. In the context of our model, a state's abnormal participation rate—given that we have taken out the effects of factors like wealth, risk tolerance, education, and race—is most naturally thought of as a measure of the average value of the common participation-cost parameter for its residents. For example, a state with a low abnormal participation rate may be one in which there are relatively few stockbrokers per capita, so that residents have less help getting started in the stock market.

This observation suggests another way to think of our empirical strategy, particularly insofar as we rely on abnormal, rather than raw participation rates. When we look to see if the impact of social interaction is more pronounced in a low-participation-cost (i.e., high-abnormal-participation) state, this is effectively a cross-state test of the social multiplier hypothesis. As discussed above, the model suggests that as we move from a high-participation-cost environment (Alabama) to a low-participation-cost environment (Connecticut), participation among socials should increase by more than participation among non-socials.

Table V

Low, Medium, and High Participation States

The sample comprises households in the Health and Retirement Study conducted in 1992. Panel A reports raw participation rates by state. A state's raw participation rate is the fraction of households in the state that own stock. Panel B reports abnormal participation rates by state. A state's abnormal participation rate is its average residual in a regression of participation against all of the controls in column (1) of Table III except for the Sociability indicator (Risk Tolerant indicator, Years of Education, Age, White and Non-Hispanic indicator, Urban indicator, dummies for every quintile of the wealth distribution, marital status dummies, and a sex-of respondent dummy).

Low Participation States	Medium Participation States	High Participation States
Panel A: Raw Participation Rates		
Alabama (14.81%)	South Carolina (23.91%)	Michigan (31.31%)
Louisiana (15.38%)	Florida (24.01%)	Maryland (32.93%)
Arkansas (15.50%)	Virginia (25.83%)	New Jersey (33.45%)
Tennessee (17.37%)	Colorado (25.97%)	Indiana (34.46%)
North Dakota (17.39%)	California (28.51%)	Missouri (34.70%)
Texas (18.04%)	Oklahoma (28.57%)	New Hampshire (35.85%)
North Carolina (18.57%)	Illinois (28.96%)	Nebraska (37.5%)
Mississippi (18.58%)	Oregon (29.09%)	Kansas (39.02%)
Georgia (19.44%)	Massachusetts (29.25%)	Wisconsin (39.82%)
District of Columbia (21.73%)	Ohio (29.38%)	Connecticut (40.95%)
New York (21.76%)	Iowa (30.00%)	Washington (40.96%)
Arizona (21.88%)	Pennsylvania (31.11%)	Minnesota (44.22%)
West Virginia (23.68%)		Wyoming (45.83%)
Panel B: Abnormal Participation Rates (Residual Relative to Median State: Iowa)		
North Dakota (−17.27%)	Florida (−1.75%)	South Carolina (2.76%)
Massachusetts (−7.72%)	New York (−1.32%)	Maryland (3.12%)
Tennessee (−7.24%)	Illinois (−0.42%)	Pennsylvania (3.18%)
Arkansas (−7.11%)	Virginia (−0.17%)	Missouri (3.19%)
Louisiana (−6.43%)	Oklahoma (−0.11%)	Michigan (3.63%)
Alabama (−6.26%)	Iowa (0%)	Kansas (3.92%)
New Hampshire (−5.33%)	Washington (0%)	Ohio (4.10%)
Oregon (−4.61%)	North Carolina (0.43%)	Connecticut (5.51%)
Mississippi (−4.13%)	New Jersey (1.54%)	Nebraska (5.79%)
Arizona (−2.02%)	Georgia (2.00%)	Indiana (6.18%)
Colorado (−1.97%)	District of Columbia (2.03%)	Wisconsin (8.23%)
California (−1.83%)	Texas (2.15%)	Minnesota (9.60%)
West Virginia (−1.77%)		Wyoming (15.21%)

Table VI presents the tests of this hypothesis. The structure is very similar to that of Table IV, with all the same suppressed controls. Now, in addition to having our social variables enter by themselves, we also interact them with an indicator variable that takes on the values {–1, 0, 1} depending on whether a state is classified as low, medium, or high participation.[24] We try basing this

[24] Given that our ability to estimate any state's true mean participation costs is imperfect, we do this grouping—rather than simply having each state's own participation rate enter directly in the regression—in an effort to combat measurement error and to improve the precision of our estimates.

Table VI
Interactions of Sociability and Risk Tolerance with State-level Participation Rates

The sample comprises households in the Health and Retirement Study conducted in 1992. The dependent variable is an indicator that the household owns stock. The independent variables are the Sociability indicator (either Know Neighbors, Visit Neighbors, or Attend Church) and the Sociability indicator interacted with the State-level Participation indicator. The State-level Participation indicator takes on the values −1, 0, or 1 depending on whether the household's state has low, medium, or high stock-market participation. In columns (1), (3), and (5), state-level participation is measured on a raw basis; in columns (2), (4), and (6), it is measured on an abnormal basis. The other independent variables shown in the table are the Risk Tolerant indicator and its interaction with the State-Level Participation indicator. The regression specifications also include Years of Education, Age, a White and Non-Hispanic indicator, an Urban indicator, dummies for every 5 percent of the wealth distribution, a sex-of-respondent dummy, marital status dummies, and the State-Level Participation indicator. Robust standard errors are in parentheses. There are 7,465 household observations. (Numbers with * are significant at 10-percent level. Numbers with ** are significant at 5-percent level. Numbers with *** are significant at 1-percent level.)

	Know Neighbors		Visit Neighbors		Attend Church	
	Raw (1)	Abnormal (2)	Raw (3)	Abnormal (4)	Raw (5)	Abnormal (6)
Sociability indicator	0.0474***	0.0425***	0.0245**	0.0218**	0.0373***	0.0340***
	(0.0145)	(0.0143)	(0.0095)	(0.0093)	(0.0110)	(0.0109)
Sociability × state-level participation indicator	0.0460**	0.0471**	0.0063	0.0114	0.0085	0.0314**
	(0.0196)	(0.0207)	(0.0122)	(0.0128)	(0.0141)	(0.0143)
Risk Tolerant indicator	0.0349***	0.0362***	0.0352***	0.0367***	0.0345***	0.0358***
	(0.0100)	(0.0099)	(0.0100)	(0.0099)	(0.0100)	(0.0099)
Risk Tolerant indicator × state-level participation indicator	−0.0117	−0.0146	−0.0109	−0.0139	−0.0118	−0.0155
	(0.0129)	(0.0134)	(0.0129)	(0.0133)	(0.0129)	(0.0133)

indicator both on the raw participation measure, as well as on our preferred abnormal participation measure.

The results are generally encouraging. When we use the abnormal participation measure, the coefficient on the interaction of sociability and state-level participation is positive in all three cases, and strongly statistically significant in both the *Know Neighbors* and *Attend Church* regressions. In terms of economic magnitudes, the *Know Neighbors* regression suggests that the differential between social and non-social households is actually a tiny bit negative, at −0.5 percent, in a low-abnormal-participation state, but rises to 9 percent in a high-participation state. With *Attend Church*, the corresponding numbers are 0.3 percent and 6.5 percent. Clearly, these are economically significant differences.

When we use the raw participation measure, the interaction coefficient in the *Know Neighbors* regression is unchanged, but that for *Attend Church* drops off substantially, and is no longer significant. The regressions with our weakest social variable, *Visit Neighbors*, do not show a statistically significant interaction

coefficient in either the raw or abnormal-participation specification, though in both cases these coefficients have the predicted positive sign.

To further bolster the case that these results are really telling us something about social effects, in all the regressions in Table VI we also interact our *Risk Tolerant* variable with the same state-level participation indicators—that is, we treat *Risk Tolerant* in a way that is symmetric to our social measures. The premise here is as follows. We are reasonably confident that the *Risk Tolerant* variable is capturing information about a personality trait that is relevant for participation but that has nothing to do with social effects. Thus *Risk Tolerant* should have the same coefficient regardless of what state a household lives in. In other words, *Risk Tolerant* should not show the same interaction with the state-level participation indicators that our social measures do.

And indeed, Table VI confirms this hypothesis. While the *Risk Tolerant* variable continues to attract a highly significant positive coefficient when standing alone, the interaction terms involving *Risk Tolerant* are small and completely insignificant in all six specifications. Thus *Risk Tolerant* behaves in a fundamentally different way across states than do our social variables. Again, this lends further weight to the notion that these social variables are not just another personality trait in disguise.

It is worth contrasting our approach to using cross-state variation in Table VI to other approaches that are common in the peer-effects literature (see, e.g., Glaeser and Scheinkman (2000) for a discussion). In particular, by analogy to some of this other work, we can use our data to demonstrate the following. First, if one adds the mean participation rate in a household's home state to the baseline regression in column (1) of Table III, it comes in strongly significant, with a coefficient of 0.240 and a t-statistic of 3.48. Thus controlling for its own characteristics, a household is substantially more likely to participate in the market if it lives in a high-participation state. Alternatively, one can add the mean education and wealth levels in a state to the same baseline regression, with the same qualitative result—a household is significantly more likely to participate in the market if it lives in a state with a wealthier and more educated population.

These sorts of results are certainly consistent with the existence of social effects, and are probably the best that one could do without access to the direct measures of sociability that the HRS affords us. But since they do not exploit the *interaction* of sociability and cross-state variation in participation, they are more subject to alternative interpretations. For example, suppose that brokerage firms endogenously choose to have more branch offices in wealthy states, and that such branch offices facilitate participation. If so, this could explain why either a state's wealth, or its mean participation rate, matters for individual-household participation, even absent any social effects. By contrast, our Table VI results cannot be explained away in this fashion, so long as one is willing to adopt the identifying assumption that the effect of branch offices on participation is the same for social and non-social households.

C. A Look at the 1998 War-Baby Survey

As noted above, in addition to the original 1992 HRS survey, we have a second independent sample of households—those in the war-baby cohort that were surveyed in 1998. Unfortunately, this sample is much smaller—roughly 1,400 as opposed to 7,500 observations—and it does not include the survey questions that allow us to construct either the *Know Neighbors* or *Attend Church* variables. The only social variable that remains is the *Visit Neighbors* variable, which we have found thus far to yield the weakest results of the three.[25] Also, this version of the survey does not enable us to construct the *Risk Tolerant* control.

Nevertheless, working with the limited data we do have, we undertake in Table VII a comparison of the two different samples. We run the exact same regression for each, the specification being the same as that in column (4) of Table III, except with the *Risk Tolerant* control dropped. In principle, there are two things that could potentially be accomplished with such a comparison. First, the 1998 data enable us to perform an obvious out-of-sample robustness check on the results from the 1992 survey.

Second, and more ambitiously, one might hope to test the intertemporal social-multiplier aspect of our theory. Mirroring the overall rise in stock-market participation over the 1990s, the average participation rate among the war babies in 1998 is 32.3 percent; this represents a 21 percent increase from the 26.7 percent participation rate among the original 1992 HRS cohort.[26] If one thinks of this time trend in participation as reflecting an economy-wide decrease in costs of participation, then our model suggests that participation should have increased more among socials than among non-socials. Or said differently, the existence of a social multiplier implies that the 1998 sample should yield a larger coefficient on the social variable than the 1992 sample. Note that this is essentially just an intertemporal version of the cross-state comparison made in Table VI: In either case the prediction is that there should be a smaller coefficient on the social variable in a high-participation-cost regime (Alabama, or the early 1990s) than in a low-participation-cost regime (Connecticut, or the late 1990s).

The point estimates in Table VII suggest that our intertemporal social-multiplier hypothesis is on target, but there is not enough power to state this conclusion with any degree of statistical confidence. In particular, the coefficient on *Visit Neighbors* goes from 0.020 in the 1992 sample to 0.035 in the 1998 sample, a striking increase of 75 percent. Unfortunately, with the much smaller sample, the 1998 coefficient is too imprecisely estimated to allow us to

[25] Of households, 67.8 percent visit their neighbors in the 1998 sample, very close to the 1992 sample value of 63.9 percent, suggesting that this variable is picking up similar information in both surveys. Looking over a much broader span of time, Putnam (1995) argues that social interaction among Americans has declined, but this trend does not show up with our simplistic measure over the relatively short 1992 to 1998 interval.

[26] Moreover, as pointed out above, the war babies are almost exactly the same age in 1998 as the original HRS respondents were in 1992, so this seems to be a clean comparison.

Table VII
Baseline Effect of Sociability on Whether a Household Owns Stocks Using the 1992 and 1998 Samples

The samples comprise households in the Health and Retirement Study surveys conducted in 1992 and in 1998. The dependent variable is an indicator that the household owns stock. The Sociability indicator is the Visit Neighbors measure. The regression specifications also include Years of Education, Age, a White and Non-Hispanic indicator, an Urban indicator, dummies for every quintile of the wealth distribution, marital status dummies, and a sex-of-respondent dummy. Robust standard errors are in parentheses. There are 7,465 households in the 1992 sample and 1,441 households in the 1998 sample. (Numbers with * are significant at 10-percent level. Numbers with ** are significant at 5-percent level. Numbers with *** are significant at 1-percent level.)

	1992 Sample (1)	1998 Sample (2)
Sociability indicator	0.0204**	0.0351
	(0.0093)	(0.0233)
Years of Education	0.0239***	0.0238***
	(0.0015)	(0.0045)
Age	0.0004	0.0030
	(0.0010)	(0.0036)
White/Non-Hispanic indicator	0.0956***	0.0769***
	(0.0094)	(0.0260)
2nd Quintile of wealth distribution	0.0282***	0.0812***
	(0.0099)	(0.0353)
3rd Quintile of wealth distribution	0.1133***	0.1429***
	(0.0129)	(0.0369)
4th Quintile of wealth distribution	0.2449***	0.2971***
	(0.0149)	(0.0383)
5th Quintile of wealth distribution	0.3726***	0.4676***
	(0.0159)	(0.0394)

reject equality with the 1992 coefficient at conventional levels of significance; indeed, we cannot even quite reject that it differs from zero.

D. Social Interaction and Checking Account Use

An interesting recent paper by Guiso, Sapienza, and Zingales (2000) finds that in those regions of Italy where "social capital" is high, people make more use of a variety of financial products, including stock-market investments and checking accounts. Following the work of Putnam (1993), Guiso et al. (2000) argue that social capital—which they measure at the regional level using electoral participation and per-capita blood donations—helps to increase the trust that people have in a variety of institutions, including financial institutions.

While the social-capital variables used by Guiso et al. (2000) are obviously quite different from our social-interaction proxies, one might stretch and argue that our results reflect a similar kind of social-capital mechanism. Perhaps those households that interact with their neighbors or that attend church have more trust in financial institutions generally, and hence are less fearful that

Table VIII
The Effect of Sociability on Whether a Household Has a Checking Account

The sample comprises households in the Health and Retirement Study conducted in 1992. The dependent variable is an indicator that the household has a checking account. The independent variables are the Sociability indicator (either Know Neighbors, Visit Neighbors, or Attend Church), Risk Tolerant indicator, Years of Education, Age, a White and Non-Hispanic indicator, and an Urban indicator. The regression specifications also include dummies for every 5 percent of the wealth distribution, marital status dummies, and a sex-of-respondent dummy. Robust standard errors in parentheses. There are 7,465 household observations, of which 78.22 percent have checking accounts. (Numbers with * are significant at 10-percent level. Numbers with ** are significant at 5-percent level. Numbers with *** are significant at 1-percent level.)

	Know Neighbors (1)	Visit Neighbors (2)	Attend Church (3)
Sociability indicator	−0.0116	−0.0062	0.0132
	(0.0175)	(0.0081)	(0.0092)
Risk Tolerant indicator	−0.0247***	−0.0248***	−0.0246***
	(0.0084)	(0.0084)	(0.0084)
Years of Education	0.0235***	0.0235***	0.0234***
	(0.0016)	(0.0016)	(0.0016)
Age	0.0006	0.0006	0.0005
	(0.0008)	(0.0008)	(0.0008)
White/Non-Hispanic indicator	0.1357***	0.1356***	0.1380***
	(0.0109)	(0.0109)	(0.0110)
Urban indicator	0.0341**	0.0343**	0.0346**
	(0.0141)	(0.0141)	(0.0141)

they will be ripped off when they put their money somewhere other than under their mattress.

Although it is hard for us to address this hypothesis fully with our data, we can take a small step by looking at the effect of our social-interaction variables on checking account use. If our variables really are a proxy for a generalized trust in financial institutions, then one might expect them to explain checking account use as well as stock-market participation, much as the social-capital variables of Guiso et al. (2000) do in the Italian data.

In Table VIII, we run exactly the same specifications as in columns (2), (5), and (8) of Table III, except that we replace the stock-market participation indicator on the left-hand side of the regression with a checking account use indicator. (Overall, 78.2 percent of the households in our sample have checking accounts.) As can be seen, our social variables do essentially nothing to explain checking account use. The estimated coefficients are all very small—actually negative in two out of three cases—and never close to statistically significant. Although this is admittedly just a small bit of evidence, it would seem to cut against the hypothesis that these social variables are indicative of a general trust in financial institutions.

Two other interesting results appear in Table VIII. First of all, the *Risk Tolerant* dummy attracts a strongly negative and significant coefficient,

suggesting that risk-averse households are, not implausibly, more likely to have checking accounts. And the coefficient on the race indicator implies that non-white/Hispanic households are almost 14 percent less likely to have checking accounts, all else equal. This is an enormous effect, and it suggests that even though our social variables may not capture trust, there may be substantially less trust of financial institutions among members of some minority groups.

IV. Conclusions

Three significant findings emerge from our analysis of the HRS data. First, social households—those that interact with their neighbors, or that attend church—are more likely to invest in the stock market than non-social households, all else equal. Second, the impact of sociability is much stronger in those states where stock-market participation rates are higher. Third, and by far most tentatively, the differential between social and non-social households appears to have widened over the course of the 1990s, as overall participation rates have climbed sharply.

This evidence is broadly consistent with the hypothesis that social interaction helps to increase stock-market participation. At the same time, we have been somewhat vague as to the exact mechanism by which social interaction promotes participation. We have discussed two possible stories—one having to do with word-of-mouth information-sharing, the other with the enjoyment that people get from talking about the market together—but have made no effort to discriminate between them. And it should be noted that this distinction might be a significant one, particularly with regard to the more dynamic aspects of the theory.

To see why, suppose that the stock market performs poorly over the next several years, leading some investors to get discouraged and withdraw. To what extent do these departing investors create an externality that affects their peers who are already in the market?[27] Under at least some versions of the word-of-mouth information-sharing story, the externality might be expected to be unimportant, since the presumption is that those who are already in the market know whatever it is they need to know about how to invest. However, under the enjoyment-from-talking-about-the-market story, there is an obvious externality, with any individual's decision to leave the market making it more likely that others in his peer group will leave too. One objective for future work might be to try to distinguish between these two possibilities.

In closing, a final point to highlight is the potentially close connection between the ideas presented here and the growing empirical literature on "local preference" in the stock market. A series of papers has demonstrated that investors strongly tilt their portfolios not only towards home-country stocks (French and Poterba (1991), Cooper and Kaplanis (1994), Tesar and Werner (1995), Kang and Stulz (1997)), but also towards the stocks of firms that are

[27] In any version of our model, there is a clear prediction that departing investors exert a negative influence on the participation decisions of those who have not yet begun to invest in the market.

headquartered nearby, or that are otherwise more familiar (Huberman (2001), Coval and Moskowitz (1999), Grinblatt and Keloharju (2000)). In many of these papers, the explicit or implicit story being told is that it is easier for investors to learn about nearby stocks. In other words, in the language of our model, participation costs are lower for nearby stocks.

If one accepts this interpretation, then our model suggests that social-interaction effects may help to amplify whatever aggregate local preference is induced by exogenous cross-stock differences in participation costs. Thus even if the direct, observable costs to a U.S. investor of buying, say, Japanese stocks are only modestly greater than the costs incurred with U.S. stocks, the social equilibrium may involve a very pronounced home-country bias. In such an equilibrium, many U.S. investors may be deterred from investing in Japan largely because they do not know anybody else who does. This hypothesis would seem to provide another natural direction for future research.

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