Why do Wealthy Investors have a Higher Return on their Stocks?

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Abstract

In contrast to the standard economics theory, an analysis of the Survey of Consumer Finance shows that wealthy investors have a higher return on their stocks than their poorer counterparts. The paper presents a general financial and economic theory of risk and search behavior to address the question if why wealthy investors have a higher return on their stocks. Two additional facts emerge: (i) wealthy investors employ more productive search efforts, and (ii) financial risk bearing and search efforts are complementary. This study develops an explanation for the wealth inequality and the equity premium puzzle as well as the policy implications of the privatization of social security.

Keywords: Investment decisions, financial behavior, search and risk behavior.

JEL Classification: D01, D11, D12, D81, D83, G10, G11, G12.

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Introduction

Utilizing data from the Survey of Consumer Finance – (SCF), three facts emerge. First, wealthy investors have a higher return on their stocks than those who are less wealthy. Second, wealthy investors adopt a more productive strategy of search activity. Third, there is a complementary relationship between financial risk bearing and search for stocks; the greater the financial risk-bearing[1], the greater the search effort, ceteris paribus. The intuition behind the third fact is that investors who bear high financial risks search more intensively to smooth and to lower the portfolio risk. These facts present a challenge to the "standard" asset pricing theory, which assumes that the return on stocks is fixed and uncorrelated with wealth.

The purpose of this study is to provide explanations for the above financial facts, as well as to find out what is "missing" in the standard theory. The paper begins by characterizing what determines the return on stock. In fact, the return on stock is a function of the investor's financial risk-bearing and the search effort employed when buying stocks. The greater the risk taking, the higher the expected return, and also, the greater the search effort, the higher the expected return. The relationship between our search and risk bearing theory and Markowitz's mean-variance efficient frontier is that the more intense the search is, the closer the expected portfolio's return to the Markowitz's mean-variance efficient frontier.

The present model follows in the spirit of Lucas's (1978) asset pricing model by adding another factor which is the search effort. Lucas' main concern was equilibrium asset pricing whereas our main concern is individual's returns and the factors that

[1] Risk-bearing is measured by the amount of risk that an investor is willing to tolerate for higher expected return; more elaboration follows in the data description.

determine the returns. The model introduces two types of search: informal and professional search. The informal search method summarizes investors' personal search efforts which include utilization of the internet, newspapers and magazines, while professional search methods are the services that provided by professional experts including financial planners and brokers. In fact, not only are there different types of search, but there are also differences in the cost of search for each type. There is a time opportunity cost for informal searches, whereas there is a pecuniary cost for professional searches[2]. Thus, we expect investors who have higher opportunity cost for time to employ less informal searches.

Indeed, the theoretical model as well as the data shows that wealthy investors utilize less informal and more professional searches than poorer counterparts. Since we observe different patterns of search, we cannot conclude that wealthy investors employ higher levels of search. So we estimate the productivity of each type of search to find out whether different patterns of search cause the discrepancy on the return on stocks. Another econometrics goal is to estimate the investor's search efficiency. Although we observe each investor's informal and professional search effort employed, we do not observe the search effectiveness of each investor. Therefore, to estimate the productivity of each search type as well as the investors' searches effectiveness we use the Heckman (1976) procedure which enables us to estimate the investors' search efficiency by using the selectivity bias of participation in the stock market.

The main estimation result shows that the differences among the search patterns explain 29 percent of discrepancy on the return on stocks between the wealthy and the

[2] A study by Vissing-Jorgensen (2002) shows that the search effort cost explains the limited participation in the stock market but the study does not estimate the contribution of the search on the return on stocks.

less wealthy. The paper shed lights and has implication on wealth inequality, equity premium puzzle, and social security reform. First, higher returns on stocks for wealthy people provide another explanation to the wealth inequality in particular for top tails[3]. Second, we find a big variation on the return on stocks that raises the issue of whether the S&P 500 index is a good proxy to the representative agent and also variability of the consumption growth rate in the cross sectional level[4]. Finally, privatization of social security will benefit wealthy people by enabling them to have a more productive social security plan.

The rest of the paper proceeds as follows. The data are described in section I, and the financial facts are reported in section II. To illustrate the theory, a two period model is introduced in section III. The estimation results are reported in section IV. The implication of the theory and the results are presented in section V; I draw conclusions in section VI.

I. The Data

Cross-section data are analyzed from Survey of Consumer Finance- SCF. The SCF provides detailed information on U.S. assets and liabilities, labor force participation, and social demographic characteristics. The survey also collects information on total family earnings and wealth. The actual number of respondents is 4,309 where for each observation there are another 5 imputed observations, thus, the number of observations in the full dataset 21,545 is five times. Since this study is mainly concerned with

[3] See Bonaparte (2005 b) for the influence of the assets return on the wealth inequality distribution.
[4] For more details see Bonaparte (2005 a) where he discusses the reconciliation between cross-section and time-series.

stockholders[5], descriptive statistics are distinguished between stockholders and non-stockholders. Table 1 reports the descriptive statistics of the stockholder in Panel A, whereas the non-stockholders are reported in Panel B. Three key variables are described: the return on stocks, the willingness to bear financial risk variable, and the search effort that are employed by investors when they buy stocks.

A. Return on stocks

The SCF gathers information about the percent gained/lost (hereafter return) on stock since it was obtained for those who own publicly traded stocks. The return on stocks measures the unrealized capital gain/lost in the household's stock holdings, not the average return of each stock the household owns. Since we do not know the vintage of the asset, the data is adjusted by length of the time where the stocks were hold. The adjustment variable is defined as the number of stocks holding in different company divided by the number of trades per year. We assume that the hazard function for a each stock is the same but it varies across investors. The hazard time measures the length of time the stock has been hold.

All stock holders report data on the NDC, but only investor who hold brokerage account provide information on the frequency of trading. In fact, about 74 percent of the stock holders report that they have a brokerage account, thus, we impute data for the other 26 percent of the missing values on trading. Brokerage account holders report data about their trade frequency and the number of trades have been made on the past year. Therefore, we define two different adjustment variables. The first one measures the time

[5] Stockholders are those who own publicly traded stock but not include stock that held through pension accounts, annuities, and trusts.

frequency which is: hourly, daily, weekly, biweekly, twice a month, monthly, bimonthly, quarterly, yearly, twice per year or every six month, and over two years, whereas the second one accounts for the number of times they buy or sell stocks or other securities over the past year. The descriptive statistics of the unadjusted return on stocks, the NDC, and the number of trades are reported in Table 1 (Panel A).

B. The willingness to bear financial risk variable[6]

SCF provides self-reported attitude toward risk which is used widely in the literature such as Haliassos and Bertaut (1995), Blume and Zeldes (1994), and Vissing-Jorgensen (2002). SCF asks respondents "Which of the statements below comes closest to the amount of financial risk that you and your (spouse/partner) are willing to take when you save or make investments?" The possible responses are:

1. Take substantial financial risks expecting to earn substantial returns.
2. Take above average financial risks expecting to earn above average returns.
3. Take average financial risks expecting to earn average returns.
4. Not willing to take any financial risks.

Table 2 reports the mean and median wealth for investors on each of the above types of risk bearing. Although the median wealth is higher for those who are willing to bear higher financial risk, the mean wealth results do not share the same tendency. However, the difference in mean wealth between investors who are willing to take above average or

[6] This variable reflects the attitude toward financial risk but not the risk aversion of the investor. However, it can be used as a proxy to the risk aversion.

substantial financial risk is statistically more significant than the mean wealth for those who are willing to take only average risk.

C. Search Methods

SCF (1998) asks investors about the way that they search when making decisions about savings and investments. The SCF provides about 19 search methods, where investors are asked to choose up to ten methods[7]. Table 3 reports the listed methods as well as the fraction of investors who use each of the methods. Indeed, the methods can be divided into two categories: informal search and professional search. The categories are distinguished by two aspects:

1. The cost of the method.
2. Whether the search is conducted by the investor herself or by renting the service of an expert.

When reviewing the cost of the method, it is important to note that there are two different costs: one is time opportunity cost and the other is pecuniary cost. The category in which investors conduct the search by themselves and require time opportunity cost is called "informal search", whereas the category in which investors rent the service of experts and incur a pecuniary cost is called a "professional search". In particular, the following is the match of each method with the appropriate category.

1. **The Informal Search** - includes calling around, reading newspapers or material in the mail, and using information from television, radio, an online service, or advertisements.

[7] Only 1 percent of the entire sample uses all ten methods.

2. **The Professional Search** - includes using the service of one or more of the following professionals: a lawyer, an accountant, a banker, a broker, and a financial planner.

Table 3 shows, among professional search methods, that using a financial planner for managing the portfolio is the most frequent among investors. The search effort is introduced by two variables, informal search and professional search. The informal search variable is the sum of the informal methods that an investor uses; the professional search variable is the sum of professional search methods that an investor uses. The descriptive statistics of the search variables is reported in Table 4.

II. Financial Facts

In this section, the paper develops three main financial facts:

A. Fact 1- positive correlation between wealth and return

The correlation between gross wealth as well as initial wealth and the return on stocks is explored via two different ways. One possible way is to look to the average wealth for those who have absolutely positive returns and compare them with those who have negative returns. The second way is by employing a regression where the return on stocks is the dependent variable, whereas the independent variables are the wealth level, demographic characteristic variables, and the time adjustment.

Using SCF data sets from years 1989, 1992, 1995, 1998, and 2001, Table 5 reports results on the average wealth for those with positive and negative returns, the difference, and t-test on the difference on wealth level. The t-test measures whether the difference is statistically significant. Of course, the t-test considers also the standard deviation for each

group of comparison. Across several years, we find that investors who have positive returns on their stocks are wealthier than those who have negative return and the difference in wealth is statistically significant.

We also employ a regression where the dependent variable is the return on stock, and the independent variables are willingness to bear financial risk, gross wealth, or the initial wealth[8]. We introduce the initial wealth since the gross wealth includes the financial gain from the return on stocks whereas the initial wealth does not count that gain. The idea is to neutralize the causality problem by subtracting the previous year's financial earnings from the gross wealth[9]. We exclude observations of those who have not participated in the stock market since the purpose of this specific regression is only to show that gross wealth and initial wealth are positively correlated with the return on stock[10]. The results of the regression are reported in Table 6.

The adjustment variable used is one that measures the NDC divided with the number of trades over the past year. Using the other adjustment variable unremarkably change the results. The main focus from Table 6 is on the coefficients of wealth levels. The result shows that the coefficients of gross wealth and initial wealth are positive and significant. Also, the hypothesis that the coefficient is zero has been rejected. Notice, the constant coefficient is negative since it highlights investors who are not willing to take any financial risk; the return on stock decreases if an investor does not take financial risk. The results also show that the coefficient of the adjustment variable is positive and significant,

[8] Initial wealth is gross wealth minus: dividend, gain/loss from the sale of stocks, bonds, and mutual funds, and gain/loss in values of stocks and mutual funds.
[9] The causality issue is concerning what initially causes the wealth level of investors; is it because they have higher returns on their stocks or high return because they have high initial wealth.
[10] In the estimation section, the estimation is conducted using not only stock holders but also the entire sample. The purpose of this regression is as supportive evidence that wealth and returns are positively correlated.

which means that those who hold more stocks for a shorter time of period would have a higher return. By employing the same regression without the adjustment variable, the coefficient of wealth level increases, thus, part of the correlation between wealth and the return on stocks is explained from investors' trades.

B. Fact 2 - Wealthy investors search more productively.

Since wealthy investors have more stocks, they have more incentive to search. On the other hand, the time opportunity cost to search for stocks is higher for wealthy investors than those who are less wealthy. Therefore, we expect the search effort to be lower for wealthy investors due to the high opportunity cost. Indeed, there are two forces that work in different directions.

Using the gross wealth variable, Table 7 reports the search methods for the top 25 percent wealthiest (top quartile) stockholders compared with the stockholders who are in the bottom 25 percent of the wealthy. For each method, we report the fraction of investors who use that method in each quartile. Table 7 shows that the top quartile has a different search behavior than the bottom one. Since the time opportunity cost for wealthy investors is higher than their counterparts, they use professional searches more than informal searches, whereas the bottom quartile uses more informal searches than professional searches. Wealthy stockholders benefit more from financial planners, accountants, and brokers. Less wealthy investors, however, call around more; they rely on magazines and newspapers, online services, and friends or relatives as they search for stocks. For investors in the top quartile, however, the number of methods used is slightly higher than those who are in the lowest quartile, but the t-statistic is significant at 1

percent level. Since the search behavior varies for different wealth levels, a theoretical model is needed to explain the search risk behavior. These new facts suggest thinking about a model that might generate them.

C. Fact 3 - investors who take substantial financial risk search more intensively

Table 8.a reports the fraction among investors who report that they are willing to take substantial financial risk for each of the listed methods versus investors who report that they are not willing to take any financial risk. It is important to mention that the method of reporting the results in Tables 3, 7, and 8.a is widely used in the literature. Blau and Robins[11] (1990) and Holzer (1987) present summary statistics on the search choices of employed and unemployed job seekers. The percentage using every method except two (banker and self/spouse/partner) is higher for the investors who are willing to take substantial financial risk. Most importantly, investors who are willing to take substantial financial risk search more with both methods, informal and the professional searches.

Another way to show the complementary relationship between search and financial risk bearing is by introducing a ratio that measures the total share of stocks from the entire portfolio, (stock holdings divided by the total of non stock asset holdings). The ratio reflects the relative of the risky investment from the less risky investment. The correlation between this ratio and informal and professional search is positive; however, since asset holdings are endogenous, this ratio is also endogenous variable. Thus, we estimate the relationship between the ratio and search effort by employing a regression where the ratio is the dependent variable over the informal and professional searches, wealth level, and other demographic variables. Table 8.b reports the results where we

[11] See Tables 1 and 2 on pages 642 and 644.

find positive coefficient on the informal and professional searches which let us to conclude that there is a complementary relationship between search and risk bearing. In the theoretical model, we show how an increase in the stock bond ratio increases both the informal and professional searches.

III. A two Period Model

Following Lucas (1978) we introduce an economy with one asset called stock. While Lucas introduces a general equilibrium model, we introduce a partial equilibrium model with additional element - the search technology. The purpose of the model is to illustrate the relationship between wealth and search behavior and the other financial facts that we have described, a two period model is employed as a simple way to provide a framework to understand the financial behavior of investors.

A. The Environment

Consider an economy occupied by heterogeneous agents with respect to their initial wealth. Agents live for only two periods and want to maximize their lifetime utility from consumption. To do so, they are allowed to save in the first period by purchasing assets from the financial market. The financial market has one type of asset; risky assets. The return on risky assets depends on the state of the "world"; the return in the good state is denoted by R^H whereas in the bad state is denoted by R^L where $R^H > R^L$.

Agents who decide to participate in the risky asset market have to pay a fixed cost F and also to search for stock with high probability to yield high returns in the next period. There are two types of search; informal and professional search. There is time

opportunity cost from informal search denoted by $w*\ell$; where w is the labor earnings and ℓ is the informal time search. Agents endowed with one unit of time that can be dedicated for both labor and search for stocks. In addition, there is another search method denoted by m that has a pecuniary cost. In the first period, agents choose the amount of time to devote to the labor market and informal search, professional search, and stock and bond holdings. For simplicity and tractability, a two-state simple version of the model is presented as follows. The probability of being in the good state $P^H(\ell,m)$ is a function of informal search ℓ and professional search m. The following is the two-state model:

$$\underset{c,s',m,0\le\ell\le 1}{Max}\; U(c)+\beta\left\{p^H(\ell,m)U\left(c^H\right)+\left(1-p^H(\ell,m)\right)U\left(c^L\right)\right\}$$

$$S.T$$

$$c+s'\le w(1-\ell)+W-I(s')F-m$$

$$c^H=R^H s',\qquad c^L=R^L s'$$

$$m\ge 0,\qquad R=\left\{R^L,R^H\right\},\qquad p^H(\ell,m)\quad is\quad given$$

Suppose U is strictly concave, and let $P(\ell,m)$ be a differentiable function with respect to ℓ, m. The first order condition with respect to s',ℓ, and m are as follows respectively:

$$(1)\qquad -U'(c)+\beta\left\{p^H(\ell,m)R^H U'\left(c^H\right)+\left(1-p^H(\ell,m)\right)R^L U'\left(c^L\right)\right\}=0,\qquad <\;\Rightarrow\; s'=0$$

$$(2)\qquad -wU'(c)+\beta\left\{P_\ell^H(\ell,m)\left[U\left(c^H\right)-U\left(c^L\right)\right]\right\}=0,\qquad <\;\Rightarrow\; \ell'=0$$

$$(3)\qquad -U'(c)+\beta\left\{P_m^H(\ell,m)\left[U\left(c^H\right)-U\left(c^L\right)\right]\right\}=0,\qquad <\;\Rightarrow\; m=0$$

Where $P_{\ell}^{H}(\ell,m)$ and $P_{m}^{H}(\ell,m)$ are the derivative of the probability function with respect to ℓ and m respectively. We specify the utility function as $U(c)=Log(c)$ and the probability function to be in the good state as: $P^{H}(\ell,m;\alpha)=\alpha\frac{\ell}{1+\ell}+(1-\alpha)\frac{m}{1+m}$.

Where α is a known parameter that reflects the productivity of informal search over the return on stock and $(1-\alpha)$ is the professional search productivity.

Thus: $P_{\ell}^{H}(\ell,m)=-\frac{\alpha}{(1+\ell)^2}$, $P_{m}^{H}(\ell,m)=-\frac{(1-\alpha)}{(1+m)^2}$

Thus, the expected return on stocks is simply: $\mathrm{E}R(\ell,m;\alpha)=P^{H}(\ell,m;\alpha)(R^{H}-R^{L})+R^{L}$.

In the Appendix (A) we solve for the policy function of the professional search. Here's the final result:

$$(4)\qquad m=\frac{-(2*x1+x2)+\sqrt{(2*x1+x2)^2-4(x1)^2+4x1*\left(W+2w-\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2}\right)}}{2*x1}$$

Where $x1=\frac{(1+\beta)}{\beta(1-\alpha)Log(R^{H}/R^{L})}$ and $x2=\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2}$.

Also, in equation (5) we find that relationship between informal and professional search.

$$(5)\qquad \ell=(1+m)\left(w\frac{(1-\alpha)}{\alpha}\right)^{-1/2}-1$$

B. Demonstration of financial fact 1 and 2

Using the comparative static results of the first order conditions, the next step is to show how the benchmark model illustrates the financial facts that we described. On

financial Fact 1 we showed that gross wealth as well as the initial wealth is positively correlated with the return on stocks. To illustrate that, recall equation (4):

$$(4) \qquad m = \frac{-(2*x1+x2)+\sqrt{(2*x1+x2)^2-4(x1)^2+4x1*\left(W+2w-\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2}\right)}}{2*x1}$$

Since $x1$ and $x2$ are positives, an increase on wealth W increases the professional search. Also, equation (5) shows that an increase on the professional search increases the informal search as well. Thus, an increase on the initial wealth W increases the professional search and informal search and thus increases the expected return on stocks.

The affect of wage rate on the informal search as well as on the professional search is not clear, thus, because we calculate the reduced form of the search, we calculate the informal and professional search data for different wage rates and by parameterization our benchmark model. We introduce two different wage rates, high and low. While the low wage rate is $w^L = 37{,}492$ which simply the average wage is for stock holders, the high wage rate w^H is one and half times the average. The other parameters R^L and R^H are specified as follows. We specify $R^H = \overline{R} + \sigma$ and $R^L = \overline{R} - \sigma$. Where $\overline{R} = 1.17$ is the average return and $\sigma = 112/2$ is one half standard deviation. This approach of specification is used by M&P when they specify the consumption growth rate on the good and bad states. Finally the discount factor stands at $\beta = .97$, the search technology parameter $\alpha = 0.5$, and the fixed cost participation $F = 10$ dollars. Figure 2 and 3 depicts the relationship between the search method and wage rate. It is important to mention that for different specification of the parameters would not change our inferences as far as we maintain that $R^H > R^L$ and $w^H > w^L$.

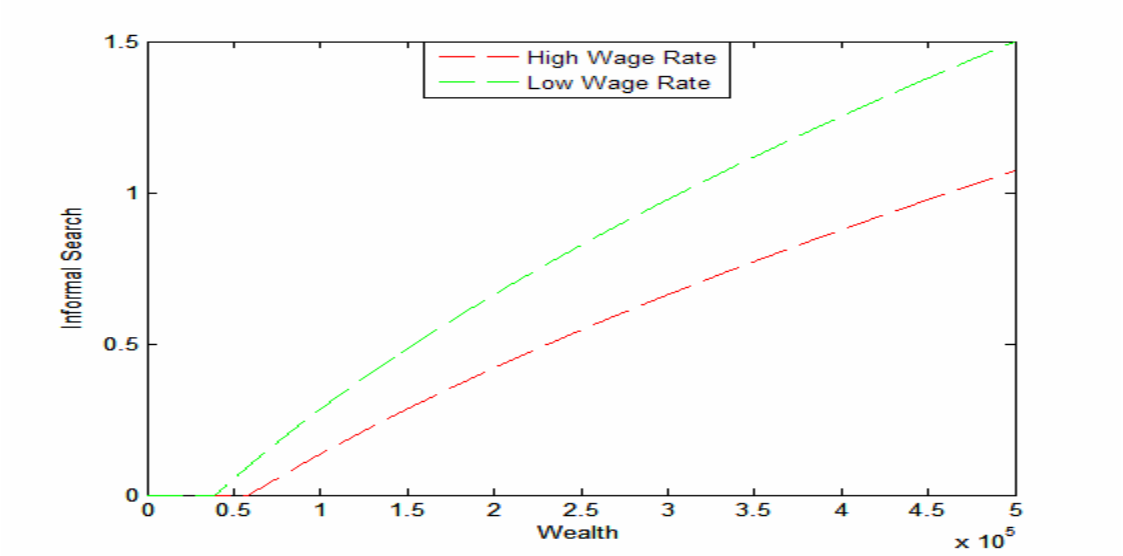

Figure 2: the informal search for different wage rates

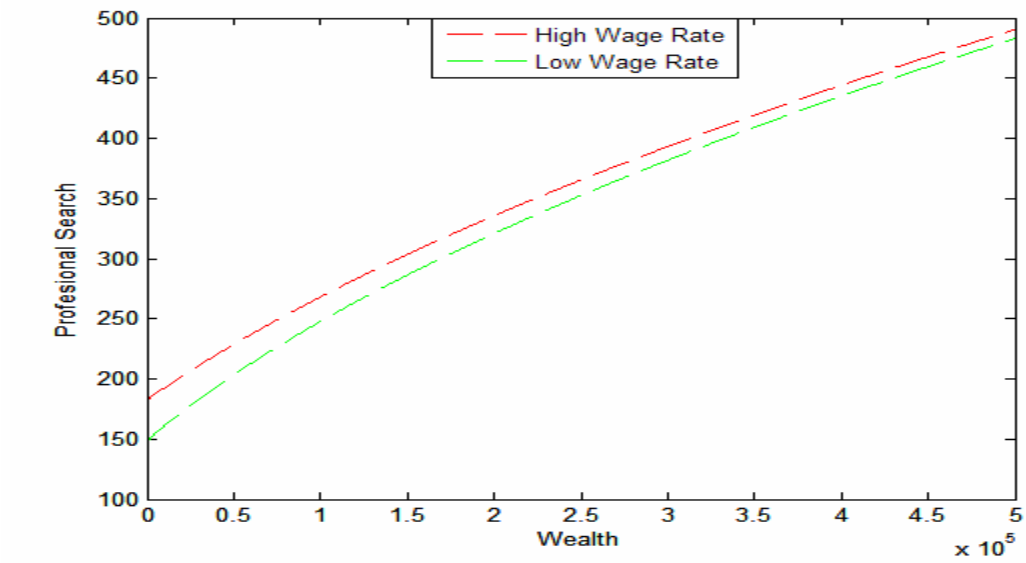

Figure 3: the professional search for different wage rates

Notice that $w\uparrow$ then $\ell\downarrow$ since when the time opportunity cost increases, the informal search decreases. Equation (5) shows substitution relationship between professional search and informal search for different levels of wages.

C. Demonstration of financial fact 3

In the financial fact 3 we find that there is a complementary relationship between financial risk bearing and the search effort. To illustrate financial fact 3, we extend our model by introducing another riskless asset called a bond where the return on this asset is deterministic and equal to R^f, where $R^L < R^f < R^H$. Thus, the formal model is as follows[12]:

$$\underset{c,s',b',m,0\le\ell\le 1}{Max}\; U(c)+\beta\left\{p^H(\ell,m)U\left(c^H\right)+\left(1-p^H(\ell,m)\right)U\left(c^L\right)\right\}$$

$$S.T$$

$$c+s'+b'\le w(1-\ell)+W-I(s')F-m$$

$$c^H=R^f b'+R^H s', \qquad c^L=R^f b'+R^L s'$$

$$m\ge 0, \qquad R=\left\{R^L,R^H\right\}, \qquad p^H(\ell,m) \quad is \quad given$$

The first order condition with respect to s', b', ℓ, and m are as follows respectively:

$$(6)\quad -U'(c)+\beta\left\{p^H(\ell,m)R^H U'\left(c^H\right)+\left(1-p^H(\ell,m)\right)R^L U'\left(c^L\right)\right\}=0, \quad < \Rightarrow \quad s'=0$$

$$(7)\quad -U'(c)+\beta R^f\left\{p^H(\ell,m)U'\left(c^H\right)+\left(1-p^H(\ell,m)\right)U'\left(c^L\right)\right\}=0, \quad < \Rightarrow \quad b'=0$$

$$(8)\quad -wU'(c)+\beta\left\{P_\ell^H(\ell,m)\left[U\left(c^H\right)-U\left(c^L\right)\right]\right\}=0, \quad < \Rightarrow \quad \ell'=0$$

$$(9)\quad -U'(c)+\beta\left\{P_m^H(\ell,m)\left[U\left(c^H\right)-U\left(c^L\right)\right]\right\}=0, \quad < \Rightarrow \quad m=0$$

Proposition - *Corner solution* - If $r > \mathrm{E}R$, then $s'=0$, then $U\left(c^H\right)=U\left(c^L\right)$, and thus the constraints in equations $(3)\&(4)$ are not binding, thus $\ell=m=0$. Therefore, $b'>0$ if the investor saves and thus the constraint from equation (2) binds.

[12] It is important to mention that by parameterzing the model and simulating data on wealth, financial facts 1 and 2 are still holding.

Notice from the first order conditions (8) and (9) we derive the relationship between informal and professional search that we derived on equation (5).

Recall equations (6) and (7), then we have:

$$\left\{p^H(\ell,m)R^H U'(c^H)+\left(1-p^H(\ell,m)\right)R^L U'(c^L)\right\}=R^f\left\{p^H(\ell,m)U'(c^H)+\left(1-p^H(\ell,m)\right)U'(c^L)\right\}$$

Again, we assume that $U(c)=Log(c)$, thus:

$$\left\{\frac{p^H(\ell,m)R^H c^L+\left(1-p^H(\ell,m)\right)R^L c^H}{c^H c^L}\right\}=R^f\left\{\frac{p^H(\ell,m)c^L+\left(1-p^H(\ell,m)\right)c^H}{c^H c^L}\right\}$$

$$p^H R^H c^L+\left(1-p^H\right)R^L c^H=R^f p^H c^L+R^f\left(1-p^H\right)c^H$$

$$c^L p^H\left(R^H-R^f\right)=c^H\left(1-p^H\right)\left(R^f-R^L\right)$$

Let denote $t=\dfrac{\left(1-p^H\right)\left(R^f-R^L\right)}{p^H\left(R^H-R^f\right)}$. Then, $c^L=t*c^H$, but:

$$c^H=R^f b'+R^H s',\qquad c^L=R^f b'+R^L s'$$

Then, $R^f b'+R^L s'=\left(R^f b'+R^H s'\right)*t$, divide both sides by b', then we have:

$$R^f+R^L\frac{s'}{b'}=\left(R^f+R^H\frac{s'}{b'}\right)*t$$

And then; $\dfrac{R^f+R^L\dfrac{s'}{b'}}{\left(R^f+R^H\dfrac{s'}{b'}\right)}=t$. Let define $\widetilde{R}=\dfrac{\left(R^f-R^L\right)}{\left(R^f-R^H\right)}$, then

$t=\dfrac{\left(1-p^H\right)}{p^H}\widetilde{R}=\dfrac{1}{p^H}\widetilde{R}-\widetilde{R}$. But; $t\left(\ell,m;\widetilde{R}\right)=t\left(\ell(m),m;\widetilde{R}\right)=t\left(m;\widetilde{R}\right)$

Thus, an increase on the ratio $\dfrac{s'}{b'}$ decreases $t(\cdot)$, and also an increases on the informal or professional searches also decreases $t(\cdot)$. Thus, the relationship between the stock bonds

ratio and the informal and professional searches is complementary which is exactly what we have introduced in financial fact (3).

IV. Estimation and Results

Although wealthy investors employ more professional searches, less wealthy investors employ more informal searches. Thus, we cannot derive a conclusion that wealthy investors employ a higher level of search. The estimation is aimed to provide whether professional search is more productive than the informal search, and whether search productivity for wealthy investors is higher. If so, then we can conclude that even though wealthy investors search less informally, the professional search is so productive that it exceeds the deficiency in the informal search. Estimating the effect of search on the return on stocks has an econometric problem: the unobserved investors' search efficiency. While the quantitative informal and professional search efforts are observable, investor's search efficiency is not observable to econometricians, but it is observed by the investor herself. Formally, let specify the return on stock R_i^s for investor i as:

$$R_i^S = R\left(\ell_i, m_i; \theta | x\right) + \varepsilon_{2i} + v_{si}$$

Such that:

$$R\left(\ell_i, PR_i; \theta | x\right) = \theta_1 \ell_i + \theta_2 m_i; \;\; \theta = \left(\theta_1; \theta_2\right)$$

Where the vector θ is the technology parameter to estimate and x is a vector of demographic characteristic variables. The above equation specifies the investor i's return on stock, given her participation in the stock market, as a function of observable predictors of return on stocks. The two transitory random components (ε_{2i} and v_{si}) are

distinguished conceptually, while ε_{2i} summarizes the observable search efficiency of an investor, the v_{si} addresses the idiosyncratic shock or the aggregate shock, and $v_{si} \sim N(0, \sigma_v)$. These random shocks are assumed to be independent of all the other variables in the model as well as reciprocally independent. While the two random components are unobservable by the econometrician, the investor observes ε_{2i} prior to the participation decision but does not observe the shocks v_{si}. Taking the expectation of R_i^S:

$$\mathrm{E}\left(R_i^s\right) = R\left(\ell_i, m_i; \theta | x\right) + \varepsilon_{2i}$$

Since we don't observe the search efficiency ε_{2i}, estimating the return on stock over the search variables would generate biased estimators. Notice, we observe the return on stocks only for those who participate in the stock market, and there are only 19 percent of investors who participate in the stock market; which means we have a selectivity bias. Correcting for the selectivity bias is following the Heckman (1976) procedure. Using the selectivity-corrected stock's return, we can estimate the parameter vector θ and the inverse mills ratio. The inverse Mills ratio represents the search productivity and the financial risk bearing that an investor is willing to bear. To correct the selection bias, I introduce a variable that affects the search cost and consequently the participation in the stock market. The instrument chosen is consistent with a study by Harrison Hong, Jeffrey D. Kubic, and Jeremy Stein (2001) where they present a theory regarding social interaction and stock-market participation, in which they find consistent evidence that "the impact of household sociability is indeed stronger in states where stock-market rates are higher and sociability generates an increase in the participation rate." The SCF

provides a regional variable called the Census Region[13]. Thus, we generate an instrument that takes the value of the region stock market participation rate that affects the stock market participation cost but does not affect the expected return on stocks. In Appendix B, we report the econometric method used to correct the selectivity bias estimator.

Table 9 reports the estimation results of the parameters. While the return on stock (second column) reports the estimation results for the dependent variable, the third column reports the stock market participation estimation results of the entire sample. Column 4 reports the result when we don't consider the selection problem, hence $\varepsilon_i = 0$ for all the investors. Notice how the results are different when we add the correcting term instead of estimating without considering the selectivity issue. The mean difference return between top wealthy quartile and bottom quartile from the estimated expected value of the dependent variable is about 28 percent, which is fairly close to the actual data, 25.7 percent.

Before discussing the issue of search productivity, let's denote the estimated coefficients β_ℓ^D and β_m^D of the informal and professional search variables in the dependent equation and β_ℓ^{Sel} and β_m^{Sel} in the selection equation. Notice that the contribution of the informal and professional search variables on the return on stock is not entirely β_ℓ^D and β_m^D since it is also dependent on the inverse mills ratio.

[13] Although the SCF does not provide data about an investor's state, data about the region is provided. By contacting Senior Economist and Project Director Survey of Consumer Finances, he explains that "The SCF is not designed to be representative at the state level … the selection of respondents within these areas in the SCF sample is made to balance population groups across regions, but not within states."

A. What is the search productivity?

Wooldridge (2002) defines, with analogue to the present study, search method productivity as the partial effect of the search method ℓ or m on the expected return $\mathrm{E}\left(R^S \middle| x, Participation = 1\right)$, which is not entirely determined by β_ℓ^D and β_m^D since there is additional adjustment factor. Namely, the informal search productivity is:

$$\frac{\partial \mathrm{E}\left(R^S \middle| x, Participation = 1\right)}{\partial \ell} = \beta_\ell^D - \beta_\ell^{Sel} * \gamma * \lambda(c)\left[\frac{xb}{\sigma} + \lambda(c)\right]$$

Where $\lambda(\cdot)$ is the inverse Mills ratio and $c = \frac{xb}{\sigma}$. Also, xb is the fitted value of the selection equation, and σ is the standard error of the residuals in the return on stocks equation (depended equation). Finally, $\gamma = \rho * \sigma$, where ρ is the correlation between the error terms in the selection and the dependent equations.

Similarly, the professional search productivity is:

$$\frac{\partial \mathrm{E}\left(R^S \middle| x, Participation = 1\right)}{\partial m} = \beta_m^D - \beta_m^{Sel} * \gamma * \lambda(c)\left[\frac{xb}{\sigma} + \lambda(c)\right]$$

B. So, why do wealthy investors have a higher return on their stocks?

Table 10 summarizes the average productivity of informal and professional searches of top and lower quartiles. It shows that top quartile investors search more productively with both informal and professional search methods. Indeed, wealthy investors have a higher return on their stocks than the poorer counterparts since they are willing to bear higher financial risk and search in a more productive way. To show that, first, not only do wealthy investors employ more professional searches, but they also have higher productivity in both informal and professional searches. The last row in Table 9 reports

the contribution to the search on the return on stocks, and the difference in the return caused by the search efforts employed by the top and bottom quartiles.

The search effort generates about an 8.9 percent difference in return on stocks between the top quartile and the bottom quartile, which is about 29 percent of the total difference in the means between the top and bottom quartiles. Notice the other part is caused by the demographic characteristics variables that are in the return equation as well as idiosyncratic shocks or other unobservable factors.

V. The Implication of the Search Technology

The financial findings as well as the theoretical model presented in this paper have several implications. In particular, there is an implication on a timely issue such as social security privatization, as well as over other concerns such as the equity premium puzzle and skewed wealth distribution. The following points are main implications of the theory.

A. Privatizing social security would deepen the gap between the retired wealthy and retired less wealthy, since not only do wealthy people save more than poor people, but also the return for a given investment for the wealthy is almost double than for their poorer counterparts. Indeed, privatizing social security would provide more security for the wealthy and render the poor less of a beneficiary of social assistance, since they would have to work harder to close the gap in the return of social security investments.

B. Mehra and Prescott (1985) concludes that the representative agent is averse to the highly procyclical risk associated with stock returns. However, there model is absent

from financial friction such as search. In fact, the search technology is not another financial friction since in the search for stock technology, we allow investors to smooth the financial risk by searching for potentially good stocks with high expected return and less volatility. Considering the search environment, the 6.18 percent risk premium is explained not only by the risk aversion but also by the search employed in the market.

In M&P: $\text{Risk premium} = R^{S\&P} - R^{f} = 6.18 = G(\text{Risk aversion})$

Whereas in my study: $\text{Risk premium} = R^{S\&P} - R^{f} = 6.18 = G(\text{Risk aversion}, \text{Search})$

Where $R^{S\&P}$ is the S&P index, R^{f} is the risk free return, and $G(\cdot)$ is a function.

C. Of course that search effort is costly, and thus, the return on stock is not only the actual return $R^{S\&P}$, but $R^{S\&P}$ minus the search effort costs. Namely, let's define the "net" return on stocks as R^{N}:

$$R^{N} = \frac{R^{S\&P}(\ell, m) - w\ell - m - I(s')*F}{s}$$

Which is clearly $R^{N} \leq R$.

Thus, in the search for stocks technology, the premium is lower.

D. Another implication of this study on the equity premium puzzle is that the distribution of households' actual return is different and has a bigger variation than the S&P 500 distribution, which questions the validity of the S&P index as a good proxy for households' actual return.

E. Another implication of the theory is regarding wealth distribution. This paper sheds light on the skewed wealth distribution where the top quintile gains more and more wealth. Figure 2 shows the skewed distribution of individuals' returns on stocks; perhaps that skewed distribution generates the skewed wealth distribution. I mention this because earnings shocks cannot explain the wealth skewed distribution very well. If the investment of wealthy investors is more productive than those who are less wealthy, then "the rich become richer and the poor become poorer".

VI. Conclusion

The paper presents a pioneering empirical study on search for stock, which places it together with other empirical search studies, such as search for job. The unique element in the search for stock that differs from other search families is the financial risk bearing for investors. In fact, the current paper bridges the fields of finance and economics since it's able to couple search behavior together with investors' financial behavior and risk bearing.

Three facts characterizing U.S. investors' behavior toward risk and search have been focused on. First, wealthy investors have a higher return in their stocks. Second, investors who are willing to bear higher financial risk employ greater search effort that fact leads us to believe there is a complementary relationship between search intensity and financial risk bearing. Third, wealthy investors adopt search strategies that are more productive than those adopted by the less wealthy.

The quantitative influence of search technology over the equity premium or over the skewed wealth distribution is beyond the scope of this paper.

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Appendix

Appendix A – Solving the reduce form solution.

Recall first order condition (1):

$$-U'(c)+\beta\left\{p^H(\ell,m)R^HU'\left(c^H\right)+\left(1-p^H(\ell,m)\right)R^LU'\left(c^L\right)\right\}=0$$

$$\beta\left\{\frac{p^HR^H}{R^Hs'}+\frac{\left(1-p^H\right)R^L}{R^Ls'}\right\}=\frac{1}{c}$$

So, $\frac{\beta}{s'}=\frac{1}{c}$ or $c=\frac{s'}{\beta}$. But $c=W+w(1-\ell)-F-s'-m$, then;

$$\beta\left(W+w(1-\ell)-F-s'-m\right)=s'$$

Finally, (6) $$\frac{\beta\left(W+w(1-\ell)-F-m\right)}{(1+\beta)}=s'$$

Recall first order condition (3):

$$-U'(c)+\beta\left\{P_m^H(\ell,m)\left[U\left(c^H\right)-U\left(c^L\right)\right]\right\}=0$$

But $U\left(c^H\right)-U\left(c^L\right)=Log\left(s'R^H/s'R^L\right)=Log\left(R^H/R^L\right)$, thus;

$$\beta\left\{P_m^H(\ell,m)Log\left(s'R^H/s'R^L\right)\right\}=\frac{1}{c}=\frac{\beta}{s'}$$

$$P_m^H(\ell,m)Log\left(R^H/R^L\right)=\frac{1}{s'}$$

Finally, (7) $$s'=\frac{(1+m)^2}{Log\left(R^H/R^L\right)(1-\alpha)}$$

From equation (6) and (7):

$$\frac{\beta\left(W+w(1-\ell)-F-m\right)}{(1+\beta)}=\frac{\beta\left(W+w-F-m\right)}{(1+\beta)}-\frac{\beta\left(w\ell+m\right)}{(1+\beta)}=\frac{(1+m)^2}{Log\left(R^H/R^L\right)(1-\alpha)}$$

But from FOC 3 and 4: $\frac{p_\ell^H(\ell,m)}{p_m^H(\ell,m)} = w$ or $\frac{\alpha(1+m)^2}{(1+\ell)^2(1-\alpha)} = w$

$$(5) \qquad \ell = (1+m)\left(w\frac{(1-\alpha)}{\alpha}\right)^{-1/2} - 1$$

thus, $$w\ell = w(1+m)\left(\frac{\alpha}{w(1-\alpha)}\right)^{1/2} - w = (1+m)\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2} - w$$

So;

$$W + w - w\ell - F - m = W + w - (1+m)\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2} + w - F - m = W + 2w - \left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2} - m\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2}$$

$$\frac{\beta(W + w - w\ell - F - m)}{(1+\beta)} = \frac{(1+m)^2}{Log(R^H / R^L)(1-\alpha)}$$

$$(W + w - w\ell - F - m) = \frac{(1+\beta)}{\beta}\frac{(1+m)^2}{Log(R^H / R^L)(1-\alpha)}$$

$$W + 2w - \left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2} - m\left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2} = \frac{(1+\beta)}{\beta}\frac{(1+m)^2}{Log(R^H / R^L)(1-\alpha)}$$

Let denote:

$$x1 = \frac{(1+\beta)}{\beta(1-\alpha)Log(R^H / R^L)},\ x2 = \left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2}, \text{ and } x3 = W + 2w - \left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2} - F$$

Then; $$x3 - x2 * m = x1 + x1 * 2m + x1 * m^2$$

$$0 = x1 * m^2 + m(2 * x1 + x2) + x1 - x3$$

$$m = -(2 * x1 + x2) + \sqrt{(2 * x1 + x2)^2 - 4x1 * (x1 - x3)}$$

$$m = \frac{-(2 * x1 + x2) + \sqrt{(2 * x1 + x2)^2 - 4(x1)^2 + 4x1 * \left(W + 2w - F - \left(\frac{w\alpha}{(1-\alpha)}\right)^{1/2}\right)}}{2 * x1}$$

Appendix B - Econometrics Methodology

We observe the return on stocks only if the investor participates in the stock market. An investor participates in the stock market only if the expected return on stocks exceeds the search cost plus the alternative opportunity return from risk free bonds. The following figure depicts the structural decision rules for an investor.

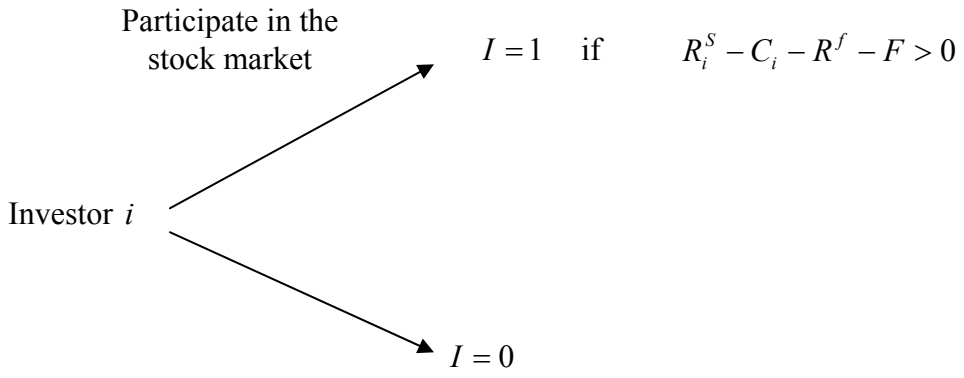

Figure 6: The sketch of the structural model (the game structure)

Where:

$R_i^S\left(\ell_i, m_i | x\right)$: The return on stocks as a function of search efforts.

$C_i\left(\ell_i, m_i, Z_i | x\right)$: The cost of search for stocks.

Z_i: Stock market participation ratio by region- instrument that affects participation cost.

F: Fixed cost participation.

R^f: Return from risk free bonds.

And:

$$C_i = C\left(\ell_i, m_i, Z_i | x\right) + u_{1i}$$

$$R_i^S = R\left(\ell_i, m_i | x\right) + \varepsilon_{2i} + u_{si}$$

Participation decision rules

An investor participates only if the expected return from stocks minus risk free bonds exceeds the search cost and the fixed affect cost:

$$\mathrm{E}\left(R_i^S\left(\ell_i, m_i|x,\right)\right) > C_i\left(\ell_i, m_i, Z_i|x\right) + R^f + F$$

Estimation

I want to estimate: $\mathrm{E}\left(R_i^s / \Omega_i\right) = R\left(\ell_i, m_i|x,\right) + \varepsilon_{2i}$

To estimate, the investor-level model of participation requires several preceding steps. First, the idiosyncratic shock is assumed to be normally distributed with $N\left(0, \sigma_u^2\right)$ and, following Lee (1978) and Willis and Rosen (1979), a reduced form probit model for stock market participation is estimated. Second, a selectivity-corrected equation of the return on stocks is estimated. The treatment of selection is required since returns on stock are observable only if $\mathrm{E}\left(R_i^s - R^f\right) > C_i + F$, and this self-selected participation causes correlation between the explanatory variables and idiosyncratic errors. Specifically, the expected return on stock that is conditional on the observable variables is:

$$\mathrm{E}\left(R_i^s / I = 1\right) = R\left(\ell_i, m_i|x,\right) + \mathrm{E}\left(\varepsilon_{2i} / \varepsilon_{2i} - u_{1i} \geq C\left(\ell_i, m_i, Z_i|x,\right) + R^f + F - R\left(\ell_i, m_i|x,\right)\right)$$

The participation self-selected bias is represented by the conditional expectation on the right-hand side of the above equation. To correct the self-selected bias, we use Heckman (1976) by adding the inverse mills ratio term as an explanatory variable derived from the reduced form participation probit estimates.

Table 1: Descriptive statistics of stock and non-stockholders

Variable	Median	Mean	Standard Deviation	Minimum	Maximum
		Panel A – Stockholders			
Gross wealth (thousands $)	281.8	862.2	3,847.3	-15,200	515,000
Initial wealth (thousands $)	271.4	780.3	3,460.9	-16,000	489,000
Stock holding (thousands $)	18.0	159.7	1,296.2	0.0	300,000
Return on stocks (percent)	-16.11	17.7	112.7	-39.19	4460.8
Number of different companies- NDC	5.67	2	10.11	1	150
Number of trading past year	2	9.76	29.74	0	300
Age	49	50.9	15.6	20.0	95.0
Education	15	14.5	2.3	1.0	17.0
		Panel B – Non-stockholders			
Gross wealth (million $)	47.6	146.4	748.8	-1,071.4	456,000
Age	45	48.2	17.7	17.0	95.0
Education	12	12.7	3.0	1.0	17.0

Gross Wealth consists of assets minus debt.
Assets include financial nonfinancial assets. Financial assets include stocks, bonds, CDs, and T-bills, whereas nonfinancial assets include a vehicle or house.
Debt is defined as: mortgage debt, home equity loans, debt for other residential property, nonresidential real estate, credit card debt, loans against pensions, loans against life insurance, margin loans, and miscellaneous.

Initial wealth is the same as the gross wealth variable from the previous definition minus:
1. Gains and losses in value of stocks and mutual funds.
2. Income from dividend.
3. Gains or losses from the sale of stocks, bonds, or real estate.

Return on Stock represents the percent gained/lost in value since it was obtained.

Stock Holding corresponds to the total market value of stock in dollars.

Number of different companies number of different companies an investor owns stock.

Number of trading past year number of times buy or sell stocks or other securities through over the past year.

Age represents the number of years old.

Education represents the highest grade of school or year of college completed.

Table 2: The gross wealth for different groups of stockholders' attitude toward risk

Attitude toward financial risk	Frequency (Percent)	Gross Wealth (thousands)	
		Median	Mean (Std)
Take substantial financial risks	8.3	2.570	930.5 (5,560)
Take above average financial risks	33.7	2.262	934.6 (3,798)
Take average financial risks	44.2	1.480	928.0 (3,772)
Not willing to take any financial risks	13.9	0.502	436.0 (2,789)

Table 3: Reported methods of search effort

Number	Search choice	Fraction	(Std)
A. Informal search			
1	Call around	0.192	0.394
2	Magazines/newspapers	0.322	0.467
3	Material in the mail	0.115	0.319
4	Television/radio	0.118	0.322
5	Online Service/internet	0.164	0.370
6	Advertisement	0.120	0.325
7	Friend or Relative	0.377	0.485
8	Self/spouse/partner	0.153	0.360
9	Material from work/business contacts	0.024	0.153
10	Investment club	0.001	0.035
11	Other personal research	0.007	0.086
12	Shop around	0	0
B. Professional search			
13	Lawyer	0.051	0.221
14	Accountant	0.160	0.366
15	Banker	0.217	0.412
16	Broker	0.243	0.429
17	Financial planner	0.294	0.456
18	Investment seminars	0.001	0.036
19	Insurance agent	0.003	0.054

Table 4: The mean, standard deviation, and difference of informal and professional search variables by stockholders and non stockholders

Search method	Stockholders	Non stockholders	Diff Std. Err.	t-statistic
Informal search	1.593 (1.564)	1.241 (1.325)	0.352 (0.0003)	1,000*
Professional search	0.968 (0.918)	0.588 (0.783)	0.380 (0.0002)	1,900*

*Significant at 1 percent level.

Table 5: average wealth comparison between investors with a positive return and households with negative returns on stocks

Year	Average wealth		Difference	t-test
	Positive return	Negative return		
1989	642,765	434,208	208,557	162.0*
1992	629,439	368,621	260,818	172.6*
1995	738,292	386,537	351,755	164.5*
1998	931,156	721,227	209,929	76.4*
2001	1374,683	803,488	571,195	295.7*

* Significant at 1 percent level.

Table 6: Regression estimates of the return on stock over explanatory variables

Explanatory Variables	Dependent Variable: The return on stock			
	(1) Coefficient	P>|t|	(2) Coefficient	P>|t|
Gross wealth /10 ^{08}	0.461 (0.040)	0.000	-	-
Initial wealth /10 ^{08}	-	-	0.205 (0.044)	0.000
Substantial and above average financial risk	0.134 (0.068)	0.048	0.165 (0.069)	0.016
Average financial risk	0.142 (0.066)	0.032	0.153 (0.067)	0.021
Age	0.006 (0.001)	0.000	0.007 (0.001)	0.000
Education (year of schooling)	0.024 (0.009)	0.009	0.027 (0.009)	0.004
Race (one if white)	0.284 (0.071)	0.000	0.292 (0.072)	0.000
Married (one if married)	-0.101 (0.045)	0.024	-0.113 (0.045)	0.012
Adjustment/10,000	0.256 (0.077)	0.001	0.264 (0.077)	0.001
Constant	-0.370 (0.183)	0.043	-0.461 (0.184)	0.012

(1) A regression when the gross wealth is reported. (2) A regression when the Initial wealth is reported.

Table 7: Search choices of top wealthy quartile and bottom wealthy quartile stockholders: fractions, standards, differences, and the t-statistics.

Variable	Fraction (Std)		Difference Std. Err.	t-statistics for Difference
	Top 25 percent	Bottom 25 percent		
Number of methods used	**2.833 (1.891)**	**2.294 (1.747)**	**0.539 (0.0011)**	**462.9***
A. Informal search				
Call around	0.139 (0.346)	0.178 (0.383)	-0.039 (0.0002)	-170
Magazines/newspapers	0.347 (0.476)	0.266 (0.442)	0.081 (0.0003)	275.2*
Material in the mail	0.146 (0.354)	0.082 (0.274)	0.064 (0.0002)	318.6*
Television/radio	0.129 (0.336)	0.110 (0.313)	0.019 (0.0002)	91.4*
Online service/internet	0.204 (0.403)	0.159 (0.366)	0.045 (0.0002)	179.8*
Advertisement	0.105 (0.306)	0.153 (0.360)	-0.048 (0.0002)	-220
Friend/relative	0.300 (0.458)	0.473 (0.500)	-0.173 (0.0003)	-560
Self/spouse/partner	0.186 (0.389)	0.145 (0.353)	.0401 (.0002)	168.8
Material from work / business contacts	0.009 (0.095)	0.043 (0.202)	-0.033 (0.0001)	-330
Investment club	0.005 (0.069)	-	-	-
Other personal research	0.009 (0.095)	0.007 (0.084)	0.002 (0.00005)	35.4*
Shop around	0.002 (0.041)	-	-	-
Sum informal search (Std. Dev)	1.580 (1.621)	1.617 (1.575)	-0.037 (0.001)	-35.7
B. Professional search				
Lawyer	0.089 (0.285)	0.030 (0.170)	0.059 (0.0001)	398.3*
Accountant	0.264 (0.441)	0.084 (0.277)	0.180 (0.0002)	766.4*
Banker	0.192 (0.394)	0.207 (0.406)	-0.015 (.0002)	-60.3
Broker	0.356 (0.479)	0.138 (0.345)	0.218 (0.0002)	816.6

Financial planner	0.346 (0.476)	0.207 (0.405)	0.139 (0.0002)	492.8
Investment seminars	0.005 (0.073)	-	-	-
Insurance agent	-	0.012 (0.108)	-	-
Sum professional (Std. Dev)	1.253 (1.029)	0.677 (0.758)	0.576 (0.0005)	995.3*

*** Significant at 1 percent level.** **** Significant at 5 percent level.**

Table 8.a: Search choices of stockholders who are willing to take substantial financial risk (column (1)) versus stockholders who report that they are not willing to take any financial risk (column (2)): fractions, standards, differences, and the t-statistics.

Search Measure	Fraction (Std)		Difference in mean (Std. Err.)	t-statistics for Difference
	(1)	(2)		
Number of all methods used[14]	**3.216 (1.942)**	**1.735 (1.069)**	**1.481 (0.0014)**	**1,000***
A. Informal search				
Call around	0.218 (0.413)	0.110 (0.313)	0.107 (0.0003)	306.4*
Magazines/newspapers	0.453 (0.498)	0.156 (0.363)	0.297 (0.0004)	713.1*
Material in the mail	0.162 (0.369)	0.037 (0.189)	0.125 (0.0002)	463.7*
Television/radio	0.297 (0.457)	0.065 (0.247)	0.232 (0.0003)	681.7*
Online service/internet	0.338 (0.473)	0.050 (0.219)	0.288 (0.0003)	856.1*
Advertisement	0.155 (0.362)	0.060 (0.238)	0.095 (0.0003)	327.9*
Friend/relative	0.476 (0.500)	0.374 (0.484)	0.102 (0.0004)	210.0*
Self/spouse/partner	0.120 (0.325)	0.177 (0.382)	-0.057 (0.0003)	-160
Material from work/business contacts	0.007 (0.084)	0	-	-
Investment club***	0	0	-	-
Other personal research	0.022 (0.146)	0	-	-
Shop around	0	0	-	-
Sum informal search (Std. Dev)	2.247 (1.675)	1.029 (1.072)	1.217 (0.001)	919.4*
B. Professional search				
Lawyer	0.084 (0.278)	0.015 (0.122)	0.068 (0.0002)	354.4*
Accountant	0.181 (0.385)	0.075 (0.264)	0.106 (0.0003)	339.1*
Banker	0.175	0.295	-0.120	-280

[14] This is the sum of all methods. This approach used by Blau and Robins (1990) and Holzer (1987) to indicate who uses more search methods among employed and unemployed youth.

	(0.380)	(0.456)	(0.0004)	
Broker	0.183 (0.387)	0.130 (0.337)	0.053 (0.0003)	149.7*
Financial planner	0.346 (0.476)	0.191 (0.394)	0.155 (0.0004)	365.0*
Investment seminars	0	0	-	-
Insurance agent	0	0	-	-
Sum professional (Std. Dev)	0.968 (1.064)	0.705 (0.679)	0.263 (0.0008)	313.1*

* Significant at 1 percent level. *** The same statistics like the material from work/business contacts.

Table 8.b: Regression estimates of the stocks bonds ratio over explanatory variables

Explanatory Variables	**Dependent Variable: The return on stock**		
	Coefficient	**Std.**	**P>|t|**
Informal Search	2.974	0.698	0.000
Professional search	1.847	1.117	0.098
Initial wealth /10^{08}	0.502	0.259	0.053
Age	-0.041	0.071	0.564
Education (year of schooling)	-0.486	0.481	0.312
Race (one if white)	13.425	2.371	0.000
Married (one if married)	9.816	3.872	0.011
Constant	-14.560	9.872	0.140

Table 9: The estimation results of the return on stocks over the attitude toward risk, informal search, and professional search.

Explanatory variables	Depended Equation – Stock Market Return		
	Return (dependent)	**Participation** (selection)	**No Correction Bias**
Informal search	0.040*	0.035*	0.024**
Professional search	0.202*	0.118*	-0.019
Age	0.066*	0.046*	0.016**
Age square/1000	-0.354*	-0.268*	-0.091
Education	0.219*	0.127*	0.024*
Initial wealth Level/10^{06}	1.006*	0.600*	0.473*
Race	0.688*	0.377*	0.286*
Substantial risk	1.385*	0.875*	0.009
Above average	1.478*	0.899*	0.162**
Average	1.004*	0.535*	0.142**
Census region participation rate	-	0.331*	-
Adjustment/10,000	0.072*	-	0.044
Inverse Mills ratio	1.839*	-	-
Constant	-8.732*	-5.119*	-0.782*

* Significant at 1 percent level. ** Significant at 5 percent level. *** Significant at 10 percent level.

Table 10: The average informal and professional search productivity by quartile

Search Method	Search Productivity by Quartiles			
	Top Quartile	**Bottom Quartile**	**Diff**	**t-statistic**
Informal	0.010 (0.004)	0.004 (0.006)	0.006 (0.0000038)	1,600*
Professional	0.104 (0.015)	0.083 (0.023)	0.020 (0.0000128)	1,600*
Total contribution of search on the return (Std)	15.2** (11.9)	6.3 (8.3)	8.9 (0.007)	1,300*

* Significant at 1 percent level.

** The calculation is as follows: 15.2=0.010* $\overline{\ell}$ +0.104* $\overline{m}$, where $\overline{\ell}$ and $\overline{m}$ are the average informal and professional searches for top quartile.