Money left on the table: An analysis of participation in employee stock purchase plans.

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ABSTRACT

We document that when employees of large US firms can invest in stocks and earn risk-free profits by participating in employee employee stock purchase plans, over 70% of people fail to take advantage of this opportunity. An average employee who does not sign up for the plan forfeits more than \$4,600 per annum. Using survey data on individual employees, we find that non-participation is more likely among people who earn lower wages, are less educated, and make fundamental errors in valuation of financial securities. Further, employees who fail to earn risk-free profits are less likely to participate in pension plans and the equity market in general. Our results have implications for the equity market non-participation puzzle and suggest that individuals do not always make the best financial choices.

1

Are individuals good at making optimal investment choices? This question has been hotly debated in a number of different contexts, such as participation in equity market and saving for retirement (see e.g., Mankiw and Zeldes (1991), Haliassos and Bertaut (2005), and Benartzi and Thaler (2007)). However, it is generally difficult to find definitive evidence of suboptimal behavior in these contexts since a wide variety of unobserved factors (e.g., individual risk aversion) can determine the optimal choices of individuals. In this paper, we consider a unique and simple setting provided by Employee Stock Purchase Plans (ESPPs) and empirically analyze one of the central predictions of finance theory – whether individuals always take up an investment opportunity with large positive profits and zero risk.

Although a large economic literature is now devoted to studying investments by employees through 401(k) plans (e.g., Benartzi (2001), Cohen (2009), Choi et al. (2011)), little is known about employee stock purchase plans that are almost as equally common. In essence, ESPPs are company-run programs that allow participating employees to buy company stock at a discount. The typical explicit discount is set at the 15% of the stock price, but the actual value provided by these plans is often higher because of a look-back feature, i.e., the option to buy stock at the lower of the prices at two points of time. What is perhaps the most interesting feature of such plans is that in most cases employees are allowed to sell the stock immediately following the purchase. This contractual feature gives employees a choice not to take any risk on this investment.[1]

Despite the obvious attractiveness of ESPPs, we find that most employees fail to take advantage of this money-making opportunity. In our sample of large publicly traded U.S. firms, the average participation rate is below 30%. Moreover, an employee who does not sign up for the plan leaves a considerable amount of money on the table, foregoing on average more than $4,600 each year. To further assess the magnitude of this economic phenomenon, we aggregate employee losses due to non-participation for

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[1]It is possible that after participating in the ESPP, some employees may prefer to hold the stock (e.g., for tax purposes). However, participating in the ESPP and selling immediately should always dominate the strategy of not participating at all.

all firms in our sample and find that they sum to over $10.5 billion.

We then go on to analyze a variety of factors that could drive non-participation. We find that participation in ESPP tends to be higher in firms where employees earn higher salaries, exercise more stock options, and hold more bachelor degrees, which could be taken as evidence of less binding liquidity constraints or better financial education. However, even for firms with highly paid employees, the average participation rate is far below 100%. For example, the average participation rate among the firms with average annual salary over $100,000 is 38.1%, whereas it is 6.9% for firms paying salary below $50,000. We also find that factors likely correlated with employee loyalty towards the firm appear to be important for participation, such as employee approval ratings of firm's CEO, analyst coverage, and employee job satisfaction.

In addition to using the aggregate annual firm-level participation data, we also analyze individual data from a detailed survey of employees at four companies with ESPPs, which was conducted in 2004-2005 as a part of National Bureau of Economic Research (NBER)'s Shared Capitalism Research project. The survey questionnaires contained 80-100 questions about various stock ownership programs and were administered at 323 different work sites (see Kruse, Freeman, and Blasi (2010) for a detailed description). The main benefit of this data set is that it has a wealth of information about individual employees, including their demographic characteristics, salaries, household wealth, investments in the general equity market, stock option grants received, and investments in 401(k). A disadvantage of these data, however, is that they only provide information on whether an employee *ever* participated in company ESPP, and thus cannot be used to infer whether employees participate currently or contribute up to the maximum allowed limit. In all four firms, employees are allowed to sell the stock immediately after the purchase through ESPP. Defining participation rate based on whether an employee ever participated in ESPP, we find that average participation rate in this sample is still only 58%. Similar to the other sample, we

find that employees who report lower salaries and lower household wealth are more likely not to sign up for the ESPP. Non-participation is also particularly common among people who incorrectly value financial securities, people of very old age, as well as individuals prone to procrastination, as measured by their lack of participation in national elections.

Our results on low participation in ESPP plans have implications for the large literature that attempts to answer why a substantial fraction of households do not participate in equity markets (see, e.g., Mankiw and Zeldes (1991), Ang, Bekaert, and Liu (2005), Campbell (2006), Rooij, Lusardi, and Alessie (2011), among others). Given that a similar set of factors may be driving decisions to participate in ESPP and invest in a general stock market, with an important difference that ESPP investment is riskless, our setting allows to examine an interesting question – what factors would matter for equity market participation, if the risk-return-tradeoff aspects were removed?[2] This question is of particular importance because non-participation can have direct implications for the equity risk premium in the economy and the equilibrium interest rate (Basak and Cuoco (1998)).

We find some evidence for each of the following factors contributing to non-participation in our context: binding liquidity constraints of employees, non-familiarity in dealing with stock, financial illiteracy, unawareness of the significant benefits to participation, lack of trust to the company, lack of loyalty, past individual experiences in the stock market, and religious attitudes toward gambling. Among these, the most economically important effects seem to be coming from financial illiteracy and non-familiarity in dealing with stock. For example, employees who grossly overvalue or undervalue

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[2]Several non risk-based explanations to the low stock market participation have been offered, including the large fixed costs associated with participation, lack of trust, unawareness, lack of familiarity, and financial illiteracy (see, among others, Vissing-Jorgensen (2002), Hong, Kubik, and Stein (2004), Brown et al. (2008), and Guiso, Sapienza, and Zingales (2008), Grinblatt, Keloharju, and Linnainmaa (2011), Rooij, Lusardi and Alessie (2011)). However, whether these factors apply to settings when the investment has no risk is not immediately clear. For example, it is conceivable that lack of trust or past stock market experience is relevant only in conjunction with having to take on some risk, but not otherwise.

their out-of-the-money stock options show a 6.76% lower propensity to sign up for the plan and employees without a college degree are 3.4% less likely to participate in ESPP.

The rest of this paper is structured as follows. Section I describes our data sources and presents summary statistics on ESPP plan characteristics. Section II discusses the non-participation rates in ESPP and quantifies losses of individuals. Section III explores the determinants of failing to participate at both the firm and individual levels. Section IV investigates the decision not to sell the stock following the purchase. Section V concludes with a brief summary.

I. Data and Summary Statistics

A. Firm Level Data

We hand collect firm level data on employee stock purchase plans from 10-K forms for all firms in the S&P 500 index, NASDAQ 100 index, and the S&P 400 midcap index over the fiscal years from 1998 through 2007. If the company has an ESPP, we also obtain a detailed ESPP contract; such contracts are typically located in the past SEC filings. We restrict attention to tax-qualified plans since they are open to all employees (with exception of executives owning more than 5% of firm's stock).[3] Our data set has information on the percentage of compensation that employees are allowed to contribute to ESPP, the maximum number of shares that can be purchased each year, the number and price of shares issued through a plan during a fiscal year, the length of the offering period, whether the plan has a lookback or reset option, the discount at which shares can be bought, and the length of the period during which employees can not dispose of the acquired shares (if any).

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[3]In addition, a company is allowed (but not required) to exclude employees with less than two years of tenure, employees working less than 20 hours per week, and "highly compensated employees," as defined in section 414(q) of the Code.

The contract features of stock purchase plans are given in Table I, Panel A. On average, the plan has been adopted by the firm's shareholders more than 8 years ago, and allows for contributions not exceeding the lower of $25,000 per year or a specified percentage of annual salary, commonly 10%, 15%, or 20%. Some of the plans put additional restrictions on the number of shares that can be purchased by employees during the year, or specify a lower dollar limit than $25,000. Taking into account these restrictions on participation, the average maximum allowed contribution comes out to $11,834 per annum. Over 91% of plans allow to withdraw the contributed funds from the plan up to the date of the actual purchase. Additionally, some plans allow to decrease or increase the contribution rate during the offering period (61.4% and 43.3%, respectively). Over 85% of the plans that specify how the transaction costs are handled, indicate that the company creates brokerage accounts for employees and pays all expenses associated with account maintenance and stock purchases. However, in most cases employees are responsible for the brokerage fees and stamp duties associated with stock sales.

The average discount stipulated by the plan is 13.96%, with most plans having a 15% discount off the market price.[4] Approximately 79.4% of ESPPs have a lookback feature, that allows employees to purchase stock at the discounted price based on the lower of prices at the beginning and the end of the purchase period. The average purchase period is 6 months in our sample, and the average value of the lookback option (when there is one) is 15.7% of the stock price. On the top of that, 8.1% of plans have a reset option that allows to reset the purchase price to the price in the beginning of the previous purchase period, provided that price was lower than the price at the beginning of the current purchase period. The value of the reset option (when present) is 5.9% of the purchase price on average. Overall, participation in ESPP provides an average expected discount of 26.6%, which is equivalent to return

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[4] The clustering of discounts is probably due to the nature of the tax code. Specifically, one of the requirements of Section 423 is that, to preserve the tax-qualified status, the plan discount cannot be set higher than 15%.

on investment of 36.2% over the purchase period. Surprisingly, only 19.5% of tax-qualified ESPPs require employees to hold stock following the purchase for any period of time. In firms that do not allow immediate disposition, the minimum holding period ranges from 1 month to 3 years, with the average of 13 months.

Since the maximum contribution to an ESPP is often set as a percentage of an employee's annual compensation, we also need to collect employee salary data, which we obtain from the website Glassdoor.com. These data are anonymously reported by firm employees (segregated by the job title in each firm) and cover most of firms in our sample. A disadvantage of these data is that the average number of respondents per firm is only 286 people, and we have a single cross section of salaries. As an alternative, we also obtain salary data from the Compustat "staff expense" item that has been used in the prior literature as a proxy for employee salaries (e.g., Hanka (1998)). However, these data often include non-salary items, such as expenses associated with pension plans, and are available only for a small part of our sample (less than 15%). To calculate the average employee salary for the rest of the firms, we use the median value of the staff expense item within industry (defined by two-digit SIC code) for that year. When staff expense item is non-missing for the firm, the correlation between Compustat salary and the survey salary is 69.2% in our sample and the survey salary has a lower mean, consistent with Compustat data overestimating the annual salary. However when we use the industry median values for the staff expense item, the correlation between the two proxies drops to 20.6%. Overall, we believe that survey salary is a more accurate measure and use the Compustat salary only for robustness checks (the correlation between the two measures of participation is 87.6%). We also obtain data on employee stock option grants and exercises for firms in our sample, which are available through the RiskMetrics database.

Panel B of Table I shows that the average annual salary that employees receive is $75,729, whereas it is $59,235 for imputed Compustat wage. Employees also receive

grants of stock options with an average Black-Scholes value of \$24,347 and realize an average value of \$20,530 from option exercises each year. Most of the employees approve of a firm's CEO (Glassdoor.com), with the average approval rate of 60.8%. As reported by employees, the average satisfaction with their job is 3 on a scale of 1 to 5. Panel B also shows that in 7.3 % of firm-years, the firms in our sample make the list of 100 best companies to work for, which is maintained by the Fortune magazine and the Great Place to Work Institute.

Following Cohen (2009) and Benartzi (2001), we collect the data on 401(k) contributions from the annual 11-K filings. To minimize data collection, we only obtain these data for firms that have ESPP. We omit 11-k forms filed for employee stock ownership plans and focus on the largest pension plan during the year in firms with multiple plans. As pointed out by Benartzi (2001), not all 401(k) plans are required to file the annual reports. Specifically, the plans that buy shares on the open market (instead of issuing them) are exempt from this requirement and are thus not represented in our sample. Benartzi estimates that approximately a third of all 401(k) plans fall in this category.

As can be seen from Table I, approximately 42.6% percent of firms with ESPPs also have a 401(k) plan (filed through 11-K). The average company match is 69.3% and it applies to the contributions of the first 5.4% of salary on average. We calculate the employee 401(k) under-participation amount as the percentage of salary to which the match applies minus the combined employee contributions during the year divided by the number of employees and the average survey salary. We set under-participation to zero whenever this variable is less than zero. The average under-participation amount for firms in our sample is 2.2% of the salary, implying that a large number of employees (at least 40%) do not take the benefit of a full company match. Note also that we tend to underestimate the under-participation since we use the average per employee values, while many employees contribute to 401(k) a greater percentage of salary than

8

the percentage to which company match applies.

B. Individual Level Data

Our second data set on ESPPs comes from the survey of employees at fourteen companies, conducted in 2004-2005 as a part of National Bureau of Economic Research (NBER)'s Shared Capitalism Research project. Company surveys administered 80-100 questions to firm employees and were given either over the web or in a paper-based format at 323 different work sites. Typically, the companies that have broad-based ownership programs (employee stock ownership plans, broad-based stock option plans, 401(k)) were chosen. The survey methodology and the choice of companies are described in more detail in Kruse, Freeman, and Blasi (2010). Since only five out of the fourteen companies had an ESPP and one of those companies was not publicly traded, we restrict our analysis to four companies, that we label for convenience A, B, C and D.

Table II Panel A gives simple summary statistics for the four companies. Company A is a large multinational company that has over 30,000 employees and operates in the high-tech industry. Company B is mid-size manufacturing firm, with 100% of employees located in the United States. Company C is a large financial firm with over 5,000 employees. Finally, Company D is a small high-tech firm that has 55.2% of employees working in countries other than U.S. Panel B gives the countries in which the work facility is located and the number of surveyed employees present at each facility. All of these countries are covered by the World Value Survey, which we use for some of our tests at the country level. The five most common countries, other than U.S., are United Kingdom, Canada, Australia, Netherlands, and India.

Finally, Panel C presents the demographics of employees working in each of four firms. Employees at company A are the most educated, with 83.7% having a college degree and 36.6% having a master's degree. Employees at this firm also work longer

hours (52.0 per week on average), are more likely to be married (82.0%), and earn higher salaries than employees at other firms. The average base salary, including commissions and overtime, is $98,959 in company A, and an average household wealth is $724,533, where wealth includes the household's value of house minus the mortgage, stocks and mutual funds, cash, checking accounts, retirement accounts including 401(k) and pension assets. Employees at company B seems to be the least well-paid, with the average annual salary of only $35,518. They also report the lowest household wealth and are much less likely to have a college degree (26.1%). Company C has the average salary of $46,335 and has the highest proportion of females (66.2%) and blacks (8.2%) in the sample. Employees at company D work long hours (50.7 per week an average), have a high pay (the average salary is $86,188), and are well-educated (75.0% have a college degree). These employees also report a highest certainty-equivalent of a risky bet and a lowest risk aversion. The risk aversion was measured with an individual's response to the following survey question "Some people like to take risks and others dislike taking risks. Where would you place yourself on a scale of how much you like or dislike taking risks, where 10 is hating to take any kind of risk and 0 is loving to take risks?" The employees of company D have and average risk aversion of 4.5 and would pay on average $38.3 for a risky bet that wins $1,000 with probability 10% and nothing with probability 90%, whereas employees at company C would only give $20 for such a bet.

II. ESPP Non-Participation and Employee Losses

Having established that stock purchase plans provide on average a 36.2% return on investment over the purchase period of 6 months, we next turn to the question of participation in these plans by employees. We define two measures of ESPP non-participation. The first is equal to 100% minus the contributions to ESPP per employee normalized by the minimum of (1) the percent of compensation multiplied by the

10

survey salary, (2) the maximum number of shares that can be purchased multiplied by the beginning-of-year price, and (3) the annual dollar limit. The second measure is similar, but uses the Compustat "staff expense" item instead of survey salary, with the median industry values at the two-digit SIC code being used whenever this item is missing for the firm. Since we use the average salary at the firm level, rather than each individual employee salary to calculate the participation rate, it is possible that the participation rate can be biased. However, the Appendix shows that the participation rate is likely to be overestimated by our procedure if the individual participation in ESPP is positively correlated with the individual's salary. We will show later in the paper that this correlation is indeed positive in the data.

We start by reporting the average non-participation rate across all firms in our sample (Table III). It turns out that the average non-participation rate is 81.9% in the full sample when we use survey salary and 73.6% when we use Compustat salary. Although, the non-participation rates are amazingly high, it is possible that they are driven mostly by firms that require employees to hold the company stock subsequent to the purchase. Despite a good return on investment, it is plausible that lack of diversification and a high correlation between employee human capital and company stock performance may make the participation in ESPP suboptimal. Hence, we next focus only on firms that allow immediate disposition of the stock subsequent to the purchase (Panels B through D). In this setting, not participating in ESPP is equivalent to leaving money on the table since investment is both riskless and profitable. Panel B shows that non-participation in ESPP is still very high, with 80.4% and 70.3% non-participation rates, on average. Thus a majority of employees do not take advantage of this money-making opportunity.

We next calculate how much money employees forfeit by not signing up for the plan. When the maximum allowed dollar contribution is C, employees can buy the number of shares equal to C/Discounted Price, and earn on each purchased share

11

the spread between the current market price and the discounted price. Thus if the combined expected discount is D, the discounted price is equal to $1 - D$ multiplied by the market price, and the average annual loss is

$$\text{Loss} = C \frac{(\text{Market Price-Discounted Price})}{\text{Discounted Price}} = C \frac{D}{1 - D}. \tag{1}$$

Table III provides our estimates. For example, Panel B shows that by not signing up for the ESPP in a firm that allows for immediate sale of stock, an average employee forfeits \$4,627 per year or 5.70% of her annual salary.

To better assess the employee real losses, we also provide estimates on the after-tax basis. Specifically, we calculate the tax liability of employee assuming she sells all the shares immediately and thus there is no capital gain or loss. In this case, all the profit from the ESPP purchase and same-day sale is taxed at the ordinary income tax rates.[5] We assume the individual tax rate of 28%, which is applicable to employees with the combined annual income of more than \$69,000 and less than \$144,000 (as of year 2003). Using this tax rate, we estimate the average after-tax forfeited gain from non-participation as \$3,331 per year. Additionally, even if we assume (counterfactually) that all employees are subject to the highest possible marginal tax rate of 35%, we still obtain large after-tax forfeited gains from non-participation, averaging \$3,100 per year.

To see whether there is significant variation in non-participation rates across firms, we further split the sample into firms with well-paid and low paid employees. Since our sample consists of large public firms, employees are likely to earn salaries higher than the national average, so we use the cutoffs of \$50,000 and \$100,000. Panel C shows that in firms with average salary less than \$50,000 per year, the non-participation rates are remarkably high at 93.1% or 92.3%, depending on the measure. However, since the salary is low in this sample and the contributions to ESPP are capped

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[5]If the employee holds the ESPP stock following the purchase, the tax treatment of ESPP profit is more complicated but generally results in lower tax bill for the employees.

by a percentage of salary, the losses per non-participant are relatively small in this sample at \$1,640. For firms where employees make more than \$100,000 on average, the non-participation rates are considerably lower at 62.9% and 39.9%, depending on the measure. Conditional on non-participation in the plan, however, the employees in these firms leave large amounts of money on the table, with an average loss due to non-participation per employee of \$8,982 . Since the companies with high salaries also tend to have more generous ESPP plans, with more likely presence of the lookback options, the losses of employees also tend to be larger as a percentage of salary, with an average of 8.41%.

Since the firm-level analysis uses the average salary and because of that imprecisely estimates the average participation rate, we also use the individual employee data at four public firms. The advantage of the individual data is that we have accurate estimates of individual's salary, wealth, stock options grants, participation in the 401(k) plan and the general equity market. Perhaps a disadvantage of these data is that the question on ESPP participation only asks employees if they *ever* participated in the stock purchase plan. Thus we cannot infer whether employees participates to the full allowed amount and whether they currently participate.

Table IV reports that the *non-participation* rates at four firms range from 7.7% (in firm A) to 59.1% (in firm D). Although these numbers are considerably lower than the average non-participation rates from our firm-level data, the participation is measured differently here and the firm selection for survey may be non-random. For example, firm A, which is also a part of our broad firm sample, turns out to have the highest participation rate in ESPP among all firms that we have considered. In fact, the ESPP non-participation using our ESPP participation (survey salary) comes up to be 0% in the year of the survey, which is again consistent with the overestimation of participation using the averages of salary.

The average annual loss per non-participant is \$4,660 in firm A or roughly 5.2% of

salary. Over the employee tenure, the amount of losses adds to $18,942. It is lower at $1,510 for firm D since this firm has a $5,000 annual limit on participation.

We also calculate the after-tax value loss to employee. Since we know the salary of each individual employee we can obtain their marginal tax rates in the year of the survey (2004/2005). The tax treatment of ESPP sales is somewhat complicated, with different amount of tax levied on disqualifying (less than two years since the date of purchase) and qualifying dispositions. In general, however, the effective tax rate goes down if employee holds the stock longer. For our purposes, we are interested in the amount of tax that would be triggered if employee engages in the same-day sale. In this case, the tax treatment is simple as there is no capital gain to consider and all income that employee earns on the ESPP is ordinary income. Calculated in this way, the average annual after-tax value loss is $3,265 in firm A and $1,213 in firm D, which is still non-trivial.

Interestingly, there are employees in each firm who have bought the company stock on the open market, but nevertheless have never participated in ESPP. For example, in firms B, C, and D more than 25% of all employees who have purchased company stock on the market never signed up for the ESPP. This is likely to suggest that many employees are simply unaware of the ESPP or its benefits.

In all four firms employees are not required to hold the stock for any period of time after the purchase. Nevertheless, we see that many employees who ever participated in ESPP have never sold the stock over their entire tenure. The percentage of employees who never sold ESPP stock varies from 39% (company D) to 58.5% (company C). A somewhat similar picture emerges with employee stock option exercises since in firms A, B and D over 50% of employees who receive stock options have never exercised them. However, it is possible that for stock options the non-exercises are driven by the presence of long vesting periods.

Finally, in the survey of firm A there were several additional questions included

14

on the valuation of employee stock options that may be related to financial literacy. Specifically, employees were asked for how many shares of stock they would exchange 10 underwater stock options. Amazingly, the survey shows that 5.1% of surveyed employees consider stock options completely worthless and would exchange them for 0 shares of stock. On the other extreme, there are also people who would not exchange their 10 underwater stock options for anything less than 10 shares of stock, with frequent suggested numbers in the range of 11-20 shares of stock. We find that overall 15.0% of all surveyed people grossly overvalue stock options.

In Table V, we break down the employee non-participation in ESPP and associated employee losses by employee salary, household wealth, and education. We only focus on firms A and D since we know the exact terms of the stock purchase plans for these firms and thus are able to accurately calculate the losses due to non-participation. Panel B of Table V shows that non-participation in ESPP is much more common among the low-paid employees. For example, in firm D, 59.5% of employees making less than $50,000 per year fail to participate in ESPP versus 29.4% employees who make over $100,000 in salary. A similar pattern is observed in firm A, with differences in non-participation rates being statistically different in two groups (t-stat =10.29). Since highly paid employees can contribute more to the plan and since they tend to have longer tenure at their firms, the losses per non-participant tend to be larger. For example, employees of firm A who have salary over $100,000 per year lose approximately $20,570 over their tenure because of non-participation in ESPP.

The low-paid workers are also more likely to incorrectly value the employee stock options. According to the survey in firm A, only 3.8% of highly compensated employees place no value on underwater stock options, whereas 12.2% of low-paid employees make the same mistake. At the same time, more low-paid employees have tendency to overvalue stock options than the highly paid employees. The incidence of overvaluation and undervaluation are statistically different between the two groups.

15

Panels B and C present results sorted by household wealth and employee education level. Generally, a very similar picture emerges with wealthier and more educated employees making fewer financial mistakes. They are more likely to enroll in ESPP, and more likely to correctly value the employee stock options.

III. Determinants of Failing to Participate in ESPP

A. Potential Explanations of Non-Participation

0.0.1   A.1. Transaction Costs

In this section, we test different potential explanations for the wide non-participation in ESPP. We start by estimating the employee out-of-pocket expenses associated with trading the ESPP stock. As we have previously mentioned, most employers tend to pay for the ESPP account maintenance and the brokerage costs associated with purchases of ESPP stock. However, the fees charged for stock sales are typically the responsibility of employee. To estimate these expenses, we assume that employee sells the stock each end of purchase period (e.g., twice a year if the purchase period is 6 months) and assume that a reasonable brokerage fee for one sale transaction of $25. These assumptions yield an estimated $85 spent in brokerage fees per annum, which is considerably smaller than the after-tax profit from ESPP participation of $3,331.

A.2. Liquidity Constraints

We then consider the liquidity constraints of employees since Campbell argues in his 2006 presidential address that binding borrowing constraints is one of the defining characteristics of households. The empirical importance of household's liquidity constraints have also been shown in several economic contexts. For example, Lusardi, Schneider, and Tufano (2011) find that half of Americans would probably or certainly be unable to come up with $2,000 in 30 days. Using credit card data, Gross and

Souleles (2003) find that increases in credit limits are associated with an immediate and significant increase in debt, particularly for people who are close to their credit limit. Similarly, Souleles (1999) documents that consumption reacts to the predictable increase in income associated with the tax refunds. In our tests at the firm level, we proxy for the tightness of liquidity constraints by using the average survey salary of the employees and the value realized from option exercises during the fiscal year. At the individual level, we use employee salary and the total household wealth.

A.3. Awareness, Familiarity, and Financial Literacy

Another potential reason for leaving money on the table is unawareness of the significant benefits to ESPP participation. For example, Guiso and Jappelli (2005) find that over 35 percent of Italian households were simply unaware of the stocks in the late 1990s, and Hong, Kubik, and Stein (2004) argue that many households do not participate in the general stock market in the U.S. because they are unaware of its existence or attractiveness. They show that more social households show a higher propensity to invest in the stock market.

To proxy for the awareness of the ESPP at the firm level, we use the number of years since the plan has been adopted, presuming that over time employees had an opportunity to learn about the plan's existence. We also use the value of stock options grants per employee in this firm. The rationale for this variable is that employees who receive stock options are more likely to be familiar with dealing with the stock in general. Additionally, to capture the employee familiarity with trading stocks and general tendency to study the benefit plans at the firm, we use the under-participation in 401(k) and percentage of people with bachelor degree in the state of the firm's headquarters. At the individual level, we also employ such variables as worker tenure, whether employee ever received stock options, whether employee ever bought the company stock on the open market, whether employee frequently trades other securities, and whether she currently participates in a 401(k) plan.

A related explanation to the low participation is financial illiteracy of employees or their perception of such. For example, Graham, Harvey, and Huang (2005) find that investors who are more comfortable about their ability to understand investment products tend to trade more frequently. Rooji, Lusardi, and Alessie (2011) show that many of the Dutch households cannot tell the difference between stocks and bonds and do not understand the benefits of diversification, whereas Lusardi and Mitchell (2006) provide evidence that approximately 80% of baby boomers cannot correctly compound interest. They also document that individuals who lack literacy are much less likely to plan for retirement, whereas Kimball and Shumway (2009) and Calvet, Campbell, and Sodini (2007) find that less sophisticated investors are less likely to participate in the stock market and/or to diversify their investments. We use employee education level (whether she received a college degree), the number of promotions received over tenure and dummy variables for gross overvaluation or undervaluation by employees of their out-of-the-money stock options as proxies for financial literacy. Additionally, since Korniotis and Kumar (2011) find that older individuals exhibit worse investment skill, we also use employee age and age-squared to capture the adverse effects of cognitive aging on ability to understand terms of benefit plans.

A.4. Trust and Loyalty

We also test for several behavioral explanations to non-participation. For example, the literature has suggested that trust may be an important element needed for an individual to invest into something (Guiso, Sapienza, and Zingales (2008)). To proxy for trust at the individual employee level, we rely on the survey questions that ask employees to evaluate whether the company keeps its promises, and whether the company is fair to its employees. Additionally, we match the facility of the country of international employees in our sample to the World Value Survey at the country level. We use responses of individuals from the same country to questions such as "do you trust people you know personally", and "do you trust people you first meet." Whenever we

18

identify on the country level, we use only countries that have at least 10 employees in our sample.

Another possibility is that some employees may not like to participate in ESPP through the purchase of company stock (no matter how temporary) because they do not like to be associated with the company. For example, Cohen (2009) shows the importance of loyalty in pension contribution decisions of employees. At the firm level, we proxy for loyalty using the dummy variable for whether the firm makes a list of 100 best companies to work for during the year, the number of analysts that follow the stock, the average approval rate of a firm's CEO by employees, and the average satisfaction of employees with their jobs. Additionally, we use the Herfindhal index of geographic concentration based on extracted state name counts from annual reports (see Garcia and Norli (2012)).[6] At the individual level, we rely on survey questions that ask employees whether they feel loyal towards the firm and whether they have a sense of sharing a common purpose with their employer.

A.5. Religious Attitudes

Recent evidence shows that religious denominations of individuals may play a role in their decisions to invest in stocks, since such investment may be considered as a form of gambling and some religions discourage such activity. For example, Kumar, Page, and Spalt (2011) provide evidence that Roman Catholics are more likely to invest in stock or hold employee stock options than are Protestants in the U.S. Please note that since in most ESPPs employees can dispose of the stock immediately, the investment may not be viewed by employees as a form of gambling in our setting. However, if employees plan to hold the stock following the purchase (e.g., because if the tax treatment) or if the plan has a lookback feature (implying the gain is positive but uncertain), it is plausible that religious denomination matters in decision to participate in ESPP. Following Kumar, Page, and Spalt (2011), we use the *Association of Religion*

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[6] We thank Diego Garcia and Oyvind Norli for sharing these data with us.

Data Archives (ARDA) public data files to define the general religiosity and the ratio of Catholics to Protestants at the metropolitan statistical area (MSA) in the U.S. Specifically, we match the firms by the MSA of their headquarters's location and define religiosity as a fraction of also religion adherents in the MSA to the MSA's total population. The ratio of Catholics to Protestants is the ratio of Roman Catholics' adherents to all Protestants in the MSA. Using the *World Value Survey*, we also employ country variation in our individual employee data. In each country, we calculate an average ratio of Roman Catholics to all Protestants, Methodists, Muslim, and Hindu, as well as the average frequency with which respondents say they belong to any religious denomination.

A.6. Individual Past Experiences

Finally, we consider a possibility that individual experiences of stock market fluctuations affect the decision to buy the stock through ESPP. Malmendier and Nagel (2011) provide evidence that experiencing lower stock returns over the course of one's life lowers the individual's willingness to take on risk. They show that such people have lower expectations of future stock returns and are less likely to participate in the stock market.

We test for the influence of past experiences on the decision to sign up for the plan by using the contemporaneous and the previous three years of stock returns. In the individual level tests, we also employ a measure of weighted past stock returns of the S&P 500 index, created in the same way as in Malmendier and Nagel (2011), with the exception that we consider only experiences starting from the age of 10, rather than from 0 (since it is somewhat unlikely that an individual would have memory of stock returns at the time when she was 2 years of age). Our results are robust to starting from the age of 0, 5, or 15, however. Additionally, we make use of the survey question that asks individuals how the stock market experiences over the past few years affected their attitude towards incentive-based compensation.

20

B. Firm-Level Results

The determinants of ESPP participation at the firm level are presented in Table VI. In most regressions at the firm level, we control for such firm-characteristics as the amount of research and development normalized by firm's assets, firm size as proxied by the logarithm of book assets, the growth opportunities measured as the average Tobin's Q, average salary of firm's employees, the combined expected discount and the dummy variable for whether the plan restricts immediate resale of stock. We also include year and industry-fixed effects (Fama-French 17 industries); the standard errors are clustered at the firm level.

We find that liquidity constraints are important for employee sign-ups to the ESPP. For example, the participation rates tend to increase with the average employee salary (the coefficient is significant in 13 out of 15 specifications). The participation rates are also strongly related to the value obtained by employees from their option exercises. However, the economic effects of liquidity constraints are modest. A one standard deviation increase in value from option exercises increases the participation rate by only 2.4%, when the average participation is 18.1%.

There is some evidence that awareness of the plan decreases the non-participation. Specifically, as the number of years since plan adoption increases we see higher participation rates, with each additional year increasing participation by approximately 0.5% (column 3). We also see that the education of employees, as proxied by the fraction of population with bachelor degree in the state of firm's headquarters, is associated with somewhat higher participation rate (column 4). Firms that make larger option grants tend to have higher participation rates, perhaps because their stock programs are more broad-based and employees are more familiar in dealing with stock (column 5). However, it is also possible that option grants capture some unobservable firm characteristic (e.g., quality of employees).

Evidence suggests that in firms where employees do not enroll in 401(k) they also

do not sign up for the ESPP (column 6). For example, a one standard deviation in under-participation in 401(k) is associated with a 4.9% drop in the ESPP sign-ups. These results may indicate that employees who are familiar with trading feel more comfortable investing in ESPP, however it is also possible that some other unobservable firm or employee characteristics drive the results. For example, some firms may put much less effort in trying to communicate the benefit plans to their employees. Somewhat mitigating these concerns, we document in column 7 that our results are preserved if we include firm-fixed effects instead of industry-fixed effects.

We next examine whether participation in ESPP is determined by employees' attitudes to risk. Specifically, we include the different components of value provided by the plan, such as discount, value of lookback option, and value of reset option. The logic is that the discount provided by the plan represents a certain benefit, whereas the other two components cannot be negative but can have different realized values depending on the stock returns. If employees are considerably risk averse, the participation rates should respond more to the discount rate than to the other two components. In column 8, we see that it is indeed the case. For example, an additional discount of 1% increases participation rate by 0.9%, whereas 1% of lookback value increases participation only by 0.3%. Additionally, there is weak evidence that participation decreases with holdup (by an average of 3.8%). However, this last result is not robust to the inclusion of firm-fixed effects, perhaps because of very infrequent changes in holdup feature over time. In column 9, we test whether ESPP participation rates are lower in firms that already force employees to invest in stock through a 401(k) plan by providing a match in a form of company stock. We do find a modest effect of a presence of 401(k) with match in stock on ESPP participation.

We also find that religious denomination of the firm's headquarters MSA has some explanatory power for participation rates. For example, higher religiosity and lower ratio of Roman Catholics to Protestant in the MSA are associated with less participation

22

(column 10). These results corroborate findings of Kumar, Page, and Spalt (2011) for the employee stock option grants. In their case, however, the decision to grant stock options is made by the manager rather than employees themselves, implying that the link between religious denominations of employees and option grants is less direct. In our case, employees voluntarily choose whether to buy the stock through ESPP.

Our results also provide support for employee loyalty explanation. Specifically, we find that being the best 100 employer during the year and having larger analyst coverage is associated with higher participation rates (column 11). The economic magnitude of loyalty is considerable since being a best employer is associated with an approximately 6.7% higher participation rate. We observe similar effects on participation if we use employee CEO approval ratings or employee satisfaction with their jobs (columns 13-14). However, a caveat is that these variables are available only at a single date (2010 year) and may be endogenous. For example, participating in ESPP may make employees to be more satisfied with their jobs. Additionally, we find that firms that are more geographically concentrated tend to have higher participation rates, perhaps because employees feel more loyal towards local companies. Alternatively, less geographically dispersed firms can have better communication with employees, so that more employees are informed about potential plan benefits.

Finally, in the last two specifications we examine whether employees decision to sign up for the plan is determined by their past experiences in the stock market. One of the reasons why it can be the case is that employees extrapolate from the past to the future (Benartzi (2001)). We find that when we control for the firm's Q (market-to-book) ratio, the past returns do not add any explanatory power to the participation rates. However, if Q is dropped from the specification, the contemporaneous stock returns, as well as stock returns over the previous two years are all significant predictors of participation rates.

C. Individual Level Results

We next turn to the participation in ESPP at the individual level. The results of the logit estimation are presented in Table VII. Overall, we find that participation is more common among people who hold college degrees, have been promoted, have longer tenure at the firm, and report higher level of wealth and salary (column 1).[7] Asian people tend to participate more frequently in ESPP, whereas Native Americans show greater tendency to non-participation, although the latter effect is sometimes non-significant. We also find a non-linear effect of age on the decision to sign up for the plan. As people age and become more experienced they are more likely to take advantage of plan benefits, however this effect is reversed at a very old age. The inverted U-shape age-skill pattern we find in the context of the ESPP participation is similar to results in Korniotis and Kumar (2011) on individual investments in general equity market. Interestingly, although in all four firms employees are allowed to dispose of the ESPP stock immediately, we find that the individual risk-aversion does matter for employee decision to participate in ESPP, with more risk averse people less likely to sign up for the plan.

Our evidence also points to importance of familiarity in dealing with stock. For example, we find that having participated in 401(k) plan, having bought company stock on the market, trading other securities and having ever received stock option are all associated with lower non-participation (column 2). In column 3, we test whether people who are likely to make mistakes in valuation of stock options are also more prone to not sign up for the ESPP. We find that indeed both groups of employees who grossly overvalue and undervalue underwater stock options are less likely to make use of ESPP. These results underscore the importance of financial literacy.

In column 4, we analyze whether the past individual's experiences of market fluc-

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[7]The result of higher participation with longer employee tenure may be mechanical, since the question only asks whether employees *ever* participated and with longer tenure they had more chances to do so.

tuations, as measured by the weighted past S&P 500 index stock returns, affect the decision to enroll in ESPP plan. We find that a 1% higher annual stock returns over the course of one's life increases the probability of participation in ESPP by 4.4%. Similarly, individuals who say that market fluctuations over the past few years have made them more favorable toward the equity-based compensation, are more likely to participate in ESPP (column 5). We also test whether general tendency to procrastinate, as proxied by the non-participation in the most recent national election, is associated with non-participation in ESPP. Indeed we find support for this explanation (column 6), with people voting in national elections having a 3.8% higher likelihood to participate in ESPP.

In Panel B, we explore such explanations to non-participation as the lack of trust, employee disloyalty and religious denominations. Overall, we find that people who report to feel loyal to the firm or have a sense of common purpose participate more in the plan (column 5), however this effect is not statistically significant. A similar result is observed for employee trust at the individual level, as proxied by the responses to questions of whether company keeps its promises and whether it is fair to its employees. By matching at the country level of employees, we find that employees from less trusting countries are more prone to leaving money on the table. Finally, we find that employees from countries that practice religions discouraging gambling, specifically Muslims, Hindu, Protestants, and Methodists, are more likely to abstain from participation.

IV. Determinants of Failing to Sell the ESPP Stock

Our individual data set also allows us to examine whether employees quickly sell the stock after they buy it through ESPP. A large number of papers argue that employees in the U.S. invest too much into their company stock (see e.g., Benartzi (2001), Huberman and Sengmueller (2004), Poterba (2003), and Cohen (2009)). For example, Meulbroek

(2002) estimates that under plausible parameters the value of company stock is only 50% on a risk-adjusted basis to undiversified employees. However, the decision not sell the stock immediately may be justified if employees have information about future stock returns, or if employees trade off the diversification benefits with smaller tax bill resulting from longer holding period. Overall, given such a large estimate of the diversification cost to employees, the decision never to sell the stock over employee tenure is probably inefficient. Additionally, we find in unreported results that people who report not selling the ESPP stock also report lower profit from ESPP, perhaps because for firm A returns over the previous 3 years were negative.

Here we investigate the determinants of failing to sell the company stock over employee tenure. Since only employees who decided to participate in ESPP in the first place, can make a decision whether to keep or sell the stock afterwards, we estimate our model using the Heckman two-stage sample selection method. We use the same dependent variables for the selection equation (ESPP participation), as for the outcome variable (decision not to sell the stock), so that our identification comes from the non-linearity in the Mills ratio term. Table VIII reports our results for the outcome equation, where the dependent variable is equal to one if employee indicates that he or she has never sold the company stock acquired through ESPP over their tenure, otherwise if employee has ever sold the stock the dependent variable is equal to zero.

We find that married people, employees with more promotions, and highly paid-employees are all more likely to sell the stock (column 1). Females are significantly more likely to hold the stock, which is consistent with Barber and Odean (2001) results that women tend to trade less. However, there are some peculiar results as well. For example, we find that people with college degrees and high household wealth tend to hold the company stock. Also, we find that people who classify themselves as more risk-averse do not sell the stock.

Since some people who acquire the stock through ESPP perhaps do not know

how to sell it through the broker or are frightened by the complexities of the tax code associated with stock trading, we test whether previous exposure to trading is associated with more dispositions of stock acquired through ESPP. Indeed, we find that people who ever exercised employee stock options or who report to trade frequently in the stock market are much more likely to dispose of the ESPP stock (column 2). Interestingly, participation in 401(k) has no explanatory power for the decision to sell or hold the stock. This result can be because most 401(k) participants due to their passivity never learn how to sell the stock.

We also find evidence that financial illiteracy, as proxied by over- and undervaluation of underwater stock options, is associated with lower propensity to sell the stock. This is especially interesting since people who place no value on out-of-the money stock options must have low expectations of future stock price, yet they tend to hold the ESPP stock longer. In column 4, we test whether the previous employee experience in the stock market affects the decision to sell the stock. Interestingly, we find that individuals who have experienced high returns of the S&P 500 index over the course of their life, tend to sell the stock acquired through ESPP (column 4). Similar result is observed when we use the individual response to how stock market fluctuations have affected their attitude toward equity-based compensation, however, the latter effect is not statistically significant.

To proxy for the past experience with a company stock, we also use a percentage of out-of-the-money stock options currently held by employee. We find that people who saw their stock options to go underwater, have a significantly higher propensity to sell the stock (column 6). Overall, this evidence may reflect employee learning the hard way the costs of underdiversification. Alternatively, it may indicate that employees extrapolate future stock returns from the past (Benartzi (2001)).

To see how beliefs of stock misvaluation affect the decision to hold the company stock, we also include two variables on valuation of employee stock options. The first

variable is equal to 1, if employee says she would sell her underwater ESOs for 5-10% of the strike price, and is zero otherwise. The second variable is confidence of employee on a scale of 1 to 5 that underwater stock options will ultimately become valuable. With both variables, we find that employees who think that stock will appreciate tend not to dispose of it (columns 7-8).

Table VIII also shows how employee loyalty and trust to the company affect their decisions to sell the stock. Perhaps non-surprisingly, we find that employees who are more loyal to the firm and more trusting tend not to dispose of the stock (columns 9-10). Thus while loyalty and trust may allow employees to make use of the money-making opportunity through ESPP, at the same time they may hurt employees by leaving them subject to risk. Finally, column 13 shows that failing to sell stock is more common among employees who are from countries that practice religions that discourage gambling.

V. Conclusion

In this paper, we document that a majority of employees at large public firms do not invest in ESPP even when it guarantees a riskless return on investment of over 36%. An average employee forfeits approximately 5.70% of salary or $4,627 per annum by not signing up for the ESPP. Our results suggest that non-participation is at least partially attributed to financial illiteracy and unfamiliarity in dealing with stocks. Using individual survey data, we document that non-participating employees earn lower wages, are less-well educated, and are more likely to incorrectly value financial securities. Employees who fail to take advantage of riskless investment through ESPP are also less likely to enroll in a 401(k) plan or participate in a general equity market. Our findings suggest that households make mistakes that significantly affect their welfare.

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Appendix A: The Bias in Estimation of Participation in ESPP Using the Average Salary Data

Let the random variable $\widetilde{P}$ denote the participation rate in the ESPP, i.e. the contribution of an employee divided by the maximum contribution allowed. Let the random variable $\widetilde{S}$ denote salary of an employee. For each firm, we would like to measure the average participation rate, i.e. $E(\widetilde{P})$. However, because we observe only the average employee salary per firm instead of a set of individual salaries, we are measuring

$$\frac{E(\widetilde{P} \cdot \widetilde{S})}{E(\widetilde{S})}.$$

To see whether we over- or underestimate the true average participation rate in each firm, we have to sign the difference between the two measures, i.e.,

$$\frac{E(\widetilde{P} \cdot \widetilde{S})}{E(\widetilde{S})} - E(\widetilde{P}).$$

Multiplying the equation by $E(\widetilde{S})$, and using the definition of covariance we see

$$E(\widetilde{P} \cdot \widetilde{S}) - E(\widetilde{P})E(\widetilde{S}) = Cov(\widetilde{P}, \widetilde{S}).$$

Thus if the correlation between the individual employee salary and participation in ESPP plan is positive, we will tend to overestimate the participation rate.

Table I. Descriptive Statistics of ESPP Plan Characteristics and Other Variables (Firm Level).

The the sample consists of S&P 500, S&P 400 midcap, and NASDAQ 100 firms for which we were able to obtain data and which have a stock purchase plan open to all employees in the firm; *years since plan adoption* is the number of years since the plan was first adopted as disclosed in SEC filings; *maximum percent of comp.* is the maximum percent of compensation an employee can contribute towards ESPP; *annual dollar limit on contributions* is the maximum of the dollar limit on participation, as specified by the company, and the average survey wage multiplied by the *maximum percent of comp.*; *discount* is the percentage discount at which employee can buy a stock; *lookback option* is equal to one if the price at which employees can buy the stock is lower of the price at the beginning and the end of the *offering period* minus the specified discount; *reset option* is the option to reset the purchase to the price at the beginning of the previous offering period; *lookback (reset) value* is the value of the lookback (reset) option as a percentage of purchase price; *combined expected discount* is the sum of discount, lookback value, and reset value; *holdup* is equal to 1 if employees are not allowed to dispose of the stock immediately after the purchase, and is 0 otherwise; *holdup period* is the minimum number of months the employee is required to hold the stock; *transaction costs paid by company* is equal to 1 if the company pays transaction costs (including brokerage fees) for the stock purchase (but not necessarily for the sale), and is 0 otherwise; *withdraw contribution option* is equal to 1 if the firm allows to withdraw contributions during the offering period, and is 0 otherwise; *increase (decrease) contribution option* is equal to 1 if the firm allows to increase (decrease) contributions rate during the offering period, and is 0 otherwise; *survey salary* is the average wage as self-reported by employees on the Glassdoor.com; *Compustat salary* is equal to the staff expense (from Compustat) normalized by the number of employees; whenever this item is missing, it is set to the median value within industry (defined by two-digit SIC code) for that year; *option grants/employee* is the Black-Scholes value of granted employee stock options, normalized by the number of employees; *value from option exercises/employee* is the number of options exercised by employees multiplied by the difference in stock price and weighted average exercise price, all normalized by the number of employees; CEO approval by employees is the percentage of employees that approve of the firm's CEO (Glassdoor.com); *employee job satisfaction* is the rating by employees of how satisfied they are with their jobs at the company (Glassdoor.com); *100 best company* is the dummy equal to 1 if the firm is listed in the year as one of the 100 best companies to work for by the Fortune magazine, and is 0 otherwise; *401(k)* is equal to 1 if the firm has 11-K filings with 401(k) plan during the year; *401(k) with match in stock* is equal to 1 if the company match to 401(k) is in employer stock; *401(k) contrib./employee* is the total dollar employee contributions to 401(k) per employee; *401(k) match* is the percentage match contributed by the company to 401(k); *401(k) match applies to % of salary* is the maximum percentage of salary to which company match applies; *401k under-participation as % of salary* is the additional percentage of salary that employees would have to contribute to make full use of the employer match. *Religiosity* is the number of religious adherents in MSA of firm's headquarters divided by MSA's total population (ARDA).

Panel A: ESPP Plan Characteristics						
	Obs.	Mean	SD	10%	50%	90%
Years since plan adoption	2,982	8.02	6.04	1	7	16
Maximum percent of comp. (%)	2,901	18.94	23.23	10	10	20
Annual dollar limit on contributions ($)	3,024	11,834	6,586	5,174	9,813	25,000
Discount (%)	3,026	13.96	3.04	10	15	15
Purchase period (months)	2,950	5.95	4.04	3	6	12
Lookback option	3,021	0.794	0.405	0	1	1
Lookback value (conditional on lookback) (%)	2,252	15.67	8.89	6.27	13.71	28.10
Reset option	2,808	0.081	0.273	0	0	0
Reset value (conditional on reset) (%)	220	5.88	1.56	3.94	6.00	7.83
Combined expected discount (%)	2,672	26.60	12.10	15.00	25.71	42.58
Holdup	2,834	0.195	0.396	0	0	1
Holdup period in months	531	13.31	7.20	6	12	24
(conditional on holdup)						
Transaction costs paid by company	1,053	0.857	0.351	0	1	1
Withdraw contribution option	2,743	0.918	0.272	0	1	1
Increase contribution option	2,670	0.433	0.496	0	0	1
Decrease contribution option	2,671	0.614	0.486	0	1	1
Panel B: Other Variables						
	Obs.	Mean	SD	10%	50%	90%
Compustat salary (industry val. used) ($)	2,907	59,235	32,215	34,896	53,567	84,308
Survey salary ($)	2,826	75,729	20,633	45,527	79,203	101,249
Compustat salary (if staff expense and survey salary non-missing) ($)	334	95,781	60,499	36,874	74,740	209,451
Survey salary (if staff expense and survey salary non-missing) ($)	334	69,678	19,850	43,525	69,638	99,087
Option grants/employee ($)	2,037	24,347	54,809	351	4,720	61,127
Value from option exercises/employee ($)	2,158	20,530	48,118	101	3,367	52,408
CEO approval by employees (%)	1,418	60.82	21.91	27	61	87
Employee job satisfaction (1-5)	1,989	3.02	0.369	2.60	3.00	3.50
100 best company	3,039	0.073	0.260	0	0	0
Analyst coverage	3,042	11	7	3	9	22
401(k)	3,042	0.426	0.495	0	0	1
401(k) with match in stock	2,738	0.070	0.250	0	0	0
401(k) match (%)	986	69.31	27.41	50	70	100
401(k) match applies to % of salary	958	5.41	1.84	3.5	6	6
401(k) under-participation as % of salary	883	2.21	1.80	0.00	2.10	4.52
Index of geographic concentration	2,869	0.329	0.215	0.099	0.284	0.617
Fraction of bachelor degrees	2,989	24.31	3.75	19.41	23.45	27.73
Religiosity	1,723	0.506	0.126	0.352	0.478	0.700
Ratio of Catholics to Protestants	1,723	2.47	2.12	0.27	2.49	4.79

Table II. Firm and Employee Characteristics at Four Firms (Individual Level).

Panel A gives the broad firm characteristics. Panel B gives the countries in which the work facility is located and the number of employees at this facility; column WVS gives the most recent year in which the World Value Survey was conducted in a particular country. Panel C presents individual employee characteristics. *CE of a risky bet* is the amount an individual would pay for a bet that wins $1,000 with probability 10%. *Wealth* is the employee's estimate of household's value of house minus the mortgage, plus value of stocks, mutual funds, and bonds owned, cash, checking accounts, and value of retirements accounts including 401(k).

Panel A: Firm Characteristics				
	Company A	Company B	Company C	Company D
Year of survey	2004	2004/2005	2005	2005
Web or paper survey	Web	Paper	Web	Web
Response rate (%)	19	72	63	77
Industry	High tech	Manufacturing	Financial	High tech
Total active employees	Over 30,000	500-1,000	5,000-10,000	Under 500
Number of employees	6,733	429	1,584	230
Fraction of US employees (%)	84.5	100	100	44.8
Company has ESPP	Yes	Yes	Yes	Yes
Company has 401(k)	Yes	Yes	Yes	Yes
Company has broad-based stock options	Yes	Yes	Yes	Yes

Panel B: Countries where facility located					
Country	Employees	WVS	Country	Employees	WVS
United States	7,459	2006	Denmark	9	1999
United Kingdom	203	2006	Spain	9	2007
Canada	123	2006	Greece	8	1999
Australia	91	2005	Korea	7	2005
Netherlands	75	2006	Sweden	7	2006
India	72	2006	Argentina	6	2006
Belgium	52	1999	Finland	6	2005
Italy	43	2005	Norway	5	2007
Singapore	43	2002	Venezuela	5	2000
France	42	2006	Czech Republic	3	1999
Germany	37	2006	Poland	3	2005
Japan	21	2005	Russia	3	2006
Israel	19	2001	Austria	2	1999
China	18	2007	Hungary	2	1999
Switzerland	18	2007	South Africa	2	2006
Ireland	12	1999	Taiwan	2	2006
Malaysia	12	2006	Chile	1	2006
Mexico	10	2005	Romania	1	2005
Brazil	9	2006	Other	142	N/A

Panel C: Employee Characteristics				
	Company A	Company B	Company C	Company D
Fraction female (%)	22.0	44.7	66.2	24.5
Fraction married (%)	82.0	61.3	62.0	73.1
Fraction Asian (%)	18.6	1.0	3.2	32.1
Fraction Black (%)	1.4	0.7	8.2	0.8
Fraction Native American (%)	0.3	1.0	1.8	0.0
Fraction with BA degree and no graduate degree (%)	47.1	21.2	31.5	40.4
Fraction with graduate degree (%)	36.6	4.9	12.2	34.6
Average age (years)	39.4	40.0	38.5	36.8
Average tenure (years)	4.4	5.5	6.2	2.2
Average hours worked per week	52.0	42.3	43.5	50.7
Average number of promotions	1.3	1.1	1.5	0.5
Average risk aversion (scale 0-10)	3.8	4.3	4.5	3.8
Average CE of a risky bet	$31.6	$24.5	$20.0	$38.3
Average salary	$98,959	$35,518	$46,335	$86,188
Median salary	$90,000	$27,500	$37,400	$80,500
Average wealth	$724,533	$179,064	$204,403	$327,571
Median wealth	$375,000	$87,500	$125,000	$200,000

Table III. ESPP Non-Participation and Employee Losses (Firm Level).

The sample consists of S&P 500, S&P 400 midcap, and NASDAQ 100 firms which have a stock purchase plan open to all employees. Contributions per employee is the dollar amount contributed by employees to the ESPP during the fiscal year divided by the number of employees. Whenever the dollar contributions are missing they are set to the number of shares issued in a plan multiplied by the end-of-year price and one minus the discount. *ESPP non-participation (survey salary)* is 100% minus the contributions per employee normalized by the minimum of (1) the percent of compensation multiplied by the survey salary, (2) the maximum number of shares that can be purchased multiplied by the beginning-of-year price, and (3) the annual dollar limit; *ESPP non-participation (Compustat)* is 100% minus the contributions per employee normalized by the maximum percent of comp. multiplied by the *Compustat salary*; *loss per non-participant* is the combined expected discount provided by the ESPP multiplied by the annual dollar limit on contributions; *loss per non-participant as % of salary* is the loss per non-participant divided by the survey salary; *after-tax loss per non-participant* is the loss per non-participant minus the expected tax liability, which is calculated as the 28% individual tax rate on profit from ESPP trade.

	Obs.	Mean	SD	10%	50%	90%
Panel A: Full Sample						
ESPP non-participation (survey salary) (%)	2,289	81.90	19.20	54.04	89.14	98.43
ESPP non-participation (Compustat) (%)	2,326	73.56	28.44	24.96	85.23	98.54
Panel B: Firms with no holdup						
ESPP non-participation (survey salary) (%)	1,821	80.41	20.12	51.34	88.34	98.27
ESPP non-participation (Compustat) (%)	1,807	70.35	29.86	17.17	82.26	97.91
Loss per non-participant ($)	1,690	4,627	4,424	1,095	3,354	9,557
Loss per non-participant as % of annual salary	1,690	5.70	4.47	1.76	4.62	10.95
After-tax loss per non-participant ($)	1,690	3,331	3,185	788	2,415	6,881
Panel C: Firms with no holdup and average survey salary < $50K						
ESPP non-participation (survey salary) (%)	217	93.09	8.76	88.85	95.71	98.68
ESPP non-participation (Compustat) (%)	143	92.31	7.32	79.41	94.54	98.92
Loss per non-participant ($)	210	1,640	898	653	1,518	2,740
Loss per non-participant as % of annual salary	210	4.63	2.33	1.76	4.30	7.88
After-tax loss per non-participant ($)	210	1,180	646	471	1,093	1,973
Panel D: Firms with no holdup and average survey salary > $100K						
ESPP non-participation (survey salary) (%)	267	62.87	23.22	35.34	66.64	89.50
ESPP non-participation (Compustat) (%)	267	39.91	31.01	0.00	42.44	81.89
Loss per non-participant ($)	241	8,982	6,128	3,113	8,013	16,909
Loss per non-participant as % of annual salary	241	8.41	5.61	3.06	7.44	15.77
After-tax loss per non-participant ($)	241	6,467	4,412	2,242	5,770	12,175

Table IV. Employee Participation in Stock Plans and Open Market at Four Firms (Individual Level).

	Company A	Company B	Company C	Company D
Fraction who never enrolled in ESPP (%)	7.7	48.9	52.2	59.1
Number of people with losses	494	195	711	67
Average annual loss (conditional on loss)	$4,660	$533	$868	$1,510
Loss over the employee tenure	$18,942	$2,764	$4,181	$3,205
Average after-tax annual loss (conditional on loss)	$3,265	$431	$621	$1,213
Percentage of annual salary lost to non-participation (conditional on loss)	5.2	1.9	2.9	2.1
Average value of company stock currently owned through ESPP	$44,433	$5,221	$5,657	$2,760
Fraction of employees ever enrolled in ESPP who never sold stock (%)	39.5	44.8	58.5	38.0
Average profit made from all sales through ESPP (conditional on sale)	$32,929	$10,807	$13,085	$4,342
Fraction who received ESOs last year (%)	97.8	22.8	75.4	61.1
Average intrinsic value of currently owned ESOs	$320,049	$6,924	$36,617	$141,177
Fraction of those who ever received ESOs who never exercised them (%)	57.1	54.1	36.0	61.3
Fraction who participates in 401(k) (%)	94.5	81.7	84.5	85.3
Average value of 401k assets	$56,867	$19,443	$39,199	$17,508
Fraction who ever bought company stock on the open market (%)	36.3	6.7	5.4	2.1
Average current value of company stock bought on the open market	$11,575	$523	$580	$26,068
Fraction of those who bought company stock on the open market who never participated in ESPP (%)	6.8	26.3	27.1	25.0
Average profit made in company stock bought on the open market	$8,247	$420	$13,085	$5.2
Fraction who frequently buy and sell securities on the market (%)	18.3	7.4	7.9	17.7
Average fraction of wealth in stocks (%)	37.5	13.9	23.6	21.4
Fraction of those who trade on the market that never participated in ESPP (%)	5.2	37.3	40.5	53.1
Fraction who exchange 10 underwater ESOs for 10 or more shares of stock (%)	15.0	N/A	N/A	N/A
Fraction who would exchange 10 underwater ESOs for 0 shares of stock (%)	5.1	N/A	N/A	N/A
Correlation coefficient between being ever enrolled in ESPP and employee salary	0.035*** (0.005)	0.294*** (0.000)	0.270*** (0.000)	0.345*** (0.000)

Table V. Employee Non-Participation in ESPP by Salary, Wealth, and Education (Individual Level).

Irrational ESO overvaluation is equal to 1 if employee would not exchange 10 underwater stock options for anything less than 10 shares. *Irrational ESO undervaluation* is equal to 1 if employee would exchange 10 underwater stock options for 0 shares of stock. T-test is for the difference in means between the two subsamples.

Panel A: Losses due to non-participation by salary						
	Company A			Company C		
	under $50K	over $100K	t-test	under $50K	over $100K	t-test
Fraction who never enrolled in ESPP (%)	23.6	6.7	10.29	59.5	29.4	6.80
Average annual loss (conditional on loss)	$1,748	$7,338	-14.48	$859	$882	-2.23
Average loss over tenure	$6,739	$30,327	-6.03	$4,084	$6,410	-3.32
Irrational ESO overvaluation (%)	24.8	9.0	7.86	N/A	N/A	N/A
Irrational ESO undervaluation (%)	12.2	3.8	6.02	N/A	N/A	N/A
Panel B: Losses due to non-participation by household wealth						
	Company A			Company C		
	under $100K	over $300K	t-test	under $100K	over $300K	t-test
Fraction who never enrolled in ESPP (%)	12.7	6.0	7.42	65.0	32.7	9.06
Average annual loss (conditional on loss)	$2,766	$5,932	-9.91	$858	$875	-2.27
Average loss over tenure	$13,124	$24,361	-4.04	$3,557	$5,617	-4.19
Irrational ESO overvaluation (%)	21.3	3.9	6.57	N/A	N/A	N/A
Irrational ESO undervaluation (%)	8.6	12.7	5.07	N/A	N/A	N/A
Panel C: Losses due to non-participation by education						
	Company A			Company C		
	No BA degree	BA degree	t-test	No BA degree	BA degree	t-test
Fraction who never enrolled in ESPP (%)	10.9	7.2	4.08	59.2	41.8	5.89
Average annual loss (conditional on loss)	$3,616	$4,975	-4.24	$860	$871	-2.19
Average loss over tenure	$13,127	$20,650	-2.92	$4,555	$3,977	1.48
Irrational ESO overvaluation (%)	17.9	14.4	2.68	N/A	N/A	N/A
Irrational ESO undervaluation (%)	7.4	4.7	3.41	N/A	N/A	N/A

Table VI. Employee Participation in ESPP (Firm Level).

The dependent variable is the *ESPP participation (survey salary)*. *RD/assets* is research and development expenses normalized by the book value of assets; *firm size* is the natural logarithm of the book value of assets; *Tobin's Q* is the sum of market value of equity and book value of debt normalized by the book value of assets; other variables are defined in the headers of Tables I and II. The estimation includes year and industry fixed-effects. *T*–statistics based on robust standard errors clustered by firm are listed in parentheses. The numbers below the t-statistics indicate by how much the participation rate increases for a one standard deviation increase in the independent variable. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
RD/assets	104.8***	108.3***	98.74***	102.0***	107.2***	88.31***	5.75
	(6.65)	(6.23)	(6.51)	(6.43)	(6.09)	(2.95)	(0.23)
Firm size	2.28***	2.17***	2.09***	2.30***	1.77***	1.36*	-0.02
	(3.20)	(2.95)	(3.00)	(3.32)	(2.69)	(1.71)	(-0.01)
Tobin's Q	2.80***	1.82***	2.94***	2.78***	1.94***	2.67***	0.66
	(6.91)	(3.80)	(7.30)	(6.76)	(4.78)	(4.63)	(0.49)
Combined	39.27***	36.29***	39.88***	40.27***	38.57***	35.28***	20.18*
expected discount	(5.61)	(5.07)	(5.55)	(5.72)	(5.47)	(3.61)	(1.64)
Holdup	-3.25*	-2.46	-2.65	-2.77	-1.99	-4.26*	3.16
	(-1.80)	(-1.35)	(-1.59)	(-1.54)	(-1.11)	(-1.82)	(0.89)
Survey salary	0.14**	0.11*	0.14**	0.13**	0.07	0.08	
	(2.33)	(1.67)	(2.44)	(2.13)	(1.46)	(0.92)	
	2.89%	2.27%	2.89%	2.68%	1.44%	1.65%	
Value from option		0.05***					
exercises/employee		(2.72)					
		2.41%					
Years since plan			0.49***				
adoption			(3.85)				
			2.96%				
Fraction of bache-				0.31*			
lor degrees				(1.78)			
				1.16%			
Option					0.05**		
grants/employee					(2.52)		
					2.74%		
401(k) under-						-2.74***	-1.45***
participation						(-5.16)	(-2.98)
						-4.93%	-2.61%
Firm-fixed effects	No	No	No	No	No	No	Yes
Adjusted-R^2	0.437	0.447	0.457	0.447	0.467	0.458	0.838
Observations	2,027	1,544	2,013	1,993	1,502	653	653

(continued)	(8)	(9)	(10)	(11)	(12)	(13)
RD/assets	105.1***	115.1***	103.4***	93.06***	-1.50	113.9***
	(6.70)	(7.64)	(5.75)	(5.68)	(-0.07)	(5.94)
Firm size	2.26***	2.11***	2.96***	1.22	-0.57	1.76**
	(3.20)	(3.20)	(3.08)	(1.55)	(-0.49)	(2.37)
Tobin's Q	2.85***	2.66***	2.65***	2.44***	1.49***	2.60***
	(7.05)	(6.43)	(4.69)	(6.28)	(3.18)	(5.15)
Combined expected		39.78***	46.47***	38.14***	9.08	22.93***
discount		(5.98)	(5.50)	(5.40)	(1.10)	(2.90)
Holdup	-3.81**	-2.98*	-0.58	-3.38*	-1.00	-0.60
	(-2.06)	(-1.66)	(-0.27)	(-1.83)	(-1.26)	(-0.22)
Survey wage	0.15**	0.10*	0.17*	0.13**		0.16***
	(2.42)	(1.92)	(1.84)	(2.22)		(2.74)
Discount	87.55***					
	(4.60)					
	2.66%					
Lookback value	28.31***					
	(2.85)					
	2.86%					
Reset value	82.19**					
	(2.01)					
	1.32%					
401(k) with		-5.41***				
match in stock		(-3.41)				
		-1.35%				
Religiosity			-17.04**			
			(-2.08)			
Ratio of Catholics			1.22**			
to Protestants			(2.15)			
			2.59%			
100 best				6.73***	2.80	
company				(2.74)	(1.40)	
				1.75%	0.73%	
Analyst coverage				0.23***	0.19	
				(2.08)	(1.55)	
				1.61%	1.33%	
CEO approval						0.11**
by employees						(2.00)
						2.88%
Firm-fixed effects	No	No	No	No	Yes	No
Adjusted-R^2	0.442	0.473	0.483	0.449	0.796	0.532
Observations	2,027	1,872	1,182	2,025	2,025	1,035

41

(continued)	(14)	(15)	(16)	(17)
RD/assets	95.88***	98.63***	109.8***	135.5***
	(5.07)	(5.91)	(6.16)	(7.71)
Firm size	1.72***	2.56***	2.08***	1.81***
	(2.57)	(3.32)	(2.94)	(2.35)
Tobin's Q	2.60***	2.64***	2.75***	
	(5.62)	(6.44)	(5.08)	
Combined expected discount	30.25***	40.75***	43.80***	40.80***
	(3.52)	(5.47)	(6.11)	(5.66)
Holdup	-3.98*	-2.76	-2.69	-2.88
	(-1.91)	(-1.52)	(-1.45)	(-1.60)
Survey wage	0.15**	0.14**	0.10*	0.10**
	(2.21)	(2.33)	(1.89)	(1.76)
Employee job satisfaction	9.74***			
	(3.30)			
	3.59%			
Geographic concentration		6.44*		
		(1.68)		
		1.37%		
Contemporaneous stock return			0.77	3.38***
			(0.89)	(4.42)
Past stock return (-1 year)			0.16	2.08***
			(0.27)	(4.03)
Past stock return (-2 years)			0.78	1.71***
			(1.41)	(3.37)
Past stock return (-3 years)			-0.27	0.55
			(-0.59)	(1.21)
Firm-fixed effects	No	No	No	No
Adjusted-R^2	0.496	0.447	0.468	0.429
Observations	1,419	1,908	1,749	1,760

Table VII. ESPP Participation and Employee Characteristics (Individual Level).

The dependent variable is equal to 1 if employee ever participated in ESPP, and is equal to 0 otherwise. The model is estimated by logit with firm-fixed effects. *Trade other securities* is equal to 1 if employee answers that he/she frequently buys and sells securities in the market, and is equal to 0 otherwise. *Bought company stock on open market* is equal to 1 if employee ever bought company stock on the market, and is equal to 0 otherwise. *Number of promotions* is the number of promotions received over the employee tenure, where 3 or more promotions are coded as 3. *Irrational ESO overvaluation* is equal to 1 if employee would not exchange 10 underwater stock options for anything less than 10 shares. *Irrational ESO undervaluation* is equal to 1 if employee would exchange 10 underwater stock options for 0 shares of stock. *Weighted past S&P 500 returns* are the weighted past stock returns of the S&P 500 index over the individual's life starting from the age of 10, with more recent years carrying larger weights (as in Malmeinder and Nagel (2011)). *Past favorable stock market experience* is the individual's response on a scale of 1 to 5, with 5 being "made me more favorable," to "How have the fluctuations in the stock market in the past few years affected your attitude towards equity compensation?" *Voted in national election* is equal to 1 if employee voted in the most recent country election, and is 0 otherwise. *Employee loyalty* is the sum of how loyal employee feels to the firm on a scale of 1 to 4 and whether employee feels she shares a common purpose with firm on a scale of 1 to 4. *Employee trust* is the sum of whether employee feels company is fair to its employees on a scale of 1 to 4 and whether the company keeps its promises. *Trust people you know* is the average frequency respondents of a particular country say they trust people who they know personally (WVS). *Trust people first meet* is the average frequency respondents of a particular country say they trust people who they meet for the first time (WVS). *Belong to religion* is the average frequency respondents of a particular country say they belong to a religious denomination (WVS). *Belong to religion discouraging gambling* is the average frequency respondents of a particular country say they belong to Muslims, Hindu, Protestants, or Methodists denomination (WVS). Standard controls in Panel B include female, married, Asian, Black, Native American, BA degree, age, age^2, log(tenure), number of promotions, log(salary), log(wealth), and employee risk aversion.

	(1)	(2)	(3)	(4)
Female	0.01	-0.12	0.37**	-0.00
	(0.08)	(-1.16)	(2.33)	(-0.02)
Married	0.01	0.03	-0.09	-0.01
	(0.13)	(0.28)	(-0.60)	(-0.12)
Asian	0.51***	0.52***	0.43**	0.50***
	(3.80)	(3.12)	(2.55)	(3.74)
Black	-0.08	-0.06	-0.01	-0.09
	(-0.39)	(-0.27)	(-0.03)	(-0.42)
Native American	-0.81*	-0.84*	-0.05	-0.82*
	(-1.78)	(-1.82)	(-0.05)	(-1.82)
BA degree	0.36***	0.40***	0.10	0.35***
	(3.98)	(3.77)	(0.70)	(3.80)
Age	0.10***	0.09**	-0.03	0.08**
	(2.90)	(2.44)	(-0.50)	(2.47)
Age^2	-0.001***	-0.001***	0.000	-0.001***
	(-3.16)	(-2.70)	(0.20)	(-2.87)
Log(tenure)	0.27***	0.18***	0.18***	0.26***
	(5.09)	(2.82)	(2.58)	(4.97)
Number of promotions	0.26***	0.23***	0.28***	0.26***
	(6.87)	(5.32)	(4.72)	(6.78)
Log(salary)	0.44***	0.10	0.44***	0.43***
	(4.45)	(0.86)	(2.71)	(4.33)
Log(wealth)	0.19***	0.13***	0.16***	0.19***
	(5.71)	(3.26)	(3.33)	(5.76)
Employee risk aversion	-0.06***	-0.04*	-0.11***	-0.06***
	(-3.13)	(-1.78)	(-3.69)	(-3.12)
Ever received ESOs		1.38***		
		(5.49)		
Bought company stock on open market		0.44***		
		(3.42)		
Trade other securities		0.44***		
		(2.70)		
Participate in 401(k)		1.28***		
		(9.26)		
Irrational ESO overvaluation			-0.48***	
			(-3.25)	
Irrational ESO undervaluation			-1.11***	
			(-5.90)	
Weighted past S&P 500 returns				0.47**
				(2.49)
Firms included	All	All	A	All
Observations	7,047	6,042	4,980	7,047

(continued)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Past favorable stock market experience	0.19*** (2.58)						
Voted in national election		0.40*** (4.44)					
Employee loyalty			0.04 (1.37)				
Employee trust				0.03 (1.43)			
US employee					0.52*** (2.94)	0.19 (0.94)	0.41* (1.74)
Trust people you know (country level)					1.69*** (4.39)		
Trust people first meet (country level)						2.14*** (5.01)	
Belong to religion (country level)							3.84*** (3.80)
Belong to religion discouraging gambling (country level)							-2.25** (-2.30)
Standard controls included		Yes	Yes	Yes	Yes	Yes	Yes
Firms in the sample	A, B, C	All	All	All	A, D	A, D	A, D
Observations	6,051	6,774	7,003	6,975	5,344	5,344	5,160

Table VIII. Not Selling Stock Purchased through ESPP and Employee Characteristics (Individual Level).

The dependent variable is equal to 1 if employee participated in ESPP but never sold the stock, and is equal to 0 if employee participated in ESPP and have sold the stock sometime in the past. The model is estimated by two-stage Heckman selection model with firm-fixed effects. The selection equation (whether employee chooses to participate) uses the same dependent variables as the outcome equation (whether employee does not sell the stock). *Trade other securities* is equal to 1 if employee answers that he/she frequently buys and sells securities in the market, and is equal to 0 otherwise. *Bought company stock on open market* is equal to 1 if employee has ever bought company stock on the market, and is equal to 0 otherwise. *Number of promotions* is the number of promotions received over the employee tenure, where 3 or more promotions are coded as 3. *Employee loyalty* is the sum of how loyal employee feels to the firm on a scale of 1 to 4 and whether employee feels she shares a common purpose with firm on a scale of 1 to 4. *Employee trust* is the sum of whether employee feels company is fair to its employees on a scale of 1 to 4 and whether the company keeps its promises. *Trust people you know* is the average frequency respondents of a particular country say they trust people who they know personally (WVS). *Trust people first meet* is the average frequency respondents of a particular country say they trust people who they meet for the first time (WVS). *Belong to religion* is the average frequency respondents of a particular country say they belong to a religious denomination (WVS). *Belong to religion discouraging gambling* is the average frequency respondents of a particular country say they belong to Muslims, Hindu, Protestants, or Methodists denomination (WVS). *Irrational ESO overvaluation* is equal to 1 if employee would not exchange 10 underwater stock options for anything less than 10 shares. *Irrational ESO undervaluation* is equal to 1 if employee would exchange 10 underwater stock options for 0 shares of stock. *Weighted past S&P 500 returns* are the weighted past stock returns of the S&P 500 index over the individual's life starting from the age of 10, with more recent years carrying larger weights (as in Malmendier and Nagel (2011)). *Past favorable stock market experience* is the individual's response on a scale of 1 to 5, with 5 being "made me more favorable," to "How have the fluctuations in the stock market in the past few years affected your attitude towards equity compensation?" *Would sell underwater ESOs* is equal to 1 if employee says she would sell underwater stock options for 5-10% of stock price, and is 0 otherwise. *Stock is undervalued* is whether employee believes underwater stock options will become valuable on a scale of 1 to 5. *Percent of underwater stock options* is the percentage of currently held stock options that are out-of-the-money. Standard controls in Panel B include female, married, Asian, Black, Native American, BA degree, age, age^2, log(tenure), number of promotions, log(salary), log(wealth), and employee risk aversion.

	(1)	(2)	(3)	(4)
Female	0.26***	0.23***	0.20***	0.26***
	(6.39)	(5.34)	(3.88)	(6.47)
Married	-0.10**	-0.13***	-0.14***	-0.09**
	(-2.22)	(-2.84)	(-2.74)	(-2.02)
Asian	-0.16	0.04	-0.09*	-0.02
	(-0.34)	(0.71)	(-1.81)	(-0.34)
Black	-0.24*	-0.20	-0.37**	-0.24*
	(-1.87)	(-1.52)	(-2.02)	(-1.89)
Native American	0.18	0.18	0.22	0.16
	(0.62)	(0.63)	(0.65)	(0.57)
BA degree	0.18***	0.10**	0.12**	0.18***
	(3.85)	(1.99)	(2.25)	(3.89)
Age	-0.025	0.002	-0.02	0.03
	(-1.44)	(0.12)	(-1.18)	(0.85)
Age^2	0.000	0.000	0.000	-0.001
	(1.50)	(0.22)	(1.48)	(-0.86)
Log(tenure)	0.004	0.01	-0.004	0.01
	(0.21)	(0.47)	(-0.19)	(0.24)
Number of promotions	-0.15***	-0.06***	-0.17***	-0.15***
	(-8.11)	(-3.25)	(-9.33)	(-8.19)
Log(salary)	-0.25***	-0.20***	-0.34***	-0.25***
	(-4.99)	(-3.57)	(-5.90)	(-4.97)
Log(wealth)	0.07***	0.12***	0.05**	0.07***
	(4.51)	(6.37)	(2.26)	(4.55)
Employee risk aversion	0.02***	0.03***	0.04***	0.02***
	(2.58)	(2.60)	(3.69)	(2.54)
Ever exercised ESOs		-0.76***		
		(-17.89)		
Bought company stock on open market		-0.01		
		(-0.35)		
Trade other securities		-0.10**		
		(-1.96)		
Participate in 401(k)		0.03		
		(0.35)		
Irrational ESO overvaluation			0.17***	
			(3.15)	
Irrational ESO undervaluation			0.38***	
			(4.25)	
Weighted past S&P 500 returns				-0.15**
				(-1.90)
Inverse Mills ratio	0.77***	1.11***	-1.25	0.77***
	(2.87)	(4.29)	(-0.87)	(2.98)
Firms included	All	All	A	All
Observations	6,980	5,963	4,948	6,980

	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Past favorable stock market experience	-0.033								
	(-1.14)								
Percent of underwater ESOs		-0.003***							
		(-3.03)							
Would sell underwater ESOs			-0.23***						
			(-6.52)						
Stock is undervalued				0.04***					
				(2.67)					
Employee loyalty					0.02*				
					(1.87)				
Employee trust						0.02*			
						(2.04)			
US employee							-0.02	0.02	0.11
							(-0.29)	(0.21)	(1.21)
Trust people you know (country level)							-0.41**		
							(-1.96)		
Trust people first meet (country level)								-0.32	
								(-1.61)	
Belong to religion (country level)									-0.94
									(-1.62)
Belong to religion discouraging gambling (country level)									1.02**
									(2.50)
Inverse Mills ratio	0.86***	0.62**	-5.64	-4.74	0.77***	0.87***	-0.26	-0.27	-0.29
	(3.01)	(2.11)	(-0.08)	(-0.12)	(2.86)	(3.13)	(-0.49)	(-0.48)	(-0.54)
Standard controls included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firms in the sample	A, B, C	All	A	A	All	All	A, D	A, D	A, D
Observations	5,994	6,447	5,462	5,517	6,936	6,904	5,502	5,502	5,204