

Loyalty-Based Portfolio Choice

Lauren Cohen

Harvard Business School

I evaluate the effect of loyalty on individuals' portfolio choice using a unique dataset of retirement contributions. I exploit the statutory difference that, in 401(k) plans, stand-alone employees can invest directly in their division, while conglomerate employees must invest in the entire firm, including all unrelated divisions. Consistent with loyalty, employees of stand-alone firms invest 10 percentage points (75%) more in company stock than conglomerate employees. Support is also found using variation in loyalty between different groups of employees, across and within firms. The cost to employees of loyalty is large, amounting to nearly a 20% loss in retirement income. (*JEL* D31, J26, J32)

The average worker in the United States spends between one-fifth and one-quarter of their life in retirement. While in retirement, an individual receives income from a number of sources, with around 20% coming from pension income.¹ With the risk of a 20% income shock, we expect individuals to weigh their pension investment choices carefully. What we observe, however, is that employees, on average, invest a large portion of their pension savings in company stock.² For instance, employees of Pfizer, Inc., invest almost 90% of pension assets in Pfizer common stock. This is a questionable asset allocation for two reasons. First, in most retirement plans, there are a number of investment alternatives besides company stock, including diversified stock funds and bond funds. Portfolio theory suggests that a diversified portfolio (free of the idiosyncratic risk associated with a single stock) would dominate a portfolio concentrated in one security. Second, employees take on additional risk by tying labor income and retirement income to the same source of variation.

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¹ Retirement age data and pension income data are from the Department of Labor's Current Population Survey, while life-expectancy data are from the National Center for Health Statistics.

² In addition, for over half of the 401(k) participants, these 401(k) investments are their sole financial investments (Investment Company Institute, 2000).

The large portion of employee pension wealth invested in one's own company stock is a portfolio selection puzzle. My hypothesis is that workers' company loyalty can help to explain this investment pattern. I define loyalty broadly here in the sense of an emotional tie, although this definition will be refined in Section 1. The question then arises of how to empirically measure loyalty. The same problems inherent in measuring quantities, such as utility, arise in measuring loyalty. We cannot observe preferences or see their properties (such as level of risk aversion). What we can observe are measures like prices and investor holdings from which we can make inferences about risk aversion and utility. Similarly, we can make inferences regarding loyalty from individual behavior.

Specifically, loyalty has observable implications on portfolio choice. A hypothesis I motivate in Section 1 with evidence from social psychology is that employees form company loyalty at the division level. In particular, I assume that employees of stand-alone firms and those of conglomerates are, *ceteris paribus*, equally loyal to their division. I then exploit a difference stemming from the statutory requirements of security reporting for stand-alone and conglomerate firms. In particular, in a stand-alone firm, employer stock represents solely the stand-alone division, whereas in a conglomerate, employer stock represents the entire firm, which includes all unrelated divisions along with an employee's own division. Because conglomerate employees may then have a diluted loyalty to the entire firm relative to the loyalty that employees of stand-alone firms have to their respective firms, loyalty-based investment predicts that conglomerate employees will invest less in their company stock than stand-alone employees. My findings support this prediction.

This prediction of loyalty is in contrast to a risk-diversification motive of employees. In 2003, almost 80% of the companies had at least one variable pay for performance plan in place (Hewitt Associates, 2003). Assuming that firms align incentives of employees at a division level, part of income is determined by the division. Employees of conglomerate firms should then be willing to invest a larger percentage of contributions into company stock than employees of stand alones. This is because conglomerate employees have a company stock instrument less correlated with their labor income due to the coinsurance effect of other divisions on the variation in company stock.

The contrasting predictions of loyalty and risk diversification against labor income set up a test between the two. I find that, controlling for other firm and plan characteristics, employees of stand-alone firms invest 10 percentage points more in company stock through their 401(k) retirement plans than do conglomerate employees. This represents more than a 75% difference in own-firm investing between employees of stand-alone firms and those of conglomerates.

I also examine changes in employee contributions following mergers and spin-offs. The same employees, presumably, can be followed pre- and post-merger and spin-off, thus controlling for employee-specific effects. Consistent with loyalty, employees increase investment in their company stock by 44%

of former investment on average post-spin-off, while postmerger employees decrease their investment in company stock by 36% of their prior allocation.

I examine a number of alternative measures of employee loyalty. First, I use a measure of loyalty based on *Fortune* magazine's ranking of the 100 Best Companies to Work For. Second, I use a measure based on firm advertising. Third, I create a loyalty measure based on union membership. The fourth and fifth measures are based upon hourly versus salaried workers, and CEO tenure. All five measures provide additional evidence for loyalty-based portfolio choice. For example, the Best Companies ranking is taken from surveys designed to measure the pride, trust, and camaraderie employees feel in a work setting. Inclusion in this list may then be a loyalty metric with less measurement error than the stand-alone-conglomerate measure. I find that employees of Best Company firms invest significantly more (12.5 percentage points more) in company stock than employees of firms not on the list.

I consider a number of alternative explanations. The first is that information, rather than loyalty, drives the observed retirement allocation choices. Specifically, I examine whether superior information or perceived information (familiarity) can explain the differences across portfolio decisions of stand-alone and conglomerate employees. Next, I explore whether excessive extrapolation of past returns is driving the differences in investment behavior. I then consider whether managerial incentives indirectly impact employee investment decisions via plan characteristics or takeover defenses. In particular, I examine whether plan characteristics at the firm's discretion can be used to affect employee investment. I find that none of these alternative explanations explain the observed differences between stand-alone and conglomerate employee investment.

Lastly, I estimate the cost of loyalty bias to the employee. The employee foregoes roughly 1.75% per year in returns due to the loyalty bias in portfolio choice. This cost is larger than the cost of home bias, and results in a loss of retirement income of 20% for a 45-year-old who defers \$3,320 per year (sample average) to a retirement plan. I also estimate one possible benefit of loyalty for the firm. I find that firms with more loyal employees may be able to pay these workers lower wages.

The paper proceeds as follows. Section 1 further develops the notion of company loyalty, and Section 2 describes the main data used in the paper. Section 3 gives the main empirical findings for loyalty-based portfolio selection by employees, while Section 4 tests alternative explanations for these results. Section 5 estimates the cost of loyalty to employees, and one possible benefit to firms of having loyal employees. Section 6 concludes.

1. Loyalty

There is a developed body of research in social psychology regarding how loyalty is both developed and manifested in groups. In particular, arbitrary

social categorizations into such mundane groups as “us” and “them” result in feelings of in-group favoritism and out-group discrimination (Rabbie and Horwitz, 1969; Tajfel and Turner, 1979; and Brown, 1995). The general format of these experiments³ is to classify subjects into arbitrary groups, based on few or no distinguishing group factors. The subjects are then asked to evaluate the in-group and the out-group on a number of characteristics (e.g., intelligence, creativity, ability to work well together, etc.). Almost uniformly, subjects associate positive valence characteristics with their group (in-group), and negative valence characteristics with the out-group (Mummendey et al., 2000). In addition, the association happens quickly and somewhat automatically, minutes after being assigned to the arbitrary social group (Otten and Wentura, 1999).

A different, but complementary, question is how these emotions are translated into individual behavior. Akerlof and Kranton (2000, 2005) examine the effect of emotional ties, which they call “identity,” on a number of individual choices. They set up a model with two types of individuals, one with a strong identity and one with a weak identity, and derive different implications for the behavior of the two types in a number of settings.⁴ In the context of this paper, loyalty could enter into behavior in two distinct ways, both through individual choice.⁵ First, an individual could actually have a utility gain from being loyal, so that loyalty is an argument inside the utility function. Second, loyalty could enter the choice problem through altering subjective probability estimates. In both mechanisms, loyalty can raise the expected utility from a certain event or action resulting in an individual making choices not otherwise made without loyalty. In the case of company stock, the employee may choose to hold company stock even with the associated large costs of underdiversification. In this paper, I do not try to distinguish between the two mechanisms of loyalty, although I think the distinction is an important one. Any policy aimed at correcting a bias caused by loyalty must take into account which of the two mechanisms is causing it. Depending on the mechanism of loyalty, the policy implications can be drastically different.

I will examine loyalty’s implications for employee investment, and thus I need to establish the link between loyalty and employee investment: loyalty to company. As mentioned above, individuals develop loyalty quickly, even to arbitrary social groupings. This loyalty increases with relation to, and contact with, the social group (Perdue et al., 1990).⁶ With regard to this, the workplace

³ Known as Minimal Group Paradigm (MGP), for its classification into groups based on “minimal” or no distinguishing characteristics.

⁴ There have been a number of papers which have also addressed the effect of loyalty in economic encounters and exchanges (Demsetz, 1962; Hirschman, 1970; Dipchand et al., 1973; Akerlof, 1983; Farrel, 1983). Guiso et al. (2005) address a related effect of trust on economic exchange and outcomes.

⁵ These mechanisms are similar to those considered in Palacios-Huerta and Santos (2002); and Morse and Shive (2007).

⁶ These are experimental findings and are thus short term. It is reasonable to think, though, that loyalty would continue to increase with time in longer-term settings, such as the workplace.

is one of an individual's most relevant social groupings. As a social group, members of the workplace are often second only to an employee's own family in terms of length of interaction time. The firm may then be a natural entity to which individuals develop loyalty.⁷ The question then arises as to where, or to which group, such loyalty lies within a firm. Psychological evidence suggests that employees should form stronger bonds with their divisions than with the entire firm because employees spend more time with their divisions than with their entire firms. For stand-alone employees, the division and firm are synonymous, so loyalty to the division equals loyalty to the firm. In contrast, for a conglomerate, when employees form loyalty to their division, this does not translate into equal loyalty to the firm. As individuals form weaker ties with groups to which they are less related and have less contact (Perdue et al., 1990), conglomerate employees would be expected to form weaker ties with the other divisions of their firm. Their loyalty to the entire firm, a combination of the loyalty to each division, would thus be weaker than to their division. Therefore, comparing a stand-alone employee and a conglomerate employee, each with the same tie, or loyalty, to their division, the conglomerate employee will have a weaker tie to the entire firm, diluted by the weaker loyalty to the divisions of the firm with which the employee is not affiliated.

If loyalty is driving employee investment into own-company stock, the prediction is clear: employees of conglomerate firms should invest a smaller percentage in company stock than stand-alone employees. For example, consider two employees, one who works for McDonald's and one who works for Taco Bell. Assume that they both have been working at the companies for the same number of years, have had an equal number of positive experiences, and are equally loyal to these divisions. When the employee of McDonald's receives his 401(k) plan document, he is able to invest directly into McDonald's, a single-segment firm. On the other hand, when the employee of Taco Bell receives his 401(k) plan document, he cannot invest directly into Taco Bell. Taco Bell (until recently) was owned by PepsiCo, and so the employee of Taco Bell only had the option to invest in Pepsi common stock. Pepsi's segments other than Taco Bell included Pepsi Bottling Co., and industry competitors Kentucky Fried Chicken and Pizza Hut. Thus, for the Taco Bell employee to invest the same amount in own-company stock as the McDonald's employee, he must be just as loyal to a bottling company (different industry), and to his industry competitors, as he is to his division, Taco Bell. In the likely case that the Taco Bell employee does not have as strong a tie to these alternative divisions as he does to his own division, he will have a diluted loyalty to PepsiCo. Therefore, even though both employees are equally satisfied and loyal to their divisions, the employee

⁷ This contact with the firm may work in the opposite direction, causing disloyalty, in the case of disgruntled workers. To get an idea of the likely magnitude of the disgruntled worker effect, I examine the General Social Survey of 1991. In the survey, 90% of workers say they are proud to be working for their organization, and 86% say they are very satisfied or moderately satisfied with their jobs. This suggests, although it does not rule out, that the disgruntled attitude may not be a pervasive attitude among workers.

of McDonald's will invest more in company stock than the employee of Taco Bell.

2. Data

2.1 Characteristics and benefits of 401(k) plans

The main data used in this paper are employee withholdings of income into company-owned retirement plans. These data are obtained from form 11-k filings with the SEC. The main benefit associated with 401(k) retirement savings plans is that employees can contribute pretax income to the plan. Thus, employees can defer tax on both income and investment appreciation until the money is withdrawn from the plan when, for instance, they have retired and are in a lower tax bracket. Another benefit offered by most plans is a company match. The match is usually given as a percentage of employee contributions (up to a set limit), and is given in one of two ways: (i) 100% in company stock or (ii) mimicking participant contributions. In either case, the match can be seen as an immediate "guaranteed" return on investment. For example, consider a plan into which the employee contributes \$10,000 and the employer makes a matching contribution of \$2,000. Prior to any investment choice, the employee has, at time 0, attained a 20% return.⁸

There are a number of employee-benefit plans containing company stock that companies may offer. As the characteristics of the plans differ, I go into detail here to clarify the distinctions in characteristics between plans, and highlight characteristics unique to 401(k) plans. One misconception about 401(k) plans is that they offer company stock at a discount, which induces employees to buy large amounts of it. 401(k) plans do not offer company stock at a discount; these discount plans are called employee stock purchase plans (ESPP). There are no ESPPs included in my sample, so the results are not dependent on these. The second aspect of my sample of plans, "bonus match," is not driving the results in the paper. Under a bonus match, an employee receives a larger matching contribution for investing in company stock than the matching contribution for investing in other investment options.⁹ These are rare, and I exclude plans that have this bonus match feature from the sample. A third belief is that company pressure forces employees to invest their 401(k) contributions into company stock. Although this is difficult to completely rule out, the following practice has developed. Almost all 401(k) plans are run nearly completely through a plan custodian (e.g., Fidelity). All trades and allocation decisions are done through the custodian. It is very unlikely (although not impossible) that the company

⁸ Following time 0, this 20% initial return depends on employee portfolio selection (under general match types). Also, the return is not immediately guaranteed in many plans in the sense that the employee cannot withdraw it from the plan, often until reaching the retirement age (without a penalty).

⁹ A typical bonus match covenant would read: "The company will match 50% of the participant's contribution, on the first 6% of income deferred. For every dollar the employee defers into own-company stock, the company will match an additional 50% (a total of 100%) on the first 6% of income deferred."

ever sees individual data on retirement contributions by employees. A main reason for outsourcing is to circumvent dealing with the day-to-day operations of the individual accounts in the plan. A final misconception is that the large percentage of funds invested in company stock does not represent the average worker's account, but instead is an artifact of large top management retirement accounts heavily tilted toward company stock. As top management may be under more scrutiny, be more able to materially affect the well-being of the firm, or have more inside information about the firm, their holding of company stock may have different signaling purposes than that of the average worker. Large management accounts, however, are not likely driving the observed allocations in 401(k) plans. In fact, the participation requirements set out in IRC Section 401 *require* a salary cap to be imposed (determined annually by the IRS) for eligible income deferred into the plan. Specifically, under IRC Section 401(a)-17(A), for a defined contribution plan to be "qualified" (receive preferential tax treatment), employees can contribute only up to a certain maximum dollar level, regardless of income. Over the sample years in this paper, no individual can contribute more than \$10,000 per year.¹⁰

2.2 Dataset and methodology

The paper uses a unique database of 11-k filings of stand-alone and conglomerate firms that I hand-collected from the SEC online database of company filings. Stand-alone firms and conglomerate firms are defined as those firms that report a single business segment and multiple business segments, respectively, which are determined using the COMPUSTAT Industrial Segment database. The segment reporting for my sample stems from Statement of Financial Accounting Standards No. 131, which requires firms to report material segment information disaggregated according to how management internally evaluates the operating performance of business units (Berger and Hann, 2002).

The main sample in the paper spans the years 1997–2000. I first gathered data on all firms reporting on the COMPUSTAT Industrial Segment database. I matched each stand-alone firm's COMPUSTAT listing with its SEC listing filed (e.g., the 2001 form filings cover the allocations and plan assets from the 2000 plan-year). This had to be done firm-by-firm, as there is no natural link variable between COMPUSTAT's listing and the SEC listing of a firm. For the conglomerate firm sample, because of the time-involved matching on a firm-by-firm basis, I chose a random subsample in order to try to match the empirical percentage of conglomerate to stand-alone firms. An important point is that for conglomerate firms, employee contribution is not one of the variables required to be separately reported for each segment, so conglomerate firms may file only

¹⁰ Additional sections of the Internal Revenue Code that deal with this issue are Sections 416(G)-1 and 410(b)-1. Both limit the participation in, and benefits of, the plan received by key employees and management.

a single 11-k for the entire firm.¹¹ I then omit 11-k forms filed for employee stock ownership plans, forms that were filed for joint ESOP-401(k) plans, and firms that began offering company stock as an option in the last quarter or last half of 2000.

The main variable of interest from the statements is the percentage of employee contributions in company stock. In form 11-k, firms are required to report the amount of plan assets in each investment option. In addition, in the 1997–1998 sample, firms also segregate yearly inflows into the amount going into each investment option.¹² For 1997–1998, I use this annual segregated data, and for 1999–2000, I estimate it. I have information on both plan assets and the proportion of plan assets in company stock for each firm for each year, so I use the following two simple measures to estimate discretionary contribution to company stock for 1999–2000.

When the employer match follows participant investment:

$$T = \frac{C}{P}. \quad (1)$$

When the employer match is in company stock:

$$T = \frac{C}{P}(1 + M) - M, \quad (2)$$

where T is the estimate of discretionary contribution percentage invested in company stock, C is the amount in company stock, P is total plan assets, and M is the annual percentage match by employer. Both measures incorporate the accumulation of past contributions and past returns in their calculation. The incorporation of past returns causes the second measure to give negative estimates of T for some firms. These firm estimates are omitted from the sample. To check the efficacy of this estimation, I use the same procedure on the 1997–1998 data. I then compare the estimates to the actual data for that sample period. I find that the correlation between estimates and actual is quite high, 0.81 for conglomerate firms and 0.92 for stand alones, lending support to the estimation procedure. In addition, although most of the results in the paper are reported for the entire pooled sample 1997–2000, all tests are also run for the 1997–1998 sample, and the results and conclusions remain the same. Another interesting aspect of the data is that employees' allocation percentage to company stock changes slowly over time (average correlation of about 0.90 from year to year). This could be due in part to slowly changing preferences, but also in part to an

¹¹ In a correspondence with the Public Reference Branch of the SEC, they relayed: "Regulation S-X Article 6A (applicable to employee stock purchase, savings, and similar plans) does not require contributions or assets of the plan to be segregated by contributing subsidiary or division."

¹² This was altered by Statement of Position 99-3, effective for all SEC 11-k filings, covering years of operation after, and including, 1999. Statement of Position 99-3 states that retirement plans no longer have to report annual inflow contributions (employee or employer) segregated by fund.

Table 1
Employer and employee summary statistics

	Conglomerate			Stand alone		
	Mean	Std. Dev.	Number of firms	Mean	Std. Dev.	Number of firms
Panel A: Employer characteristics						
Plan characteristics						
Plan assets	653.21	2,729.58	199	191.27	634.01	64
Company stock	222.06	1,407.76	199	44.94	109.71	64
Company stock/plan assets	17.30%	17.61%	199	20.60%	18.80%	64
Maximum total match	3.35%	1.75%	231	4.05%	2.68%	50
Match in company	32%			27%		
Company characteristics						
ME	13,602	51,242	219	4,069	7,484	52
B/M	0.6811	0.5354	216	0.7918	0.7975	52
1-year past return	0.08363	0.6899	215	0.3209	1.263	48
5-year past return	1.579	3.087	176	1.357	2.257	34
10-year past return	5.804	15.06	132	7.841	16.49	18
Panel B: Employee characteristics						
Annual contribution	3,718	1,312	25	2,978	1,357	29
Percent of income	7.9%	2.9%	199	8.2%	2.9%	50
Total contribution/plan assets	17.0%	52.1%	199	19.4%	18.0%	64
Active/total	79.8%	11.0%	21	81.9%	20.1%	26

Panel A is a summary of employer retirement plan and company characteristics for the sample year 1999. Plan assets is the aggregate of the current value of all participant accounts in the retirement plan, in millions of dollars. Company is an aggregate market value of employer stock aggregated across all firms. Average company stock/plan assets is the average over all firms of company stock as a percentage of plan assets. Maximum total match is the maximum annual contribution that employers will contribute to the retirement plan on behalf of participants, as a percentage of participant income. Match in company stock is the percentage of all firms in the given sample that match in company stock. ME is in millions of dollars. Panel B is a summary of employee characteristics. Data were collected on the number of plan participants (active and inactive) for a subset of firms using the Department of Labor's Form 5500 Tapes. The percent of income deferred by employees is estimated using (total company contribution/total employee contribution) for a given year and the maximum total match of a firm, and so is an upper bound of income contribution percentage by employees. The last two measures, total annual contribution/total plan assets and active participants/total participants, are both proxies for the number of years the retirement plan has been offered (plan age).

effect consistent with Samuelson and Zeckhauser (1988), in which employees forget to rebalance their portfolios (Madrian and Shea, 2001).

2.3 Employee and plan characteristics

Table 1, Panel A, contains firm and plan characteristics. As expected, conglomerate firms are, on average, larger firms with larger retirement plans, as both average ME and total plan assets are over three times larger than those for stand alones. One piece of information provided by the 11-k is the company matching percentage, usually given as a percentage of employee contributions. The most common company match in the sample was 50% of employee contributions on the first 6% of income that employees defer into the plan. I calculate maximum total match as the maximum (as a percentage of employee income) that the company will match if the employee contributes the maximum percentage of income (usually 16%) into the plan. This can be seen as

the benefit fully invested employees receive in the form of immediate return from the company match. For instance, in stand-alone firms, the 4% maximum total match represents about a 25% match to employee contributions (4/16), and so an average 25% immediate return to a fully invested employee. From the table, the percentage of firms that match in company stock (as opposed to following participant's investment choice) is similar across the type of firm (27% and 32% for stand-alone and conglomerate, respectively). The maximum total match is also uncorrelated with whether or not the company matches in company stock.¹³

Characteristics of employees of both types of firms are in Panel B of Table 1. I collect data on the number of plan participants (active and inactive) for a subset of firms using the Department of Labor's Form 5500 Tapes. The average annual contribution of employees to the retirement plans of both types of firms is around \$3,000. As a percentage of annual income, employees of conglomerate and stand-alone firms defer on average 7.9% and 8.2%, respectively.¹⁴ The ratio (total contribution/plan assets), which is the sum of total employee and employer contributions for a given year divided by total plan assets, and the ratio: active/total, the number of active participants divided by total participants, are both proxies for the age of the retirement plan. Both measures suggest that stand-alone and conglomerate firms have offered the sampled defined contribution plans to employees for roughly the same number of years.

3. Loyalty-Based Investment

I begin by testing allocations to 401(k) plans of stand-alone and conglomerate firm employees. Loyalty works in the opposite direction of portfolio diversification against labor income, setting up a test between the two. Loyalty predicts that employees of stand-alone firms will invest a larger percentage in company stock than employees of conglomerate firms. This is because stand-alone employees can invest directly in the division in which they work, while employees of conglomerate firms are forced to invest in all unrelated divisions of their respective firm through company stock. The portfolio diversification against labor-income prediction is that employees of conglomerate firms invest a larger percentage in company stock than employees of stand alones due to the coinsurance effect of unrelated divisions.

¹³ I calculated mean Total Company Matches separately for firms that do and do not match in company stock, and they were not significantly different.

¹⁴ The percentage of income deferred by employees is estimated using (total company contribution/total employee contribution) for a given year and the Maximum Total Match of a company. The percentage is thus an upper bound of income contribution percentage by employees.

Table 2
Determinants of employee allocation into company stock

Dependent variable: Percentage in company stock							
Stand alone	0.083*** (3.95)	0.101*** (4.14)	0.114*** (4.08)				
Segments				−0.015*** (−2.67)			
Emp Herfindahl					0.042** (2.22)		
Sales Herfindahl						0.081** (2.39)	
Cap ex Herfindahl							0.048* (1.86)
ln(ME)	0.021*** (3.97)	0.020*** (3.45)	0.024*** (3.92)	0.024*** (3.54)	0.022*** (3.62)	0.023*** (3.57)	0.022*** (3.39)
ln(B/M)	−0.036*** (−3.39)	−0.035*** (−3.15)	−0.035*** (−2.53)	−0.028** (−2.24)	−0.030** (−2.34)	−0.027** (−2.25)	−0.032*** (−2.74)
ln(Wages)	0.383 (0.67)	0.028 (0.05)		0.119 (0.18)	0.183 (0.27)	0.223 (0.34)	0.144 (0.21)
Com match	0.075*** (3.34)	0.074*** (3.17)	0.088*** (3.06)	0.080*** (3.17)	0.083*** (3.20)	0.080*** (3.12)	0.080*** (3.13)
ln(1+R3)		0.019** (2.11)	0.012 (0.73)	0.016* (1.66)	0.017* (1.79)	0.016* (1.69)	0.017* (1.80)
Year-fixed effects	Yes	Yes	No	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	828	699	259	697	697	697	697
Adj. R-squared	0.422	0.455	0.545	0.383	0.382	0.383	0.378

The dependent variable in the regressions is the percentage of employee discretionary contributions in company stock. The first independent variable of interest in the regressions is stand alone, a categorical variable indicating the firm type of stand alone or conglomerate. It is equal to 1 if the company is a stand-alone firm, and 0 if the company is a conglomerate. The second independent variable in the regressions is number of firm business segments as reported in the COMPUSTAT Segment database. The remainder of the diversification measures are firm Herfindahl indices based on the segment measures of employees, sales, and capital expenditures. These Herfindahl indices will be equal to 1 for stand-alone firms, and will approach 0 as firms become more diversified. Also included in the regressions are the firm characteristics of natural logarithm of market equity and book-to-market equity, ln(ME) and ln(B/M). The natural logarithm of a measure for wage is included, ln(Wages). Wages are measured as the mean seasonally adjusted real industry hourly wage (deflated to 1,982 dollars). Com match is a categorical variable equal to 1 if the company matches in company stock and 0 otherwise. Past returns of three years are included. The fourth column of the table is for the 2000 cross section only. Industry-fixed effects are at the 2-digit SIC code level. The sample period is 1997–2000, and year-fixed effects are also included where indicated. All regressions include an intercept (not reported). Standard errors are robust and clustered at the firm level. *t*-statistics calculated using the clustered standard errors are in parentheses.

*, **, *** denote significance at the 90%, 95%, and 99% levels, respectively.

3.1 Categorical variable

Before turning to a regression framework, it is useful to examine the allocations of stand-alone and conglomerate employees in a univariate framework. Over the entire sample 1997–2000 period, employees of stand-alone firms allocate 18.06% of discretionary contributions to own-company stock, while employees of conglomerate firms allocate only 12.47%. This difference of 5.59 percentage points is significant at the 1% level ($t = 4.39$). The regression results shown in Table 2 provide the ability to separate the effect of other company characteristics that may be correlated with being a stand-alone or conglomerate firm on contributions into company stock. The framework also makes it possible to more cleanly test loyalty against other explanations for employee contributions into own-company stock. The dependent variable in all regression models

is employee discretionary contributions into company stock as a percentage of total employee contributions. The main independent variable of interest is a categorical variable for stand-alone and conglomerate firms (*Stand Alone*). This variable takes a value of 1 for stand-alone firm plans, and a value of 0 for conglomerate firm retirement plans. The coefficient on this variable should measure the increase (decrease) in contributions of employees of a stand-alone firm relative to employees of a conglomerate firm, controlling for the other variables in the regression. Control variables for firm characteristics include the natural logarithms of market equity, book-to-market ratio, past returns, and wage.¹⁵ I use the three-year horizon for past returns because the median employee tenure of private workers over the sample period is 3.2 years (taken from the Department of Labor's Current Population Survey (supplemental questions)).¹⁶ I also include an employer matching contribution-type indicator. This categorical variable, *Com Match*, is equal to 1 when the company has a policy to make matching contributions strictly into company stock, and 0 when the company match mimics the participant's investment choice. This may capture an endorsement effect (Benartzi, 2001), in that the employees may view the employer match as implicit investment advice. However, if the employees have an optimal amount of company stock exposure they plan to take, we should see employees investing less of their own discretionary contributions in company stock when the company match is already forced into this investment choice.¹⁷

Loyalty predicts a positive coefficient on a stand-alone firm, while portfolio diversification predicts a negative coefficient. From Table 2, in all models the coefficient is positive and significant, with standard errors clustered at the firm level to account for within-firm correlation over time. From the first specification, employees of stand-alone firms invest over 8 percentage points more ($t = 3.95$) in company stock than employees of conglomerates, after controlling for firm and plan characteristics and including year- and industry-fixed effects. Controlling for past returns, the difference widens to 10 percentage points and remains highly significant ($t = 4.14$). The 10-percentage-point increase in the second column represents more than a 75% increase in allocation to company stock for employees of stand-alone firms relative to the average conglomerate employee. Thus, the effect of loyalty seems to have a substantial impact on employee investment behavior. Another consistently significant independent variable is firm size. I provide evidence later in Section 3 that size is proxying for the employee's extent of outside exposure to the firm (as better

¹⁵ Wage is measured as the average of seasonally adjusted real industry wage of the firm's industry (deflated to 1,983 dollars) over the past 10-year period. These data were taken from the Current Employment Statistics of the Bureau of Labor Statistics. A company's industry was defined by its SIC code, and companies were assigned to one of the eight industries.

¹⁶ The main results are not sensitive to return horizon; I examine various horizons in Section 4.

¹⁷ Additional firm characteristics of beta and standard deviation of past returns were included in the regressions (12-, 24-, 36-month horizons), along with nonlinearities in ME (squared and cubed) in addition to the log specification, as stand alone might simply be capturing the effect of a nonlinearity in ME. Beta, standard deviation, and the nonlinearities in ME are not significant, and do not affect the impact of stand alone.

captured by advertising expenditures). Consistent with the endorsement effect and in contrast to employees' choice of a fixed optimal level of company stock exposure, employees increase the amount invested in company stock by about 7 percentage points when employers already match in it. Plan characteristics in addition to company match are examined in Section 4.

The third column of Table 2 looks only at one cross section, 2000. This abstracts from the result being driven by within-firm dependence across time. The results are almost identical to those in the second column (same specification, but for the full sample with year-fixed effects). The point estimate of the conditional loyalty effect is 11.4 percentage points with similar significance ($t = 4.08$), even considering the sample is one-third that of the entire sample.¹⁸

3.2 Herfindahl indices

A potential problem with the stand-alone categorical variable is that the measure may be too coarse a measure of firm diversification, and so may be misclassifying firms. Consider a firm that has two segments: one that makes up 90% of assets and income, and the other that makes up 10%. This might be classified as a conglomerate firm under the *Stand Alone* variable, but the bulk of the employees (those in the 90% segment) might be expected to act like stand-alone employees. An illustration of this in the sample is the investment pattern of Sara Lee employees: Sara Lee Corp., a food goods manufacturer, owns the relatively smaller apparel company, Hanes. The employees of Sara Lee Foods allocate, on average, three times the percentage of the Hanes employees into Sara Lee company stock. So, even though Sara Lee Corp. is a conglomerate firm, employee contributions of the larger Sara Lee Foods division will drive the overall investment by employees into company stock, making employee investment look more like a stand-alone than a conglomerate.

This highlights the need for a more continuous measure of firm diversification. I construct two different measures of firm diversification. The first measure is the number of segments, where segment number proxies for increasing diversification of the firm. Loyalty predicts that the coefficient on this variable should be negative: as the number of segments increases, the amount invested by employees in company stock should decrease. The second measure consists of Herfindahl indices of diversification within the firm. The COMPUSTAT Segment database reports data on capital expenditures, sales, and employees stratified by segment within a firm. I use each of the variables to create Herfindahl indices, with an example of the Herfindahl index for sales ($H_i(\text{sales})$), as

¹⁸ The wages are not included here, as the model is estimated with industry-fixed effects. The wage measure is estimated using Bureau of Labor Statistics data on industry wages. Thus their identification, with the inclusion of industry-fixed effects, comes from time-series variation between industries. As this is only one cross section, they are not identified separately.

follows:

$$H_i(\text{sales}) = \sum_{j=1}^{seg_i} \left(\frac{\text{sales}_j}{\sum_{k=1}^{seg_i} \text{sales}_k} \right)^2. \quad (3)$$

For stand-alone firms, the Herfindahl index is equal to 1 by definition. As the firm's value becomes more dispersed across the segments, the index will get closer to 0. Thus, the more dispersed a firm is, the lower its Herfindahl index value. The loyalty prediction is then a positive coefficient on the indices, as a larger index represents a firm closer to a stand alone. Portfolio diversification against labor income predicts a negative coefficient, as a smaller index represents increased coinsurance by other segments, so a greater motive to invest in company stock. The results of the regressions are in Table 2. The negative and significant coefficient on segments in the fourth column is consistent with the loyalty prediction. The -0.015 coefficient means that the average employee of a conglomerate with six segments will invest 6 percentage points less in company stock than the average employee of a two-segment conglomerate. The coefficients of the Herfindahl indices are all positive and significant, also supporting the loyalty prediction. The coefficient of 0.081 on Sales Herfindahl ($t = 2.39$) translates into the average employee of a stand-alone firm investing 6 percentage points more in company stock than the average employee of a conglomerate firm with five segments, all with equal sales. These continuous measures of diversification provide further evidence consistent with the predictions of loyalty-based investment.

3.3 Direct tests: Spin-offs and mergers

3.3.1 Spin-offs. The spin-off of a segment or subsidiary gives a cleaner experiment for testing loyalty's prediction on investment behavior. It provides a more direct test of the prediction and supporting results of Table 2, in that presumably the same employees can be followed from conglomerate to stand alone. Although the choice of whether to spin off is endogenous, this framework allows me to orthogonalize against systematic differences in employees, as I am following (presumably) the same employees across firm type. If employees in a conglomerate increase their percentage invested in company stock when their segment is spun off into a stand-alone firm, this would provide cleaner evidence for loyalty. If the employees decrease investment when spun off into a stand-alone firm, as labor income and company stock may be more closely tied to the same source of variation, this would provide cleaner evidence for portfolio diversification against labor income.

I match a database of spin-offs from 1993 to 2002 to my sample of stand-alone and conglomerate firms. The cases where both parent firm and spun-off firm match my database are presented in Panel A of Table 3. Consistent with the predictions of loyalty, employees do, on average, increase the percentage held in company stock upon being spun off into a stand-alone firm. In fact,

Table 3
Effect of spin-offs and mergers on employee contributions

Spin-off year	Spin-off	PercCS	Parent	PercCS	Perc. inc. (Dec.) After spin-off
Panel A: Spin-offs					
1993	Albemarle	0.261	Ethyl Corp	0.165	57.94%
1995	Cap. One Fin.	0.359	Signet Bank. Corp.	0.234	53.05%
2000	Edwards Life.	0.171	Baxter Int.	0.150	14.16%
2000	Moodys	0.056	Dun and Bradstreet	0.047	20.30%
1998	R.H. Don.	0.098	Dun and Bradstreet	0.086	13.42%
1992	El Paso Nat. Gas	0.124	Burl. Res.	0.253	-50.87%
1992	Control Data	0.006	Ceridian Corp.	0.055	-89.86%
1999	Nabisco Group	0.045	RJ Reynolds	0.026	73.55%
1997	Getty Pet. Mktg.	0.092	Getty Pet.	0.028	225.60%
2001	Acuity Brands	0.079	Nat. Serv. Ind.	0.034	129.05%
					Average inc. 44.63%
Panel B: Mergers					
Merger year	Target	PercCS	Acquirer	PercCS	Perc. inc. (Dec.) After merger
1996	Amer. Cyan. Co.	0.316	Amer. Home Pr.	0.268	-15.24%
2000	ITI	0.253	Interlogix	0.027	-89.15%
2002	Interlogix	0.046	General Electric	0.056	21.86%
1998	Atl. Energy, Inc.	0.003	Connectiv	0.001	-63.22%
1997	Allwaste	0.202	Philip Serv.	0.165	-18.48%
1999	Allegiance	0.290	Card. Health, Inc.	0.240	-17.12%
2001	Bindley West. Ind.	0.274	Cardinal Healthcare	0.264	-3.65%
2003	Syncor	0.665	Cardinal Healthcare	0.539	-18.92%
2002	Moore N. Amer., Inc.	0.154	Moore-Wallace Inc.	0.135	-12.40%
1999	Aero.-Vickers, Inc.	0.060	Eaton	0.014	-76.90%
1998	Echlin, Inc.	0.135	Dana Corp.	0.101	-25.18%
2001	Galileo Int., Inc.	0.017	Cendant Corp.	0.026	57.43%
1993	Ass. First Cap. Par.	0.065	Ford	0.004	-94.34%
1996	Harley Dav. H.R.	0.356	Monaco Coach Corp.	0.004	-98.77%
2002	Compag	0.142	Hewlett-Packard	0.117	-17.20%
1999	Nielsen Med. Res.	0.117	Moore Corp. Limited	0.007	-94.45%
1997	BDM Int., Inc.	0.058	TRW, Inc.	0.010	-83.37%
2002	Immunex Corp.	0.137	Amgen, Inc.	0.118	-13.56%
1995	SciMed Life Sys., Inc.	0.230	Boston Sci. Corp.	0.292	26.83%
1999	Halter Mar. Gr.	0.076	Friede Gold. Hal., Inc.	0.052	-32.10%
1999	Friede Gold. Int., Inc.	0.045	Friede Gold. Hal., Inc.	0.040	-11.08%
1999	Mot. Coils Man. Co.	0.127	WAB Tech., Inc.	0.055	-56.37%
1999	MotivePower, Inc.	0.344	WAB Tech., Inc.	0.187	-45.65%
2000	Conn. Energy	0.472	Energy East	0.226	-52.12%
2000	Conn. Energy	0.322	Energy East	0.082	-74.53%
					Average inc. -36.31%

Panel A shows the effects of a spin-off on the percentage invested in own-company stock (PercCS) by employees. PercCS for the parent firm is calculated using the ending year balances from form 11-k for the year prior to the spin-off. PercCS for the spun-off firm is calculated using the 11-k ending year balance from the year of spin-off, and dependent on the number of months included in the initial spin-off year, also using the year following the spin-off. The spin-off data were provided by Spin-off Advisors, LLC. Panel B shows the effects of a merger on the percentage invested in own-company stock (PercCS) by employees. PercCS for the target firm in the premerger year is calculated using the ending year balances from form 11-k for the year of the merger, and depending on the number of months included in the merger year, the prior year. PercCS in the postmerger firm is calculated using the 11-k ending year balance from the same retirement plan now operated by the parent, and dependent on the number of months included in the merger year, using the year following the merger. The merger data were collected from the SDC Platinum database of financial transactions.

the increase is substantial, with the average employee increasing percentage invested in company stock by about 45% of their former allocation percentage.

3.3.2 Mergers. The merger of two firms (or acquisition of one firm by another) gives the opposite experiment of a spin-off. Although one might expect more turnover of the acquired firm employees around mergers, as long as a reasonable percentage of the prior employees stay on, the experiment will still capture some extent of within-employee shifts in preferences. As with a spin-off, the choice of acquiring a firm or being acquired is endogenous, although the reaction through employee investment can still be followed pre- and postmerger. In the case of a merger, the prediction of loyalty is opposite to that for a spin-off: the same employee should decrease investment in the newly merged parent company, as compared to the investment in company stock in the premerger firm.

I collect data on all mergers from 1990 to 2003 using the SDC, Platinum database of Thomson Financial Services. I match these data to only those cases where both pre- and postmerger firm are in my sample for the years 1993–2003. From these matches, I require that the employee group's allocation decisions be identifiable both before and after the merger. Oftentimes when one firm acquires another, the acquiring firm immediately merges the target firm's retirement plan into the existing retirement plan of the acquirer. In these cases, the target employees' investment decisions are not observable after the merger. To ensure that I am tracking as closely as possible the same employees' decisions over time, I exclude these cases. My sample includes only those mergers in which the target firm's 401(k) plan remained as a distinct plan postmerger. The sample is in Panel B of Table 3. Consistent with the predictions of loyalty, merged employees do act in an opposite way, on average, to spun-off employees. Following the merger and the switch to acquirer company stock, they decrease the amount invested in the company. The decrease is large, and quite similar in magnitude to the increase of spun-off employees, with merged employees decreasing their percentage investment in company stock by more than 36% following the merger.

I also look at the change in allocations of spun-off and merged employees in a multifactor setting. I control for time-fixed effects, industry-fixed effects, change in number of investment options, and returns to employees before and after the firm event. Comparing the two firm events, the evidence is consistent with the prediction of loyalty on employee investment choice, and the univariate results. Target employees involved in mergers significantly decrease the amount invested in company stock following a merger by 71% of the former percentage allocation ($t = 5.90$), while spun-off employees increase the amount invested in company stock by 42% of the former allocation percentage following a spin-off ($t = 1.81$).

3.4 Alternative measures of loyalty

A potential problem with the stand-alone and Herfindahl measures of loyalty is that they are correlated with other firm and managerial characteristics. Although I attempt to control for aspects of these, they still may be clouding the effect of loyalty on portfolio choice. I thus use a number of alternative measures of loyalty to establish additional evidence of loyalty-based portfolio choice.

3.4.1 100 best companies to work for. *Fortune* magazine publishes an annual ranking of the 100 Best Companies to Work For. Its ranking is based on two sources: (i) *Fortune's* independent analysis and (ii) employee perceptions, with the majority (two-thirds) coming from employee perceptions. Employee perceptions are taken from surveys designed to measure the pride, trust, and camaraderie employees feel in a work environment.¹⁹ These employee feelings toward the firm may be a company loyalty metric with less measurement error than the stand-alone–conglomerate measure. I collect the data from these rankings and match them to the sample of firms each year. From this match, I create Best Company, a categorical variable equal to 1 if the company made the *Fortune* list in that year, and 0 otherwise. Firms that have employees who are more loyal to (or have more pride in) their company should be willing to invest more into company stock. The regression results are in the first column of Table 4. Consistent with the prediction of loyalty, Best Company employees invest 12.0 percentage points ($t = 2.08$) more in company stock than employees of firms not on the list. This regression controls for other firm and plan characteristics, including whether the firm is a stand alone or a conglomerate.

The results in Table 4 not only support the notion of loyalty-based investing, but also provide evidence against the notion that familiarity is driving the observed employee allocations. More specifically, the stand-alone variable used in my main analysis may be capturing some bit of familiarity along with loyalty. Alternatively, Best Company encompasses a measure of pride and trust within a firm that should correlate to, and perhaps be measuring, employees' loyalty while not clearly being correlated with perceived information. Therefore, familiarity does not have a clear prediction on the variable while loyalty does. The magnitude and significance of the Best Company variable thus provides initial differentiating evidence of loyalty driving allocations, to which I return in Section 4.

3.4.2 Advertising. From the evidence in the social psychology literature (detailed in Section 1), one way for firms to generate more loyal employees is to increase employees' contact with the firm. A method by which firms can do this is to increase what I call employees' outside or external exposure to the firm. Firms can do this by increasing the amount of advertising of the firm.

¹⁹ The surveys are conducted by an independent entity, the Great Place To Work Institute, Inc.

Table 4
Alternative loyalty measures: Best companies, advertising, union membership, transient workers, and CEO tenure

Dependent variable: Percentage in company stock						
Stand alone	0.067*** (2.73)	0.102** (2.41)	0.067*** (2.69)	0.070*** (2.83)	0.091*** (2.66)	0.150*** (3.33)
ln(ME)	0.012** (2.26)	-0.019 (-1.42)	0.017*** (3.05)	0.016*** (2.92)	0.020** (2.24)	0.018** (2.02)
ln(B/M)	-0.035*** (-3.21)	-0.104*** (-4.04)	-0.034*** (-2.99)	-0.033*** (-2.89)	-0.040*** (-2.95)	-0.060*** (-3.91)
ln(Wages)	-0.041 (-0.53)	0.258*** (2.78)	-0.010 (-0.13)	-0.027 (-0.33)	-0.171* (-1.74)	-0.257*** (-3.35)
Com match	0.084*** (3.28)	0.106** (2.59)	0.083*** (3.30)	0.082*** (3.19)	0.060** (2.22)	0.022 (0.82)
ln(Past3Ret)	0.021** (1.99)	-0.003 (-0.20)	0.020* (1.92)	0.021* (1.94)	0.020 (1.47)	0.014 (1.19)
ln(Fut3Ret)					-0.024** (-1.99)	-0.038** (-2.42)
Best company	0.120** (2.08)					
ln(Advertising)		0.034** (2.61)				
Union			-0.056** (-2.19)			
Transient				-0.056*** (-3.11)		
CEO tenure					0.003** (2.13)	
Company tenure						0.003*** (2.63)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	699	163	699	699	448	292
Adj. R-squared	0.335	0.563	0.329	0.325	0.360	0.505

The dependent variable in the regressions is the percentage of employee discretionary contributions in company stock. The independent variables of interest are top company, advertising, union, transient, CEO tenure, and company tenure. Best company is a categorical variable equal to 1 if the firm was on the list of *Fortune* 100 Best Companies to Work For in that year, and 0 otherwise. ln(Advertising) is the natural logarithm of advertising expense of the firm (in thousands of dollars). Union is a categorical variable equal to 1 for plans covering solely union workers, and 0 for all other plans. Transient is a categorical variable equal to 1 for plans covering solely hourly workers, and 0 for all other plans. CEO tenure is a measure of the number of years the current CEO has been in office. Company tenure is a measure of the number of years the current CEO has been with the company. ln(Past3Ret) and ln(Fut3Ret) are the natural logarithm of the past 3-year and future 3-year returns. The remaining independent variables are defined as in Table 2. The sample period is 1997–2000, and both year-fixed effects and industry-fixed effects at the 1-digit SIC code level are included in all regressions. All regressions include an intercept (not reported). Standard errors are robust and clustered at the firm level. *t*-statistics calculated using the clustered standard errors are in parentheses.

*, **, *** denote significance at the 90%, 95%, and 99% levels, respectively.

It is true that advertising will be correlated with firm size, as large firms advertise more heavily. However, if external exposure is driving employee allocations, firm size may simply be a proxy for this effect. Thus, the consistent significance of size in the regressions of employee company stock allocations may reflect the strength of this external exposure.

The variable ln(Advertising) is the natural log of advertising expenditures by the firm (in thousands of dollars). The prediction of loyalty is that the coefficient on this variable should be positive. As external contact of employees with the firm increases, loyalty increases, causing an increase in percentage

invested in company stock. Also, if firm size is merely proxying for external exposure, when the more direct measure of advertising is included, it should drive out the effect of size on employee contributions into company stock. The second column of Table 4 contains this regression's results. Controlling for firm characteristics (including level of firm diversification), increased advertising significantly increases employee investment in company stock. A two-standard-deviation increase in advertising expenditures results in more than an 8-percentage-point increase in company stock allocations. This supports the prediction of external exposure's effect on loyalty. In addition, advertising drives out the effect of size, which was consistently significant in all previous regressions.²⁰ This lends credence to the hypothesis that size may be merely proxying for external exposure to the firm.

3.4.3 Union investing. One reason that unions develop is to create a forum to collectively present problems and discrepancies to the company. Union members may therefore, by self-selection, be those employees less tied to the firm. As well, one way that a union gains power is through its ability to collectively bargain, which hinges on its ability to make credible statements about the actions of its members. This ability is jeopardized when the members of the union are too loyal to the firm, as the members may be reluctant to take actions against the firm because of their loyalty. From self-selection and this collective bargaining effect, it may then be predicted that union members are less loyal to the firm than nonunion members, and so loyalty would predict union employees invest less than nonunion employees in company stock.

The risk-diversification prediction of union employee investment may be the opposite. Most unions provide a number of services to their members, including job search assistance in times of unemployment, and even in some cases direct payments during unemployed periods. As these benefits are specific to union members, the labor income of union members would be somewhat insured by the union. This would cause their labor income stream to be less correlated with the company than nonunion employees, and so they might be expected to invest a larger percentage in company stock than nonunion members.

The familiarity prediction may also be different than that of loyalty. Under the assumption that, given a certain job, union members work the same hours as nonunion members, both sets of employees have equal exposure to the firm.²¹ With equal exposure to the firm, it is reasonable that union and nonunion members have the same level of perceived information about the firm. Familiarity then may predict that union membership should not have an effect on employee investment into own-company stock.

²⁰ Both the ability of advertising to drive out size and advertising's statistical significance are robust to specifications, suggesting that multicollinearity is not driving this result.

²¹ In the regressions, I control for both industry and wage and so have a rough control for type of job.

There are unions that bargain separately for retirement plans, and these plans are filed separately under autonomous 11-k filings by the company. The union plans have roughly equivalent features as the nonunion plans of the firm, including matching percentage and company match type (whether or not in company stock). In most cases, the union plans are outsourced through the same plan custodian, and so the investment options are also identical. I define the categorical variable *Union* to take a value of 1 for solely union plans, and 0 for all other plans. The predictions of the three explanations above on this coefficient are: loyalty, a negative coefficient, risk diversification, a positive coefficient, and familiarity, a zero value. The regression results are in the third column of Table 4. Controlling for other characteristics (including other sources of loyalty), union members do invest significantly less (nearly 6 percentage points less) than nonunion members in company stock. This evidence supports the loyalty prediction, and contrasts the other two.

3.4.4 Transient investing. In addition to filing separate plans for collectively bargaining employees, some firms also file separate plans solely covering hourly workers of the firm. This segregation of employees makes it possible to test the difference in investment patterns between hourly and salaried workers. Hourly workers are often those whose human capital is less specific, and whose labor income is less tied to the firm (e.g., clerical workers). From a risk-diversification framework, it is exactly these workers who should be most willing to invest in company stock. However, these are also the employees who are expected to be the most transient, and therefore have, on average, the least contact with the firm. The prediction of loyalty is then opposite to that of the risk-diversification framework. As these more transient employees have likely developed a weaker tie to the firm, they should be less loyal. So, they should invest a smaller percentage in company stock than salaried employees.

The plans covering only hourly workers (filed on autonomous 11-k filings by the firm) have roughly equivalent features as the other firm plans. I define the categorical variable, *Transient*, to take a value of 1 for plans solely covering hourly workers, and 0 for all other plans. The regression results are in the fourth column of Table 4. In support of loyalty's prediction on employee behavior, hourly workers invest significantly less than salaried workers. These transient workers invest, on average, about 6 percentage points less in company stock than salaried workers.

3.4.5 CEO tenure. When a firm's structure, hierarchy, and management stay constant over a long period of time, this allows employees a longer time over which to build loyalty to the company. To measure this effect, I use the tenure of the CEO in this position (*CEO Tenure*), and the CEO's tenure with the company (*Company Tenure*), to proxy for length of time over which the firm has been

under one stable regime.²² Long CEO tenures (and CEO tenures within the company) can also signal CEO loyalty,²³ which may lead other employees to be loyal as well. Thus, loyalty would predict that as employees of firms with a longer history of a stable regime have had more time to grow a tie to it, these employees should invest more in company stock. The regressions are in the last two columns of Table 4, and are run controlling for future returns in addition to past returns to capture forecast ability of employees about CEO performance. In support of loyalty's prediction, controlling for other characteristics, an increase in CEO tenure in office (and also tenure in the firm) has a significant effect on the amount employees invest in company stock. A two-standard-deviation increase in the tenure of the CEO increases the amount invested in company stock by 4 percentage points.

4. Alternative Explanations

4.1 Information-based explanations

4.1.1 Superior information hypothesis. The information-based explanation of employee investment in company stock is that employees have superior positive information about their company relative to other investors, and so are willing to purchase a large percentage of their company stock. One issue with this explanation is that possessing true superior information about their employing companies implies that employees should be willing to trade on this information, both buying and selling. The data from Section 3 imply instead that employees routinely direct a large percentage of discretionary contributions into buying company stock. Unless all the companies are consistently performing well, this would not be consistent with an information-based explanation. I use two measures to test this superior information effect on allocations. The first is a test of the predictive power of employee allocations for future returns. The second is a more direct test of the trading implication of information on allocations, using the variance of allocations to company stock. In both tests, I split between stand-alone and conglomerate firms to test whether there are differences between the superior information of employees in both types of firms.

The first test is that of employees' ability to predict future returns, conditional on other firm and plan characteristics. For this hypothesis to explain the stand-alone–conglomerate differing investment, stand-alone employees' allocations should have a superior ability in predicting future returns relative to conglomerate employees' allocations. The results of the regressions are reported in columns 1–3 of Table 5. The dependent variables in the regressions

²² The data on CEO characteristics are obtained from the COMPUSTAT Execucomp database.

²³ This is a noisy signal, as CEO tenure is likely correlated with past performance. I therefore control for past performance in these tests.

Table 5
Superior information, familiarity, and excessive extrapolation

Dependent variable	FutRet-1	FutRet-3	FutRet-5	% in company stock		% in company stock		
Stand alone	0.106 (0.84)	0.376*** (2.85)	0.945*** (3.17)		0.100*** (4.01)	0.093*** (4.17)	0.124*** (4.42)	0.110*** (2.97)
ln(ME)	0.031* (1.93)	0.009 (0.32)	0.174*** (3.35)	0.018*** (3.03)	0.019*** (3.20)	0.019*** (3.50)	0.021*** (3.26)	0.022*** (2.83)
ln(B/M)	0.020 (0.38)	0.030 (0.34)	0.090 (0.46)	-0.038*** (3.31)	-0.036*** (3.17)	-0.042*** (3.63)	-0.032** (2.47)	-0.023 (1.48)
ln(Wages)	6.606** (2.11)	14.983*** (3.53)	3.221 (0.47)	0.098 (0.17)	0.053 (0.10)	0.186 (0.31)	0.219 (0.30)	0.701 (0.60)
Com match	0.035 (0.70)	0.136 (1.38)	0.143 (1.11)	0.080*** (3.23)	0.069*** (2.99)	0.073*** (3.16)	0.069*** (2.77)	0.078*** (2.73)
ln(1+R3)	-0.086** (2.04)	-0.160*** (2.60)	-0.325*** (2.75)	0.014 (1.47)	0.016* (1.68)			
(ComStock%)	-0.090 (0.49)	-0.418 (0.98)	0.410 (0.59)					
(ComStock%)*(Stand alone)	-0.248 (0.74)	-0.649 (1.10)	-2.704* (1.86)					
Domestic exposure				0.025 (0.54)	0.042 (0.96)			
ln(1+R1)						-0.001 (0.13)		
ln(1+R5)							0.024** (2.31)	
ln(1+R10)								0.039*** (3.48)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	699	660	204	655	655	782	613	426
Adj. R-squared	0.020	0.096	0.177	0.285	0.319	0.317	0.335	0.441

The dependent variable in the first three columns is the future 1-year (FutRet-1), 3-year (FutRet-3), and 5-year returns (FutRet-5) of company stock, respectively. The dependent variable in columns 4–8 is the percentage of employee discretionary contributions in company stock. The independent variable ComStock% is the percentage of employee discretionary contributions in company stock. Stand alone is a categorical variable equal to 1 for the firm type of stand-alone and 0 for a conglomerate. The term (ComStock%)*(Stand alone) is the interaction between the percentage invested in company stock and firm type. Geographic familiarity is measured by Domestic Exposure. Domestic exposure is constructed as the ratio of sales in domestic segments to total sales by all geographic segments. Also included in the regressions are the firm characteristics of natural logarithm of market equity and book-to-market equity, ln(ME) and ln(B/M). The natural logarithm of a measure for wage is included, ln(Wages). Wages are measured as the mean seasonally adjusted real industry hourly wage (deflated to 1,982 dollars). Com match is a categorical variable equal to 1 if the company matches in company stock and 0 otherwise. 1-, 3-, 5-, and 10-year past returns are also included where indicated. Year-fixed effects and industry-fixed effects at the 2-digit SIC code level are included. All regressions include an intercept (not reported). Standard errors are robust and clustered at the firm level. *t*-statistics calculated using the clustered standard errors are in parentheses.

*, **, *** denote significance at the 90%, 95%, and 99% levels, respectively.

are one-, three-, and five-year cumulative future returns. The level of employees' discretionary contributions (Com Stock%) has no predictive power for future returns of any horizon considered. The point estimate is even slightly negative in some specifications. This lack of predictive ability is consistent with both Benartzi (2001) and Huberman and Sengmuller (2004). The interaction term (Com Stock%)*(Stand Alone) measures the increase in the ability of employees of stand-alone firms to predict and trade on future returns relative to employees of conglomerates. From Table 5, stand-alone employees have no increased ability relative to conglomerates' in forecasting and trading at any horizon. None of the interaction terms is reliably greater than 0, with the point estimates even negative.

The second test is using the variance of company stock allocations. This better addresses the implication of the superior information hypothesis that employees should be willing to trade more on this positive and negative superior information, both buying and selling company stock.²⁴ It also brings up the alternative explanation of perceived information. Perhaps employees do not truly have superior information about their firm, but believe that they do. In this case, they will be willing to trade (although incorrectly) on this level of perceived information.²⁵ Perceived information has an implication of no predictability of future returns, consistent with the results in Panel A of Table 5. However, it has the same implication as superior information for the second moment of allocations. If employees of stand-alone firms have either a higher level of superior information or perceived information relative to conglomerate employees, this should show up in the second moments of allocations. To test this, I examine the coefficient of variation (standard deviation/mean) of allocations for employees of stand-alone firms relative to employees of conglomerates. I use this measure to scale the standard deviation, as from Section 3 the two types of firms have different mean levels of allocations. Coefficients of variation are calculated at the plan level over the sample (requiring at least two plan years of data). A note in the interpretation of these results is that these allocations are aggregate plan allocations at a yearly frequency. Ideally, I would like to have individual account data at a much higher frequency.

I find that stand-alone employees have an average coefficient of variation of 0.395, while conglomerate employees' coefficient of variation is 0.522, with the 0.127 significant difference ($t = 1.98$). Thus, in contrast to either a superior information or a perceived information explanation, stand-alone employees do not have higher coefficients of variation, but instead have significantly lower

²⁴ Short selling is not allowed in these plans, and thus the lowest allocation percentage is 0. This may induce a bias in the forecast relating to negative information. There are, however, very few 0 allocations in the sample, and test results are the same when these are excluded.

²⁵ Besides perceived information, there have been surveys that assess employees' perceptions of the risk of company stock in their 401(k) plans (John Hancock Financial Services, 2002). In addition, other papers explore alternative factors that could affect company stock investment including ambiguity (Boyle et al., 2004), community effects (DeMarco et al., 2004), and education (Choi et al., 2005).

coefficients of variation than do employees of conglomerate firms. Stand-alone employees therefore not only hold more company stock, but also seem to trade in and out of it less than conglomerate employees (relative to the mean holdings).

4.1.2 Geographic familiarity. The type of familiarity on which I focus in this section is geographic familiarity. There is evidence that geographic proximity can influence portfolio choice (Huberman, 2001). The hypothesis is that the closer in physical proximity individuals are to a firm, the greater their perceived information, and so the more they invest in the firm. To test the effect of geographic familiarity, I construct a measure of geographic concentration of firms, Domestic Exposure, defined as the ratio of domestic sales (provided in the COMPUSTAT Geographic Segment database) to total sales. I then run regressions including the *Stand Alone* variable along with this geographic exposure measure. As I control for level of firm diversification, this measure attempts to capture the degree to which the employee is more familiar with other company activities in a way not related to diversification. The hypothesis is that the employees will be more familiar with the firm's operations if they are concentrated in the local market. In contrast, the level of employee loyalty to other divisions of the company is not dependent on the geographic distance between divisions (the employee forms loyalty to his division). The prediction of familiarity is then that the coefficient on Domestic Exposure should be positive and significant, while loyalty predicts that there should be no effect of geographic dispersion after controlling for firm diversification. The fourth and fifth columns of Table 5 show that the measure of Domestic Exposure is not different from zero in either specification. As well, this familiarity measure does not affect the magnitude or significance of firm diversification on employees' allocation decision.²⁶

4.2 Excessive extrapolation

It may be the case that employees use past returns to determine future allocations. Specifically, they may use the representativeness heuristic (Kahneman and Tversky, 1972), so that they excessively extrapolate past returns into predicted future performance. Benartzi (2001) finds that in a sample of S&P 500 firms, differences in past returns help to explain varying allocations across firms. Thus, it could be that differing allocations of stand-alone and conglomerate employees are driven by cross-sectional differences in past returns of the firms. To test this, I include the logarithm of buy-and-hold past returns for each firm, over a number of time horizons. The results are presented in Table 5. Although the effect of extrapolation increases with return period (in line with

²⁶ The caveat of this measure is that ideally, segment-level ZIP Code information would be obtained to run the test more directly. As these data are not available, except for the data on country of segment, I create the coarser country-level measure. There is, however, much evidence that cross-country variation has a large effect on investment patterns (French and Poterba, 1991).

Benartzi, 2001), excessive extrapolation cannot explain the differing allocation decisions between stand-alone and conglomerate employees. As predicted by loyalty, regardless of controlled return horizon, employees of stand alones invest significantly more in company stock than employees of conglomerates. Further, past returns do not have a large effect on the magnitude or significance of *Stand Alone*.²⁷

4.3 Managerial incentives

In this section, I examine the possibility that the firm or management may induce employees to hold company stock. It either may have incentives to do so, as a defense mechanism against takeovers (Brown, Liang, and Weisbenner, 2006; and Rauh, 2006), or as a source of cheaper compensation in the face of cash constraints (Liang and Weisbenner, 2002). Further, if this incentive is correlated with being a stand-alone or a conglomerate firm, it may be driving the results of Section 3. I test for this in two ways. First, I examine to what extent discretionary plan characteristics are driving employees' contributions. These plan characteristics may be unrelated to managerial incentives. However, they are characteristics that the firm can choose, and so are potential tools to manipulate employee investment. Second, I examine the extent to which characteristics affecting the probability of being taken over drive company stock allocations.

4.3.1 Plan characteristics. In this section, I explore whether plan characteristics over which management has discretion are driving the results I find. Research shows that plan characteristics can affect employee investment choice (Benartzi and Thaler, 2001; Liang and Weisbenner, 2002; Choi et al., 2004; and Huberman and Jiang, 2006). I collect data from the 11-k filings for each plan year in the sample that data was available on the following plan characteristics: number of investment options in the plan, number of equity options, number of equity-only options, trustee of the plan, and position of company stock in the list of options.²⁸ I test the effect that each of the characteristics has on employee investment into company stock, and whether it can explain the stand-alone–conglomerate differences in investment. The first four columns of Table 6 show, consistent with Benartzi and Thaler (2001), that the number of investment options affects employee choice, while the fifth and sixth columns suggest that even the placement of company stock in the menu of investment choices can have a large and significant impact on employee allocations to the company. Another plan characteristic I examine is the trustee of the plan. The

²⁷ In addition, all of the alternative loyalty measures of Table 4 persist, controlling for past returns of the varying horizons and controlling for *Domestic Exposure*.

²⁸ An important note is that the last characteristic is obtained from the 11-k filing and not from the plan document that is sent to employees. However, in looking through a sample of the plan documents that are sent to employees, both the order and the descriptions in the 11-k filing are excerpted from the plan document (with the descriptions often shortened in the 11-k).

Table 6
Plan characteristics and managerial incentives

Dependent variable: Percentage in company stock							
Stand alone	0.110*** (2.64)	0.114*** (2.89)	0.100** (2.50)	0.115*** (2.82)	0.077** (2.51)	0.072** (2.34)	0.115*** (2.96)
ln(ME)	0.033*** (3.85)	0.036*** (4.43)	0.031*** (3.77)	0.034*** (4.13)	0.028*** (2.86)	0.027*** (2.70)	0.029** (2.51)
ln(B/M)	-0.009 (-0.60)	-0.007 (-0.49)	-0.012 (-0.81)	-0.008 (-0.54)	-0.033** (-2.01)	-0.032* (-1.84)	-0.034 (-1.45)
Com match	0.054** (1.98)	0.063** (2.36)	0.049* (1.85)	0.058** (2.20)	0.051* (1.70)	0.056* (1.90)	0.052* (1.76)
# Options	-0.001* (-1.90)					-0.004 (-0.94)	
# Equity options		-0.009*** (-2.92)					
(1/# Options)			0.038 (0.41)				
(1/# Equity options)				0.418** (2.53)			
Company first					0.058*** (2.69)		
Company position						-0.007*** (-2.78)	
Governance index							0.002 (0.35)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trustee-fixed effects	Yes	Yes	Yes	Yes	No	No	No
Observations	550	536	550	536	373	373	244
Adj. R-squared	0.520	0.548	0.514	0.543	0.473	0.436	0.424

The dependent variable in the regressions is percentage of employee discretionary contributions in company stock. The independent variables of interest are # options, # equity options, company first, company position, and governance index. # options is the number of investment options offered in the plan, while # equity options is the number of equity options offered. Company first is a categorical variable equal to 1 if company stock is the first option listed, and 0 otherwise. Company position is the position of company stock in the list of investment options. Governance index is the corporate governance index constructed by Gompers, Ishii, and Metrick (2003). Stand alone is a categorical variable equal to 1 if the company is a stand-alone firm, and 0 if the company is a conglomerate. Also included in the regression are the firm characteristics of natural logarithm of market equity and book-to-market equity, ln(ME) and ln(B/M). Com match is a categorical variable equal to 1 if the company matches in company stock, and 0 otherwise. The natural logarithm of a measure for wages is included, ln(Wages), as are past returns, and a constant (all unreported). The sample period is 1997–2000. Trustee-fixed effects are included where specified. Both year-fixed effects and industry-fixed effects at the 2-digit SIC code level are included in all regressions. Standard errors are robust and clustered at the firm level. *t*-statistics calculated using the clustered standard errors are in parentheses.

*, **, *** denote significance at the 90%, 95%, and 99% levels, respectively.

trustee has fiduciary responsibility over the plan, and thus helps the firm to choose the menu of investment options. Two firms with the same number of options may have vastly different qualities of options (e.g., high-fee funds versus low-fee funds), which will not be captured solely by # Options. To attempt to control for this, I include trustee-fixed effects in columns 1–4.

Examining columns 1–6 of Table 6, although these plan characteristics do have an effect on allocation, they cannot explain the differing investment choices of stand-alone and conglomerate employees. Stand Alone remains large and significant in every specification considered. I also run regressions, including variables, for the existence and size of defined benefit pension plans for the company (defined benefit pension data are obtained from COMPUSTAT).

These outside pensions do not significantly affect employee investment into company stock in their 401(k) plans.²⁹

4.3.2 Takeover defense. A takeover defense motive may be driving management to attempt to affect the amount of company stock held by employees. To test whether this is driving my results, I include a number of factors found to affect takeover likelihood (Dyl and Hoffmeister, 1981; Comment and Schwert, 1995; and Rauh, 2006). The most robust of these factors has been firm size: the larger the target firm, the less likely the takeover is to be successful.³⁰ The last column of Table 6 shows, as in all the regression specifications, that size is positive and significant. This is in contrast to the prediction of a takeover defense motive: larger firms have a lower probability of being taken over, so their managers should need to induce less employee ownership of company stock. In addition to explicit firm characteristics, management and legislators can take alternate actions to affect takeover likelihood. State laws and firm-level shareholder rights restrictions can be passed to decrease the probability of takeover. I use the Gompers, Ishii, Metrick Index (Gompers, Ishii, and Metrick, 2003) of corporate governance to proxy for the level of shareholder rights restrictions. This index has a high value for firms that have relatively weak shareholder rights, and a low value for firms with relatively strong shareholder rights. Thus, firms with a high level of the index should need less employee stock ownership as a guard against takeovers. The last column of Table 6 contains the index.³¹ Controlling for other firm and plan characteristics, the governance index does not seem to be a significant driver of employee investment into company stock.³² Further, stand alone is nearly unchanged in magnitude and significance, suggesting that a takeover defense motive cannot explain the variation in stand-alone and conglomerate employee investment decisions into company stock.

²⁹ The categorical variable *DB Plan*, which is equal to 1 if the firm has a defined benefit plan in addition to the 401(k) plan and 0 otherwise, and the variable *DB Size*, which is the size of defined benefit plan assets (in millions of dollars), were included in the regressions of Table 6. Neither had a significant effect on the percentage allocated to company stock, nor did they affect the magnitude or significance of the stand-alone variable.

³⁰ In addition to size, there is mixed evidence on characteristics, such as the market-to-book ratio, sales growth, and debt-to-equity ratio of firms having marginal explanatory power. Of these, book-to-market ratio seems to be the strongest, in that firms with a higher book-to-market ratio (perhaps distressed) have a higher probability of being taken over successfully.

³¹ As there are only data on the Governance Index and governance characteristics for 1998 and 2000, only these two years of the sample are used in these regressions.

³² I also run this regression using only the Delay index of governance, as it has been argued (Coates, 2000; and Gompers, Ishii, and Metrick, 2003) that this index is the most pertinent to takeover defense. I find that Delay does have a negative coefficient (as predicted by a takeover defense motive), although it is not statistically significant.

5. Cost and Benefit of Loyalty

5.1 Cost to employees

There are a number of methods for estimating the cost to investors of concentrating their portfolios into company stock. Brennan and Torous (1999) define utility over final wealth, and use a certainty equivalent loss to estimate the loss from an undiversified portfolio. Meulbroek (2003) assumes an instantaneous CAPM and log normal returns to derive the loss to investors from holding company stock instead of a more diversified portfolio. I use a simple method of loss in Sharpe Ratio to estimate the cost of the loyalty bias to these employees in terms of foregone return for their given level of risk. I use this method to also give a comparison of the cost of the loyalty bias to the cost of the home bias for domestic investors.

The loyalty bias in company stock investment is the value of overweighting in own-company stock due to loyalty to the firm, controlling for other firm and plan characteristics. Taking a conglomerate and a stand-alone employee and controlling for all other firm and plan differences, I measure this as the difference in their investment choices. I use the regression estimates of Table 3 to do this. Thus, I attempt to take employees in the same situation by roughly equating the characteristics of the firm and investment plan that they face, and measure the marginal effect of being in a stand alone or a conglomerate. This estimate is in Panel A of Table 7. For simplicity, I assume that the other assets of the plan are in a market index fund for employees of both stand alones and conglomerates. To find the amount invested in company stock by the employees, I use the model estimates by plugging in the mean values of all plan and firm-control variables and using a value of the stand-alone variable of 0 for conglomerate employees and 1 for stand-alone employees. I then calculate the average monthly return and standard deviation of monthly returns for the sample of conglomerate and stand-alone firms, and for the value-weighted market index, over my sample period. In addition, I calculate the covariance of monthly returns of the market index separately with both conglomerate firm returns and stand-alone firm returns, and the average monthly return on the three-month T-bill (labeled Risk-Free Rate). The Sharpe Ratios for the portfolios of the stand-alone and conglomerate employees, in addition to the market index, are in Panel A. The difference in Sharpe Ratios of 0.0320 represents a 23% higher Sharpe Ratio³³ for employees of conglomerates than those of stand alones.³⁴ I then calculate the Sharpe Ratio that an employee of a stand-alone firm could achieve with the

³³ In this analysis, neither outside wealth (beside the proxy for wage that is included as a rough proxy for wealth) nor correlation of labor income with company stock is included. Assuming that wealth is distributed equally across stand-alone and conglomerate employees, the difference in Sharpe Ratios between stand alones and conglomerates is likely to be even larger, as stand-alone employees' labor income correlation with company stock return is likely higher than for employees of conglomerates.

³⁴ Note that both employees of conglomerates and of stand alones would be better off (in terms of Sharpe Ratio), by investing 100% in the market index. This is a feasible discretionary contribution allocation for almost all employees, as nearly every plan had a market index fund investment option.

Table 7
Cost to employees of loyalty

	Stand alone	Conglomerate	Market
Panel A: Cost to employees of loyalty			
ComStock% Est. from Table 2 – Column 2	0.2138	0.1129	
Avg. monthly ret. of firm	0.0095	0.0129	0.0134
Avg. monthly std. dev. of firm	0.1654	0.1449	0.0522
Avg. cov. of mon. ret. w/market	0.0023	0.0025	
Risk-free rate	0.00425		
Sharpe Ratio (SR)	0.1364	0.1684	0.1753
SR of stand alone w/o loyalty bias	0.1602		
Cost of loyalty in SR terms (C)	$0.1602 - 0.1364 = 0.0237$		
C*std. dev. of returns	0.00145		
Cost of loyalty in annualized	1.75%		
Foregone returns			
Panel B: Cost of home bias			
	Domestic	Global	
Avg. monthly ret.	0.0126	0.0142	
Avg. monthly std. dev.	0.0443	0.0451	
Risk-free rate	0.005502		
Sharpe ratio (SR)	0.161	0.193	
Cost of home bias in SR terms (C)	$0.193 - 0.161 = 0.032$		
C*std. dev. of returns	0.0014		
Cost of home bias in annualized	1.68%		
Foregone returns			
Panel C: Cost of loyalty in retirement savings			
	Employee with loyalty bias	Employee without loyalty bias	Market
ComStock% est. from Table 2 – Column 2	0.2138	0.1129	
Market%	0.7862	0.8871	
Avg. monthly ret. of firm	0.0101	0.0101	0.0095
Avg. monthly std. dev. of firm	0.1559		0.0443
Annual deferred saving	\$3,320		
Avg. annual. risk adj. ret. of portfolio	0.1214	$0.1214 + 0.0175 = 0.1389$	
Retirement savings after 20 yrs.	\$272,694	\$339,788	
Cost in dollars	\$67,094		
Cost in percent of retirement savings	19.75%		

Panel A presents an estimate of the cost of loyalty to employees. Summary statistics were calculated on the sample of firms used in the paper from 1997 to 2000. The value-weighted market index summary statistics were calculated from 1997 to 2000. The Risk-free rate is the average one-month yield on the 90-day T-bill, over the period 1997–2000, and was obtained from the Federal Reserve historical files on T-bill rates. Panel B presents an estimate of the cost of home bias to US domestic investors. The summary statistics are estimated from 1990 to 2001, and are taken from Eun and Resnick (2003). Panel C presents an estimate of the cost of loyalty to an employee. The employee is assumed to be aged 45, have 20 years until retirement, and to defer the sample average amount into a retirement account each year, \$3,320. The expected returns of the stand-alone firm and of the market are estimated using the period 1990–2003.

same investment allocation as an employee of a conglomerate. The difference in Sharpe Ratios between stand-alone employee investment choice with and without the loyalty bias is 0.0237, which is a 17% difference in Sharpe Ratios. I multiply 0.0237 by the standard deviation of the stand-alone employee's portfolio, which gives a measure of the foregone return incurred because of the investment bias of loyalty. Translating this into an annual return, the loyalty bias results in foregone returns of 1.75% per year for stand-alone employees.

I then separate Sharpe Ratio loss from the loyalty bias into its two components: mean and standard deviation. As might be expected (*ex ante* there is no reason to think stand-alone firms outperform the market), the majority of the Sharpe Ratio loss is from the variance term. Seventy percent of the total Sharpe Ratio loss of 0.0237 is from the variance term and the residual 30% is from the mean.

To put this result into perspective, consider the cost to investors of the more familiar home bias. Using a similar analysis as above, the Sharpe Ratios of both the optimal domestic portfolio and the optimal global portfolio are in Panel B of Table 7. These figures are calculated from monthly returns using the sample 1990–2001 (Eun and Resnick, 2003). The difference in these Sharpe Ratios of 0.032 represents a 20% higher Sharpe Ratio attainable by considering global investment options. This translates into a cost to domestic investors of 1.68% per year of not investing in global equities. Comparing this to the cost of the loyalty bias, the loyalty bias results in foregone returns larger (6% larger) than the foregone returns from the home bias.³⁵

Consider an employee who is aged 45, has 20 years until retirement, and that defers \$3,320 per year (sample average) into a retirement plan. The cost of the loyalty bias to her will be the compounded foregone return from investment. Assuming that the employee faces until retirement the average monthly return of a stand-alone firm since 1990,³⁶ the amassed retirement income with and without the cost in foregone return per year of 1.75% is calculated in Panel C. From Panel C, the employee faces a decrease in retirement income of nearly 20% from the loyalty bias in investment.

5.2 Benefit to firms

It is often exuded that loyal workers are a desirable characteristic and benefit to the firm. This benefit, however, is difficult to quantify. In this section, I test for one possible benefit of loyal employees, an effect on wages. When employees have greater loyalty to a firm, it may be expected that the firm has more discretion than otherwise in decisions regarding the employees. This is because the employees are more reluctant to sever with the firm because of the stronger ties developed. I find that, controlling for other firm characteristics, the more loyal employees are to a firm (as measured by the percentage allocated to company stock), the lower wage the firm needs to pay them. Specifically, a one-standard-deviation increase in percentage allocated to company stock decreases the wage bill per employee of the firm by \$2,774 ($t = 1.74$).³⁷ This represents a roughly 5% decrease in the wage bill per employee. The result

³⁵ The calculation of the cost of home bias did not include other international frictions, such as exchange rate risk, government appropriation risks, capital controls, and tax burdens. Including these frictions would likely shrink the cost to domestic investors of the home bias (by reducing the benefit of foreign investment), resulting in a wider gap between the cost of the loyalty bias and home bias to these employees.

³⁶ Other sample periods and assumed expected rates of return yield similar results.

³⁷ These regressions are not included here, but are available upon request.

suggests that a tangible benefit of lower wage costs may exist from having more loyal employees. There are a number of caveats to these regressions. First, there is a relatively small sample of firms for which wage expense data are available. Second, there are likely to be a number of other factors affecting wage determination, which may be correlated with the loyalty result.

6. Conclusion

There has been a shift in employer-sponsored retirement plans from defined benefit plans to defined contribution plans. Along with this shift has been a shift in dependence on defined contribution plans, with over 50% of 401(k) participants having 401(k) assets as their sole financial investment. What, then, drives employees' portfolio decisions in these defined contribution plans? I find support for employee loyalty affecting this portfolio choice problem. I find systematic investment decisions of employees both between firms and within employees of the same firm that support the loyalty explanation. These contribution results cannot be explained by, and in some cases are even opposite to, that which would be predicted by portfolio diversification against labor income, an information-based explanation, a takeover defense mechanism, framing effects, or excessive extrapolation of past returns. The cost of this loyalty bias is potentially large for these employees, larger than the cost of home bias, amounting to a possible 20% loss in retirement income.

There are two paths of further research on loyalty in investment. The first is deciphering the mechanism that loyalty plays in individual choice. Loyalty could be affecting individuals' judgments through a direct increase in utility, or through a bias in probability forecasts (or both). Although the two may make observationally equivalent predictions in some contexts, they are important to distinguish between, as loyalty may have a large effect on investor choice and investor wealth, and policy implications for dealing with loyalty effects caused by the two mechanisms can be drastically different. The second is identifying additional situations in which loyalty is likely to play a role in investment decisions. For instance, Morse and Shive (2007) find that loyalty to country plays an important role in investment allocation. Loyalty, though, need not be constrained to equity portfolio decisions. Managerial and financial institutions' decision making with respect to labor choice, location of investment capital, and external financing are all decisions in which loyalty may play a substantial role.

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